# Courses of Instruction

## 2000-2001

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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 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 each week, and the third figure indicates the number of clock hours spent in discussion or recitation each week.

**VARIABLE CREDIT COURSES**

VAR indicates variable credit with no minimum credit or no maximum credit indicated.

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

5. **TERM**

F  Taught Fall Semester
S  Taught Spring Semester
SS Taught Summer Session

The courses listed are those which are 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 class schedule and addendum for a listing of courses to be offered in a given term.

The following types of courses do not indicate term; they will be offered when there is sufficient demand: -86, Practicums; -87, Internships; -90, -91, Workshops; -92, -93, Seminars; -94, -95, Independent Studies; -96, -97, Group Studies; -98, Research; and -99, Thesis or Dissertation.

6. **PREREQUISITES**

The class schedule for each term is the best source for determining current prerequisites.

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.

7. **COURSE FEES**

Certain courses carry a special fee which is assessed at the time a student registers for courses. Since the costs are determined annually, course fees may vary from the stated charge in this section. Refer to the class schedule each term to determine current fees.

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 in this publication.
AGRICULTURE COURSES

College of Agricultural Sciences

A CC 116/IECC 116 03(3-0-0). Plants and Civilizations. F, S. Credit not allowed for both A/A CC 116 and IE/IECC 116. Worldwide origins of plants and produce as basis for food, spices, perfumes, medicine, art, mythology, religion, wars, exploration, slavery.

A 140 03(4-2-0). Technology in Agriculture. F
Computer concepts and terminology. PC operating systems, Word tools, e-mail, presentation technology, word processing, spreadsheet, and database.

A CC 192 03(1-0-2). Orientation to Agricultural Systems. F
Freshman inquiry course in agriculture. Information and skills necessary to succeed in majors in the agricultural sciences. Introduction to interdisciplinary systems thinking.

A 224/ NR 224 03(2-0-1). Integrated Ranch Management I. F, S. Prerequisite: A/A CC 192 or first-year seminar. Credit not allowed for both A 224 and NR 224. Introduction to integrated ranch system concepts through describing complex organizations and building decision support systems.

* A 240A-B 02(2-0-1). Basic Agricultural Skills. F, S. Special fee, $20 per subtopic.
Livestock and crop skills practices and their economic importance. Laboratory practice aimed at skills needed in successful enterprise production. A) Basic agricultural skills I. B) Basic agricultural skills II.

A 244A-E 02(1-2-0). Topics in Agricultural Mechanics. F, S, SS. Offered only off-campus.

A CC 270/IECC 270A 03(3-0-0). World Interdependence-Population and Food. S. Credit not allowed for both A/A CC 270 and IE/IECC 270A.
Survey of world population and food; emphasis on understanding the problems and opportunities in a world context.

A 300 02(1-0-0). Issues in Agriculture. F. Also offered online.
Scientific, technical, cultural, and social issues facing agriculture, and their interrelationships.

A 320A-F 03(2-0-0). Computer Applications in Agriculture. S. Prerequisite: A 140 or BD 150 or CS 110.

A 324/NR 324 03(2-0-1). Integrated Ranch Management II. S. Prerequisite: A 224/NR 224. Credit not allowed for both A 324 and NR 324. Application of enterprise planning analysis for use in ranch resource management. Continued emphasis on interdisciplinary systems analysis.

A 330/PL 330 03(3-0-0). Agricultural Ethics. S, SS. Credit not allowed for both A 330 and PL 330. Basic concepts in ethics and their application to agriculture.

A 346 03(3-0-0). Principles of Cooperative Extension. F. Also offered as correspondence course.
Traditional and contemporary delivery systems of Cooperative Extension emphasizing structures of nonformal education.

A 387A-B Var [1-12]. Internship.

A 465 03. Pesticide Management. F, S, SS. Offered as correspondence course only.
Reasons for and safe correct pesticide use.

A 466 01. Management of On-Farm Stored Grain. F, S, SS. Offered as correspondence course only.
Basic principles of grain storage and management strategies for insects and fungi; chemical controls and safe pesticide use.

A 467 02. Management and Control of Wood-Destroying Pests. F, S, SS. Offered as correspondence course only.
Wood-destroying agents; wood preservative chemicals and treatment; industry regulations; labels; safety; environmental concerns.

A 468 03. Management and Control of Turfgrass Pests. F, S, SS. Offered as correspondence course only.
Classification of turfgrass pests; pest management, control; environmental concerns, industry regulations; safety; skill in pesticide applications.

A 475 03(3-0-0). Space Agricultural Science. S. Prerequisite: Combined total of 25 credits of basic and/or applied sciences.
Agricultural sciences in space applications, focusing on plant and animal growth in closed environments.

A 487 Var [1-12]. Internship. Prerequisite: A 346.

A 492A-B Var [1-3]. Seminar. Prerequisite: A) A 346; concurrent reg. in A 487.

A 495 Var. Independent Study.
A 496A-E Var [1-12]. Group Study.

A 545/BZ 545 02(2-0-0). Plant Tissue Culture. F. Prerequisite: BZ 440. Credit not allowed for both A 545 and BZ 545.
Theory, technology, and techniques of cell, organ, tissue, and protoplast culture of plants.

A 546/BZ 546 01(0-2-0). Plant Tissue Culture Laboratory. F. Prerequisite: A 545/BZ 545 or concurrent registration. Credit not allowed for both A 546 and BZ 546.
Laboratory techniques of cell, organ, tissue, and protoplast culture of plants.

A 547 04(2-0-2). Delivery of Cooperative Extension Programs. F. Prerequisite: A 346 or concurrent registration. Also offered as correspondence course.
Methods, techniques, and procedures in planning, implementation, and delivery of Cooperative Extension programs.

A 570/VS 570 02(2-0-0). Issues in Animal Agriculture. F. Credit not allowed for both A 570 and VS 570.
Issues that have a major impact on the direction of changes in animal agriculture.

A 587 Var. Internship.

A 692 01(0-0-1). Seminar.

A 695 Var. Independent Study.

A 698 Var. Research.
ASTRONOMY COURSES

Department of Physics
College of Natural Sciences

AACC 100 03(3-0-0). Introduction to Astronomy. F, S. SS.
Description of the various objects found in the heavens as well as the principles and techniques employed in investigations of these objects.

AACC 101 01(2-0-0). Astronomy Laboratory. F, S. Prerequisite: AA/AACC 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: M/M CC 124, M/M CC 126; PH/PHCC 110 or PH/PHCC 121 or PH/PHCC 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: M/M CC 124, M/M CC 126; PH/PHCC 110 or PH/PHCC 121 or PH/PHCC 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: M/M CC 124, M/M CC 126; PH/PHCC 110 or PH/PHCC 121 or PH/PHCC 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.

ADULT EDUCATION COURSES

School of Education
College of Applied Human Sciences

AD 495 Var. Independent Study-Adult Education.

AD 520 03(0-3-0). Adult Education I. F.
Philosophical foundations, a description of program service areas, adult participation trends, and current issues.

AD 586 Var. Practicum.
Participation in field experiences relevant to study program and objectives.

AD 590-A C Var. Workshop.

AD 620 03(0-9-0-3). Processes and Methods. F. Prerequisite: AD 520 or AD 624
Processes and methods including helping theories used by adult learning facilitators.

AD 624 03(0-0-3). Adult Teaching and Learning I. F. Prerequisite: AD 520 or written consent of instructor.
Using theory and best practices to design and deliver instruction for adults.

AD 629 03(0-0-3). Program Development. S. Prerequisite: AD 520.
Models for planning, implementing, and evaluating programs for adult learners.

AD 687A-B Var. Internship.
Career or job fieldwork experience with an adult education institution, agency, or program. A) Adult education. B) Community education.

AD 692 Var. Seminar-Adult Education.

AD 695 Var. Independent Study.

AD 698 Var. Research.


AD 724 03(0-0-3). Adult Teaching and Learning II. F. Prerequisite: AD 624.
Adult teaching and learning, alternative delivery systems, performance technology, and faculty evaluation.

APPAREL AND MERCHANDISING COURSES

Department of Design and Merchandising
College of Applied Human Sciences

AM 101 03(3-0-0). Fashion Industries. F, S.
Development, organization, and trends of domestic and foreign fashion industries.

AM 140 03(0-6-0). Apparel Design. F. Special fee, $30.
Analysis and design of apparel including skill development in technical drawing and rendering using traditional media.

AM 141 04(2-4-0). Apparel Production I. S. Special fee, $15.
Analysis of apparel and garment components in areas of pattern development, construction, and quality standards.

AM 240 03(0-6-0). Computer-Aided Apparel Design. F.
Apparel design using the computer to generate drawings for fabric, graphic logo, and apparel.

AM 241 03(1-4-0). Apparel Production II. F. Prerequisite: AM 141.
Special fee, $15.
Production processes of sewn textile products, flat pattern, pattern grading, marker making, and writing specifications.

AMCC 250 03(3-0-0). Clothing, Adornment and Human Behavior.
Psychological, sociological and cultural factors influencing clothing and adornment.

AM 265 03(3-0-0). Product Evaluation. F.
Evaluation of products and distribution channels.

AM 270 03(3-0-0). Merchandising. S. Prerequisite: EC/ECCC 202.
Buying procedures, advertising, pricing, and channel members in relation to consumer demand.
AM 290 Var. Workshop.

AM 311 03(3-0-0). Advanced Textiles. S. Prerequisite: CVCC 104, DM 120.
Textile product serviceability; effect of fiber structure on properties and performance; new developments.

AM 339 03(3-0-0). Textile and Apparel Economics. F. Prerequisite: DM 120 and EC/ECCC 202.
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.
AM 240, 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. S. Prerequisite: AM 240. Special fee, $35.
Computer-aided technology and multicultural research used to create repeat fabric designs; fabric printing using silkscreen.

AM 343 03(1-4-0). Fashion Illustration. F. Prerequisite: AM 140, AR 135.
Techniques of fashion illustration and sketching as practiced in apparel design and production.

AM 345 03(0-6-0). Draping Design. F. Prerequisite: AM 241. Special fee, $35.
Apparel designing through basic draping techniques.

AM 363 03(3-0-0). Historic Costume. S.
Influence of social, political, and economic conditions on costume of predynastic Egypt to present time.

AM 366 03(3-0-0). Merchandising Promotion. S.
AM 270 or BK 305
Activities used to influence sale of merchandise and services; promote trends and ideas.

AM 371 04(3-2-0). Merchandising Systems. F. Prerequisite: AM 270 or DM 360/BK 360, BA 205.
Business mathematics and current practices related to acquisition, negotiation, distribution, and sale of merchandise.

AM 384 Var. [1-3]. Supervised College Teaching. F, S, SS

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

AM 446 03(1-4-0). Apparel Design and Production. F. Prerequisite: AM 240, AM 341. Special fee, $15.
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. F. Prerequisite: AM/AMCC 250 or FY/PYCC 100 or written consent of instructor.
Psychological and social factors influencing clothing and its effect on others.

AM 460 03(3-0-0). Historic Textiles. F.
Historic development of textiles from a global perspective, focusing on textiles produced by diverse cultures.

AM 466 03(3-0-0). Retail Environment Design and Planning. F. Prerequisite: AM 270; DM 130.
Application of design/merchandising principles to retail selling environments, including traditional store design/layout, direct mail, and Websites.

AM 472 03(3-0-0). Consumer Behavior. S. Prerequisite: BK 305 or DM 305. Credit not allowed for both AM 472 and BK 364.
Analysis and evaluation of consumer behavior in relation to areas of merchandising and consumer sciences.

AM 479 03(0-3-0). Merchandising Policies and Strategies. F. Prerequisite: AM 270, AM 330, AM 366, AM 371, or written consent of instructor.
Examination of merchandising environment as influenced by its structure, and economic, legal, demographic, and psychographic trends.

AM 490A-D Var. Workshop.

AM 495A-D Var [1-3]. Independent Study.

AM 496A-D Var. Group Study.

AM 521 04(1-4-1). Advanced Textile Analysis. F. Prerequisite: AM 321.
Intensive investigation of selected fiber and fabric properties using standard testing procedures and analyses techniques.

AM 530 03(3-0-0). International Trade in Textiles and Apparel. F.
Prerequisite: AM 270, DM 120.
Economic analysis of textile and apparel industries focusing on consumption and international trade.

AM 540 03(1-4-0). Advanced Apparel Design and Production. F. Prerequisite: AM 341.
Computer-aided design technology used in apparel sketching, pattern drafting, grading, and marker making.

AM 550 04(4-0-0). Sociocultural Concepts of Clothing. F.
Prerequisite: AM 450.
Clothing as communication and projection of personality. Review of research.

AM 563 03(3-0-0). Advanced Historic Costume. S.
Prerequisite: Twelve credits of art history, history, and/or textiles and clothing. Theory and research in Western costume history.

AM 590A-B Var. Workshop.

ANIMAL SCIENCE COURSES

Department of Animal Sciences
College of Agricultural Sciences

AN 100 03(3-0-0). Animal Sciences. F, S
Principles of growth, muscle biology, anatomy, endocrinology, genetics, behavior, health, and management applied to the production of livestock.

AN 143A-B 02(0-4-0). Elementary Equitation. F, S, SS. Special fee, $350 per subtopic. Basics of horsemanship; proper horse handling procedures.
A) Western. B) English.
AN 145 01(0-2-0). Packing and Outfitting. F. S. Prerequisite: AN 143A or written consent of instructor. Special fee, $350. Outfitting and packing the horse; hitches, knots, and horse care; planning pack trips, setting up camp. Overnight pack trip included.

AN 192 01(0-0-1). Animal Sciences Preprofessional Seminar. Long-range academic planning, professional opportunities, and career planning.

AN 200 02(2-0-0). Poultry Science and Production. F, S. SS. Also offered as correspondence course. Application of biological science and management in production of low-cost, high-quality animal protein for human consumption.

AN 220 02(2-0-0). Feeds and Feeding. F, S. Prerequisite: AN 100. Understanding of feedstuffs; nutrients and their functions; and feed practices for all physiological stages of livestock.

AN 240 03(2-2-0). Equine Management. F. Equine industry, breeds, selection, form to function, care and management, soundness, health, reproduction, feeding and facilities.

AN 241 03(2-0-0). Equine Behavior. S. Understanding of horse behavior; study of ethology and learned behavior.

AN 243A-B 02(0-4-0). Intermediate Equitation. F, S. Prerequisite: AN 143A-B or equivalent skills. Special fee, $450 per subtopic.

AN 245 02(2-2-0). Equine Evaluation. S. Special fee, $10.


AN 286 02(1-2-0). Livestock Practicums. Prerequisite: AN 100 or equivalent experience. Livestock breeds and terminology; classification of feedstuffs; livestock handling and care; basic animal management techniques; hands-on experience.

AN 292 01(0-0-1). Career Identification and Preparation Seminar. F. Career opportunities in animal sciences. Communication with industry leaders in student's anticipated career areas.

AN 300-T. Topics in Animal Sciences. F, S. Prerequisite: AN 100. Credit not allowed for both AN 300B and EN 300.

AN 310 03(3-0-0). Animal Reproduction. F. S. Prerequisite: AN 230/PS 230. Anatomy and physiology of the reproductive system; causes of reproductive failure in farm animals; methods of improving reproductive performance.

AN 311 01(0-2-0). Bovine Artificial Insemination. Special fee, $100. Proper technique for artificially inseminating cattle as well as an overview of reproductive anatomy and physiology.

AN 320 03(3-0-0). Principles of Animal Nutrition. F. S. Prerequisite: AN 286. Understanding of nutrients and nutrient function required to support animal life through all physiological states.

AN 322 02(1-0-0). Basic Nutrition for Pets. SS. Also offered as correspondence course. Understanding of specific requirements, feeding practices, food sources and management for companion animals (dogs, cats, birds, fish, reptiles, etc.).

AN 330 03(3-0-0). Principles of Animal Breeding. F. S. Prerequisite: Three credits in statistics. Genetic principles underlying animal improvement; elementary population genetics, heritability, systems of mating, selection.

AN 340 03(0-4-0). Horse Training Laboratory I. F. Prerequisite: AN 243D or equivalent skills and written consent of instructor. Special fee, $450.

AN 341 03(0-4-0). Horse Training Laboratory II. S. Prerequisite: AN 340. Special fee, $450.


AN 344 02(0-4-0). Equine Performance Events. S. Special fee, $450.

AN 345 02(2-0-0). Farrier Science. F. S. Prerequisite: AN 240 or equivalent experience. Anatomy and physiology of horse's foot. Principles of trimming and shoeing; therapeutic shoeing.

AN 346 03(3-0-0). Equine Disease Management. F. S. Prerequisite: AN 230/PS 230. Caretending and common diseases of horses.


AN 360/FT 360 03(3-0-0). Principles of Meat Science. F, S. Prerequisite: CC 107 or CC 111. Credit not allowed for both AN 360 and FT 360.

AN 371 03(3-0-0). Commercial Poultry Industry. S. Prerequisite: AN 100 or AN 200 or FT 110. Also offered as correspondence course. Interrelated, unique aspects of modern poultry industry comparing specific commercial poultry production operations.
AN 372 03(2-2-0). Sheep Production. S. Prerequisite: AN 250, AN 310, AN 320, AN 330.
Sheep production under farm and ranch conditions; products, breeds, breeding, nutrition, reproduction, and management systems.

AN 375 03(3-0-0). Computerized Livestock Records Management. F, S. Prerequisite: CS 110.
Effective use of computers and data base management for management of livestock records; emphasis on horses and beef cattle.

AN 376 03(2-3-0). Dairy Farm Operations. S. Prerequisite: AN 310, AN 320, AN 330.
Integration of nutrition, genetics, physiology, and economics for management decisions of dairy farm operations and production and marketing of milk.

Current production practices applicable primarily to commercial cow-calf and feedlot producers.

AN 384 Var [1-5]. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course.

AN 386A-C. Equine Practicum. B) Special fee, $30; C) Special fee, $10.
A) Equine training and management 02(1-2-0) B) Equine reproductive management 02(1-2-0) C) Equine farrier management 01(0-2-0).

Digestive physiology and nutritional requirements. A) Ruminants. B) Nonruminants.

AN 422 03(3-0-0). Animal Metabolism. F. Prerequisite: C 245, C 246 or C 243, C 244.
Nutrient digestion, absorption, transport and metabolism in monogastric and ruminant domestic species as affected by physiological changes.

AN 430 02(1-2-0). Applied Animal Breeding. S. Prerequisite: AN 330.
Planning and evaluating improvement program designed to direct genetic changes in livestock.

AN 440 02(2-0). Equine Production and Industry. S. Prerequisite: AN 240, AN 346, AN 444, AN 446.
For students planning a career in the horse industry; management of facilities, production systems, personnel, marketing, and biological systems.

AN 442 02(0-4-0). Riding Instructor Training. F, S. Prerequisite: AN 343A or B.
Teaching techniques; theory; handling of large mounted groups, beginner through advanced levels.

AN 444 03(3-0-0). Equine Reproductive Management. S. Prerequisite: AN 310. Special fee, $25.
Anatomy and physiology of genital tract, estrus detection, control of cycle, artificial insemination, infertility, stallion management.

AN 446 02(2-0-0). Equine Nutrition. F. Prerequisite: AN 320.
Digestive physiology, nutrition and related diseases of the horse.

AN 460/FT 460 03(2-2-0). Meat Processing. F. Prerequisite: An 360/FT 360. Credit not allowed for both AN 460 and FT 460.
Formulation, processing, and analysis of meat products.

AN 474 03(2-2-0). Swine Production. F. Prerequisite: AN 250, AN 310, AN 320, AN 330.
Production of purebred and commercial swine; breeds, breeding, feeding, marketing, and management.

AN 475 02(2-0-0). Travel Abroad-Australian Animal Agriculture. F, S, SS.
Onsite evaluation of Australian animal agriculture systems with emphasis on production, marketing, and management.

AN 476 03(3-0-0). Beef Feedlot Management. F. Prerequisite: AN 320.
Feedlot facilities; nutrition; procurement, merchandising, handling, processing cattle; health care; custom feeding, managerial duties.

AN 477 02(2-0-0). Incubation and Hatching. F. Prerequisite: BY 103 or BI/BI CC 110.
Embryonic development, flock and hatchery management, hatchery and incubator design.

AN 478 03(2-0-0). Beef Production and Management. F. Prerequisite: AN 250, AN 310, AN 320, AN 330.
Beef production as related to consumer through feedlot segments. Major emphasis on cow-calf-management.

AN 487 Var. Internship.

AN 492 01(1-1-1). Management Decisions Seminar. Prerequisite: AN 292.
Integration of information, decision making, problem solving, and issue management applied to animal- and equine-related industries.

AN 495 Var. Independent Study.

AN 496 Var [1-5]. Group Study.

AN 500 Var [1-6]. Recent Developments. SS. Prerequisite: Fifteen credits in animal sciences.
Recent developments in animal science, avian science, and food technology.

AN 510 03(2-2-0). Bovine Reproduction Management. F. Prerequisite: AN 310.
Role of reproduction in economic efficiency of cattle production systems. Causes of delayed breeding and nonpregnancy, abortion and perinatal mortality.

AN 520 03(3-0-0). Applied Comparative Nutrition. F. Prerequisite: AN 320 or FN 550 and FN 551.
Comparative digestion strategies and mechanisms of nutrient utilization for terrestrial vertebrates: livestock, pets, wildlife, and zoo animal models.

AN 560 03(3-0-0). Issues in the Meat Industry. F. Prerequisite: AN 100.
Current issues in U.S. meat production, processing, marketing, and consumption.

AN 565 03(3-0-0). Interpreting Animal Science Research. S. Prerequisite: AN 100; ST/STCC 311 or ST/STCC 307 or EH/EHCC 307.
Designing, conducting, analyzing, and reporting of animal science research.

AN 567 03(2-0-1). Meat Safety, HACCP, and TQM. S. Prerequisite: Written consent of instructor.
Control of health problems in meat products through hazard analysis critical control point (HACCP) and total quality management (TQM) practices.
"AN 570 03(3-0-0). World Animal Agriculture. S. Prerequisite: AN 100. Production methods for selected countries of first, second, and third world. Effects of food supplies, climate, and market demand upon choice of management and breeds.

AN 575 02(2-2-0). Systems Analysis in Animal Science. S. Prerequisite: AN 375. Use of systems analysis and computers in multidisciplinary approach to solving of animal science and related problems.

AN 578 03(2-2-0). Beef Cattle Management Decisions. S. Prerequisite: AN 478. Integration of principles of nutrition, meats, breeding, herd health, etc. into a total management program to meet needs of beef industry.

AN 587 Var [1-9]. Internship.

"AN 610 02(2-0-0). Hormonal Regulation of Growth. S. Prerequisite: PS 501 or written consent of instructor. Cellular and molecular regulation of animal growth by hormones and growth factors.


AN 630 04(3-0-1). Population Genetics. F. Prerequisite: AN 330 or SC 330; ST/STCC 301. Forces which change genetic composition, mean, and variability; mating systems; heritability and genetic correlation; selection indexes.

"AN 631 03(2-2-0). Selection Index Theory. S. Prerequisite: AN 630, ST/STCC 304, or written consent of instructor. Quantitative methods for genetic evaluation: selection index theory and introductions to best linear unbiased prediction.

"AN 633 02(2-0-0). Physiological Genetics. S. Prerequisite: SC 330. Mechanisms of expression of genetic variation related to internal and external environment; not restricted to any species or organism.

AN 660/FT 660 03(1-0-2). Advanced Meat Science. S. Prerequisite: AN 350/FT 360 or AN 422 or BC 301 or FN 350. Credit not allowed for both AN 660 and FT 660. Anatomical, biochemical, histological, and physical factors associated with transformation of muscle into meat.

AN 699 Var. Thesis.

"AN 710 03(2-2-0). Growth and Body Composition. SS. Prerequisite: PS 501. Growth, development of animals; chemical composition, application to meat production and fitness. Techniques for in-vivo estimation.

"AN 720 03(3-0-0). Nutritional Energetics. F. Prerequisite: One graduate-level nutrition course or written consent of instructor. Dietary energy use to meet animal requirements for maintenance, growth, pregnancy, and lactation; environmental, nutritional, and physiological effects.

"AN 725 03(3-0-0). Rumen Metabolism. S. Prerequisite: One graduate-level nutrition course or written consent of instructor. Microbial degradation, transformation, and synthesis of ingested nutrients, feed particle passage kinetics in the rumen.

"AN 730 03(3-0-0). Advances in Cattle Breeding. S. Prerequisite: AN 330, ST 302. Literature and research methods in beef cattle breeding.

"AN 731 03(2-0-1). Parameter Estimation for Genetic Prediction. F. Prerequisite: AN 631. Models used in analysis of livestock data and restricted maximum likelihood procedures for mixed models.

AN 784 Var. Supervised College Teaching. F, S, SS.


AN 795 Var. Independent Study.

AN 799 Var. Dissertation.

ANTHROPOLOGY COURSES

Department of Anthropology
College of Liberal Arts

APCC 100 03(2-0-0). Introductory Cultural Anthropology. F, S. Human societies and their cultural settings; variation in beliefs, social customs, and technologies; human differences in anthropological terms.

APCC 101 03(1-0-2) Cultures of the World. F, S. Interactive introduction to a broad variety of cultures using anthropological methods of investigation.


APCC 121 01(0-2-0). Human Origins and Variation Laboratory. F, S. Prerequisite: APCC 120 or concurrent registration. Labs demonstrating genetic and evolutionary processes, comparative skeletal anatomy, human evolution through fossil casts, and modern human variation.

APCC 140 03(3-0-0). Introduction to Prehistory. F, S, SS. Origins of human society from the Stone Age to urban civilization using architecture, art, tools, and other material remains.

APCC 141 03(1-0-2) Humans in Prehistory. Contemporary methods used by archaeologists; prehistoric human cultural developments world wide.

APCC 200 03(3-0-0). Cultures and the Global System. F, S. Analyze diversity, cultural responses, and adaptations of smaller-scale societies to emerging global trends.

AP 252 03(2-0-2). Archaeological Investigation. S. Investigation of the archaeological record, how the record is formed, and how archaeological data are analyzed and interpreted.

AP 266 02(1-2-0). Introduction to Field Archaeology. F, S, SS. Prerequisite: AP/APCC 140. Field methods including map preparation and interpretation, site location and recording, site excavation, and stratigraphy.

AP 295 Var [1-3]. Independent Study.
AP 300 03(3-0-0). History of Anthropological Theory. F. Prerequisite: AP/APCC 100 or APCC 101 or AP/APCC 200; AP/APCC 140 and APCC 141 or AP 150/APCC 120 and AP 151/APCC 121.

Anthropological theory from its beginnings in 19th century through recent developments in the latter half of the 20th century.

*AP 310 03(3-0-0). Peoples and Cultures of Africa. S. Prerequisite: AP/APCC 100.

Sub-Saharan life styles including marriage and family, traditional government, religion and magic, ecology and economy, art, music, and literature.

*AP 311 03(3-0-0). Peoples and Cultures of the Pacific. S. Prerequisite: AP/APCC 100.

Native cultures of Australia and Pacific Islands; prehistoric migrations; racial, linguistic, and cultural patterns; European contact.

*AP 312 03(3-0-0). Peoples and Cultures of India. F.

Anthropological contributions to the understanding of contemporary India.

AP 315 03(3-0-0). Psychological Anthropology. F. Prerequisite: AP/APCC 100, PY/PYCC 100.

Cross-cultural studies of socialization, sex roles, perception, cognition, ethnosociology, altered states of consciousness, cultural change.

*AP 318/ET 318 03(3-0-0). Peoples and Cultures of the Southwest. F. Prerequisite: AP/APCC 100. Credit not allowed for both AP 318 and ET 318.

Analyze development of cultures of the American Southwest including migration, political incorporation, socioeconomic, and cultural development.

*AP 319 03(2-0-1). Latin American Peasantries. S. Prerequisite: AP/APCC 100.

Sociocultural, economic, and political responses of Latin American peasants to poverty and global processes.

AP 322 03(3-0-0). Religion in Society. F.

Major anthropological theories of religion in "traditional" and "modern" societies.

AP 324 03(3-0-0). Folk Religion. S.

European folk beliefs and their carry-over into America; ghosts, vampires, trolls, elves, saints, rituals, witchcraft, sorcery, folk curses.

*AP 329 03(3-0-0). Cultural Change. F. Prerequisite: AP/APCC 100. Cultural change and evolution emphasizing colonial origins of underdevelopment.

*AP 331 03(3-0-0). Peoples of Latin America. F.

Economic, religious, and social bases of cultural variation as result of both colonization and recent impacts from global restructuring.

*AP 332 03(3-0-0). Peoples of the Caribbean. F.

Cultural variations based on 1) ethnicity, class, and gender identities; 2) colonial legacies; and 3) contemporary economic pressures.

AP 333 03(3-0-0). Food and Culture. F.

Foods and foodways around the world; social roles, religious taboos, traditional technologies, ethnicity, and cuisines.

AP 334 03(3-0-0). Comparative Narrative Traditions. S.

Relationship between narrative traditions and social contexts of their creation.

AP 335 03(3-0-0). Language and Culture. F, S.

Human language and private communication, nonverbal channels, sociolinguistics, and language change.

AP 340 03(3-0-0). Medical Anthropology. S. Prerequisite: AP/APCC 100.

Cultural adaptation to disease; non-Western theories of health and disease: categories, causes, cures; learned roles of patients and healers.

AP 350 03(3-0-0). Archaeology of North America. F. Prerequisite: AP/APCC 140.

Indian life, tools, architecture, religion, food-getting from cultures of 12,000 years ago or earlier until European contact.

*AP 351 03(3-0-0). Archaeology of Europe and Africa. S. Prerequisite: AP/APCC 140.

Human culture, tools, art, religion, social life, subsistence, and palaeoecology from 4 million B.C. to 1200 B.C. in the Old World.

AP 356 03(2-0-1). Forensic Archaeology. F. Prerequisite: AP/APCC 140 or written consent of instructor.

Application of modern archaeological method and theory to crime scene investigation and reconstruction.

AP 359 03(2-0-1). Colorado Prehistory. F.

Human behavioral responses to environmental diversity, cultural adaptation, Pleistocene and Recent climates, anthropogenic environmental change.

AP 370 03(3-0-0). Primate Behavior and Ecology. S. Prerequisite: AP 150/APCC 120 or BZ/BZCC 110.

Behavioral patterns, ecological relationships, and communication of nonhuman primates.

AP 372 03(2-0-0). Human Osteology. F. Prerequisite: AP 150/ APCC 120 or BY/LSCC 102 or BZ/BZCC 101 or BZ/BZCC 110.

Human bones and teeth in a review of functional human evolution.

AP 373 03(3-0-0). Human Evolution. S. Prerequisite: AP 150/ APCC 120 or BY/LSCC 110.

Current topics and debates in human evolution concentrating on biocultural changes in the human lineage.

*AP 374 03(3-0-0). Human Biological Variation. S. Prerequisite: AP 150/APCC 120 or BY/LSCC 102 or BZ/BZCC 101 or BZ/BZCC 110.

Biological diversity of human populations; history of development of race concept.

AP 412 03(3-0-0). Indians of North America. F, S.

Native American peoples, their origins, languages, and cultural variation across the continent.

AP 413 03(3-0-0). North American Indians Today. F, S. Prerequisite: AP/APCC 100.

Contemporary cultural and social problems of American Indians on reservations and in urban centers in United States and Canada.

*AP 414/ET 414 03(2-0-1). Development in Indian Country. F. Credit not allowed for both AP 414 and ET 414.

Critical examination of history, public policy, and tribal strategies for economic development and natural resource management in Indian Country.

*AP 421 03(3-0-0). Comparative Social Organization. F. Prerequisite: AP/APCC 100.

Variations in forms of social organization in preindustrial, peasant, and industrial societies.

*AP 422/S 422 03(2-0-1). Comparative Legal Systems. S. Prerequisite: AP/APCC 100 or S/SCC 100. Credit not allowed for both AP 422 and S 422.

Traditional approaches to law, competing concepts of law in the global system, and experiences of minorities in state legal systems.
"AP 440 03(0-0-0). Theory in Cultural Anthropology. F. S. Prerequisite: AP/APCC 100. Theoretical paradigms used to explain culture including evolutionary, functional, ecological, political economy, postmodernism, and hegemony.

"AP 441 03(0-0-0). Method in Cultural Anthropology. F. Prerequisite: AP/APCC 100. Methodological orientations and research techniques. Ethnographic and cross-cultural approaches including quantitative and formal models.

AP 442/ET 442 08(0-0-0). Ethnographic Field School. SS. Prerequisite: AP/APCC 100, ET/ETCC 200 or written consent of instructor. Credit not allowed for both AP 442 and ET 442. Directed fieldwork with American Indian communities; methodology, protocols, and social relations of ethnographic field research.

AP 450 03(0-0-3). Hunter-Gatherer Ecology. S. Prerequisite: AP/APCC 100, AP/APCC 140. Ecology of recent hunter-gatherers is reviewed as basis to develop and evaluate archaeological models of prehistoric foraging peoples.

AP 451 03(3-0-0). Andean Archaeology and Ethnohistory. S. Prerequisite: AP/APCC 100 or AP/APCC 140. Prehistory and colonial experiences of native Andean peoples.

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

AP 460 Var [1-3-8]. Field Class in Archaeology. SS. Prerequisite: Written consent of instructor. Special fee, $50 per credit. Directed fieldwork in local archaeology, site survey, and excavation; recovery, preservation, cataloging, analysis of artificial and skeletal materials.

AP 465 03(2-2-0). Zoosearcheology. S. Prerequisite: AP 150/APCC 120, AP/APCC 140. Analysis of animal bones from archaeological sites to develop interpretations of past human behavior.

AP 472 03(3-0-0). Human Adaptability. S. Prerequisite: AP 150/APCC 120 or BU/ILSCC 102 or BU/BZCC 103 or BU/BZCC 110. Human biological responses to environmental conditions and constraints including diet, nutrition, disease, climate, culture change, and urbanization.

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

AP 479 03(3-0-0). Forensic Anthropological Methods. S. Prerequisite: AP 372. Advanced human identification techniques: skeletal determination of sex, race, age, stature, idiomsyncrasies, and time since death.

AP 484 Var [1-3-5]. Supervised College Teaching. F. S. Prerequisite: Written consent of instructor.

AP 486 Var [1-4-6]. Practicum. Application of anthropological methods under actual project conditions.

AP 492A-B 03(0-0-3). Seminar. Prerequisite: Six credits of anthropology. A) Archaeology. B) Biological anthropology.

AP 493 03(1-0-2). Contemporary Issues in Anthropology. S. Prerequisite: Senior standing. Linkage between anthropological subfields and how professional anthropologists approach issues.

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

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

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

AP 529A-B 03(0-0-3). Anthropology and Development. F. Prerequisite: Nine credits in anthropology or written consent of instructor. A) Anthropology and development. B) Modernization and culture change.

AP 530 03(3-0-0). Humans in Ecosystems. F. Prerequisite: AP/APCC 100. Links between people and environments including human causes of land use change and adaptations people make to their environments.

AP 539 03(3-0-0). Anthropology of Modernity. F. Critical examination of the institutions, values, and processes which constitute the modern world. Impact of modern forces on "traditional" peoples.

AP 540 03(0-0-3). Medical Anthropology. S. Prerequisite: Nine credits in anthropology or written consent of instructor. Biocultural and cultural approaches to adaptation to health/illness; application to ethnicity, gender, patient/healer roles, sociocultural change.

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

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

AP 543 03(3-0-0). Method and Theory in Ethnology. S. Prerequisite: Nine credits in cultural anthropology. Major schools of thought in cultural anthropological theory, field work, and analytical methods and models.

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

AP 545 03(3-0-3). Method and Theory in Biological Anthropology. F. Prerequisite: Six credits in biological anthropology. Method, theory in biological anthropology focusing on synthesizes and interpretations of human biology, variation, adaptability and evolution.

AP 548 03(1-0-2). Altered States of Consciousness. S. Prerequisite: Nine credits in anthropology or written consent of instructor. Cultural theories of altered states of consciousness, various social and expressive aspects of trance, spirit possession, glossolalia.
AP 550A-C 03(0-0-3). Regional Prehistory. Prerequisite: A-B) AP 350. C) Nine credits in anthropology or written consent of instructor.


*AP 551 03(0-0-3). Paleoindian Archaeology. F. Prerequisite: AP/APCC 140. Archaeology of the American during late Pleistocene/early Holocene; background and development of contemporary models.

*AP 555 03(0-0-3). Paleolithic Archaeology. F. Prerequisite: AP 373 or ER 342. Current knowledge of Pliocene and Pleistocene climates; methods used to reconstruct past environments; emphasis on key events in human evolutionary history.

*AP 575 03(0-0-3). Hominid Paleoecology. S. Prerequisite: AP 373 or ER 342. Current knowledge of Pliocene and Pleistocene climates; methods used to reconstruct past environments; emphasis on key events in human evolutionary history.

AP 584 Var. Supervised College Teaching. F, S, SS.

AP 585 Var. Practicum-Field Archaeology. Direction of anthropological fieldwork under professional supervision.

AP 660 Var. Field Archaeology. F, S, SS. Prerequisite: AP 350. or ER 342. Field application of nondestructive survey methods, advanced cartographic and excavation methods, project supervision skills.

AP 684 Var. Directed Study. F, S, SS.

ART COURSES

Department of Art
College of Liberal Arts

ARCC 100 03(3-0-0). Introduction to the Visual Arts. F, S, SS. Exploration of the development of visual arts.

AR 101 03(0-6-0). Visual Form. F, S, SS. Two- and three-dimensional design to develop visual awareness and insight into structure and organization of visual arts.


AR 110 03(0-3-0). History of Western Art I. F, S. Western arts from prehistory through the medieval period.

AR 111 03(3-0-0). History of Western Art II. F, S. Prerequisite: AR 110. Western arts from Renaissance through the 19th century.

*AR 112 03(3-0-0). History of Asian Art. F. Arts of China, Japan, and India.

*AR 113 03(3-0-0). Native Art Survey. F. Visual arts of native peoples of North America, Africa, and Oceania.

AR 135 03(0-6-0). Introduction to Drawing. F, S, SS. Prerequisite: $711. Elements of artistic freehand drawing emphasizing experimentation with wide variety of media.

AR 136 03(0-6-0). Introduction to Figure Drawing. F, S, SS. Prerequisite: AR 135. Special fee, $30. Human form as basis for self-expression through various drawing media.

AR 169 03(0-6-0). Foundations Painting. F, S, SS. Special fee, $7. Concepts of organization and color theory structured for understanding and manipulation of two-dimensional space.

AR 170 03(0-6-0). Foundations Sculpture. F, S. Concepts of organization structured for understanding and manipulation of three-dimensional space; use of shop tools and materials.

AR 208 03(3-0-0). Native American Art and Material Culture. S. Special fee, $13. Traditional arts and material culture of the indigenous peoples of North America.

AR 212 03(3-0-0). History of Western Art III. F, S. Prerequisite: AR 211. 20th-century visual arts.

AR 230 03(0-6-0). Photo Image Making I. F, S. Special fee, $30. Use of photographic imagery as an art medium.

AR 235 03(0-6-0). Drawing Workshop I. F, S. Prerequisite: AR 136. Special fee, $30. Drawing using models and various still life material.

AR 240 03(0-6-0). Pottery I. F, S, SS. Special fee, $33. Basic techniques of studio ceramics; exploration of expressive potential in pottery.

AR 245 03(0-6-0). Metalsmithing and Jewelry I. F, S. Prerequisite: AR 136, AR 140, AR 170. Special fee, $50. Basic metal techniques; forming and construction; surface treatment and finishing processes; behavior and mechanical properties of metals.

AR 250 03(0-6-0). Fibers I. F, S. Special fee, $35. Basic weaving and other fiber structure techniques.

AR 255 03(0-6-0). Introduction to Graphic Design. F, S. Prerequisite: Completion of required 100-level art courses. Special fee, $5. Problems emphasizing typography, layout, symbols, illustration, and package design.

AR 260 03(0-6-0). Painting II. F, S. Prerequisite: AR 135, AR 140. Special fee, $10. Basic oil painting procedures, techniques, and concepts.

AR 265 03(0-6-0). Printmaking I-Intaglio and Relief. F, S. Prerequisite: AR 136. Special fee, $55. Problems in composition utilizing basic techniques and principles of printmaking processes.
**AR 270** 3(0-6-0). Sculpture I, F, S. Prerequisite: AR 170. Special fee, $35.
Introduction to sculptural techniques and concepts.

**AR 295A-B** Var [1-4]. Independent Study.

**AR 305** 3(0-6-0). Paper Making I, F, F, SS. Prerequisite: AR 101 or AR 160. Special fee, $40.
Basic techniques and processes of handmade paper; emphasis on flat design.

**AR 306** 3(0-6-0). Paper Making II, F, F, SS. Prerequisite: AR 305. Special fee, $40.
Exploration of handmade paper as medium for personal expression; emphasis on sculptural form and pulp dyeing.

**AR 310** 3(3-0-0). History of American Art. F. Prerequisite: AR 212.
History of American art from Colonial Period to end of World War II.

**AR 311** 3(3-0-0). Art of Africa. F. Prerequisite: AR/ARCC 100 or AR 111 or AR 113.
History of the art of Africa.

**AR 312** 3(3-0-0). History of Pre-Columbian Art. S.
History of the art of Central and South America.

**AR 314** 3(3-0-0). Women in Art History. S. Prerequisite: AR/ARCC 100 or AR 110.
Women as artists in history of art and women's media in art.

**AR 315** 3(3-0-0). United States Art Since 1945. F. Prerequisite: AR 212.
Visual art in the United States since 1945.

**AR 316** 3(3-0-0). Art of the Pacific. S. Prerequisite: AR/ARCC 100 or AR 111 or AR 113.
Arts of Australia, Indonesia, Melanesia, Micronesia, and Polynesia.

**AR 318** 3(3-0-0). Native American Art. F. Prerequisite: AR 110, AR/ARCC 100 or AR 111 or AR 113.
Arts and crafts of Northern American Indian groups.

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

**AR 321A-B** Var [3-5]. Travel Abroad-Studio Workshop in Italy. SS. Prerequisite: A) AR 135. B) AR 220 or portfolio review and written consent of instructor.
Exploration of studio techniques in Italy. A) Drawing. B) Photo image making.

**AR 325** 3(3-0-0). Concepts in Art Education. S. Prerequisite: ED 310/EDCC 275; admission to Teacher Licensure Program.
Artistic learning in children, adolescents, adults, and special populations.

**AR 326** 4(0-8-0). Art Education Studio. F, S. Prerequisite: ED 310/EDCC 275; admission to Teacher Licensure Program. Special fee, $35.
Art area required for teacher licensure as indicated by individual student needs.

**AR 330** 4(0-8-0). Photo Image Making II. F, S. Prerequisite: AR 230 or portfolio review. Special fee, $55.
Studio course designed to develop the growth of photographic expression.

**AR 331** 4(0-8-0). Photo Image Making III. F. S. Prerequisite: AR 230. Special fee, $65.
Studio course designed to further growth of concept, materials in photographic expression as an art medium.

**AR 335** 3(3-0-0). Drawing Workshop II. F, S. Prerequisite: AR 235. Maximum of 9 credits allowed in course. Special fee, $30.
Independent as well as common drawing experiences.

**AR 336** 3(3-0-0). Drawing Workshop III. F. S. Prerequisite: AR 235 or AR 365. Special fee, $30.
Drawing with strong emphasis on reading assignments from fields of contemporary art history, aesthetics, and art criticism.

**AR 340** 4(0-8-0). Pottery II. F, S, SS. Prerequisite: AR 240. Special fee, $50.
Beginning wheel throwing; investigation of the expressive potential of throwing technique.

**AR 341** 4(0-8-0). Pottery III. S. Prerequisite: AR 340. Special fee, $62.
Exploration of form for expression of personal content; supportive technology; expression in historical pottery.

**AR 345** 4(0-8-0). Metalsmithing and Jewelry II. F, S. Prerequisite: AR 245. Special fee, $60.
Raising and casting techniques in combination with construction; metal spinning.

**AR 346** 4(0-8-0). Metalsmithing and Jewelry III. F. S. Prerequisite: AR 245. Special fee, $65.
Forging and enameling techniques on nonferrous and ferrous metals; stone setting.

**AR 350** 4(0-8-0). Fibers II. F. Prerequisite: AR 250. Special fee, $70.
Fabric decoration and surface design techniques; investigation of fabric as an expressive medium.

**AR 351** 4(0-8-0). Fibers III. S. Prerequisite: AR 250. Special fee, $50.
Studio work investigating expressive potential of fibers and fabric.

**AR 355** 4(0-8-0). Typography and Design Systems. F. Prerequisite: AR 255. Special fee, $5.
Emphasis on typographic solutions for advertising, corporate identity, packaging, and publication design.

**AR 356** 4(0-8-0). Illustration. S. Prerequisite: AR 255, 6 credits in drawing. Special fee, $5.
Problems emphasizing media, experimental techniques, and compositions.

**AR 360** 4(0-8-0). Painting II. F. Prerequisite: AR 260. Special fee, $15.
Techniques and concepts inherent in acrylic and other water-based media.

**AR 361** 4(0-8-0). Painting III. S. Prerequisite: AR 235, AR 260. Special fee, $35.
Compositions and techniques in oil and/or acrylic emphasizing the human figure.

**AR 365** 4(0-8-0). Printmaking II-Lithography. F, S. Prerequisite: AR 136. Special fee, $65.
Preparation, processing, and printing techniques in stone and metal plate lithography.
AR 366 04(0-8-0). Printmaking III-Studio Workshop. F. S. S. Prerequisite: AR 365. Special fee, $65. Advanced intaglio, relief, planographic, and stencil processes in the workshop; continued emphasis on individual creative growth.

AR 370 04(0-8-0). Sculpture II. F. S. Prerequisite: AR 270. Special fee, $60. Additive, subtractive, and related techniques.

AR 371 04(0-8-0). Sculpture III. S. Prerequisite: AR 270. Special fee, $65. Casting in metal.


AR 405 03(0-6-0). Paper Making III. F, S. S. Prerequisite: AR 365. Special fee, $40. Further use of paper as a media for personal expression; emphasis on controlled serial editions.

*AR 410 03(3-0-0). Greek Art. F. S. Prerequisite: AR 110. Aegean and Greek architecture, painting, and sculpture.

*AR 411 03(3-0-0). History of Medieval Art. S. Prerequisite: AR 110. Early Christian, Byzantine, Islamic, Romanesque, and Gothic visual art forms.

*AR 412 03(3-0-0). History of Renaissance Art. S. Prerequisite: AR 111. Architecture, sculpture, painting, and minor arts, 1300 to 1600.

*AR 414 03(3-0-0). History of Baroque and Rococo Art. S. Prerequisite: AR 111. 17th- and 18th-century European styles in architecture, painting, and sculpture and other art forms from Mannerism to neoclassicism.

*AR 415 03(3-0-0). History of 19th-Century European Art. F. S. Prerequisite: AR 111. Architecture, sculpture, painting, and other arts in Europe, 1780 to 1900.

*AR 416 03(3-0-0). History of 20th-Century European Art. S. Prerequisite: AR 212. Architecture, sculpture, painting, and other arts in Europe, 1900 to present.

*AR 417 03(3-0-0). Roman Art. S. Prerequisite: AR 110. Roman sculpture, painting, and architecture.

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

AR 420 Var [3-5]. Travel Abroad-Art History in Italy. SS. Prerequisite: AR 111. Art historical study of painting, sculpture, and architecture in Italy.

AR 430 04(0-8-0). Advanced Photo Imaging Making I. F, S. Prerequisite: AR 331. Special fee, $45. Advanced problems in use of photo imaging making as an art medium.

AR 431 04(0-8-0). Advanced Photo Imaging Making II. F, S. Prerequisite: AR 430. Special fee, $45. Studio course to refine individual directions and professional goals in photography as an art medium.

AR 435 03(0-6-0). Drawing Workshop IV. F, S. Prerequisite: AR 336. Special fee, $30. Further definition of philosophical and artistic direction.

AR 436 03(0-6-0). Drawing Workshop V. F, S. Prerequisite: AR 435. Special fee, $30. Capstone course leading to a unified body of finished drawings.

AR 440 04(0-8-0). Pottery IV. F. S. Prerequisite: AR 341. Special fee, $62. Advanced individual research in pottery form and expression; supportive technology; expression in contemporary American pottery.

AR 441 04(0-8-0). Pottery V. S. Prerequisite: AR 440. Special fee, $62. Advanced individual research in pottery form and expression of personal subject matter; supportive technology.

AR 445 04(0-8-0). Metalsmithing and Jewelry IV. F, S. Prerequisite: AR 345. Special fee, $60. Chasing and repoussé techniques in two- and three-dimension; inlay, engraving, and etching techniques.

AR 446 04(0-8-0). Metalsmithing and Jewelry V. F, S. Prerequisite: AR 445. Special fee, $50. Advanced techniques: granulation, electroforming, photoetching, makume, niello, ferrous metals techniques.


AR 451 04(0-8-0). Fibers V. F, S. Prerequisite: AR 351 or AR 450. Maximum of 8 credits allowed in course. Special fee, $25. Advanced individual research in the expressive use of fibers and fabric.


AR 456 04(0-8-0). Advanced Illustration. S. Prerequisite: AR 350. Maximum of 8 credits allowed in course. Special fee, $5. Projects in editorial and reporstial illustration emphasizing techniques applied to solving problems in advanced composition.


AR 461 04(0-8-0). Advanced Painting II. S. Prerequisite: AR 461. Maximum of 8 credits allowed in course. Special fee, $15. Continuation in direction of individual creative expression.

AR 465 04(0-8-0). Printmaking IV-Studio Workshop. F. S. Prerequisite: AR 366. Special fee, $65. Advanced printmaking workshop; intaglio, relief, planographic, a;stencil; continued emphasis on individual creative growth.

AR 466 04(0-8-0). Printmaking V-Studio Workshop. F. S. Prerequisite: AR 465. AR 465. Maximum of 8 credits allowed in course. Special fee, $65. Advanced printmaking concepts in studio and research problems.


AR 471 04(0-8-0). Sculpture V. F, S. Prerequisite: AR 470. Maximum of 8 credits allowed in course. Special fee, $55. Advanced expression using sculptural techniques.


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


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


AR 684 Var. Supervised College Teaching. F, S, SS.

AR 699A-G Var. Thesis. Prerequisite: Twelve credits in studio area of concentration.

AEROSPACE STUDIES COURSES

Office of Provost/Academic Vice President

AS 101 01(1-2-0). Foundations of the Air Force I. F.
   Air Force opportunities, benefits, emphasis on officership, customs, and communications skills, group problem solving.

AS 102 01(1-2-0). Foundations of the Air Force II. S.
   Organizational structure and missions of Air Force organizations; emphasis on leadership, military history, and communications skills.

AS 201 01(2-0). Evolution of Air and Space Power I. F.
   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(1-2-0). Evolution of Air and Space Power II. S.
   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 250 03(2-2-0). Aerospace Studies. F. S.
   Ground school instruction in principles of flight, weather, navigation, radio communications, flight planning, emergency procedures, FAA regulations.

AS 301 03(3-2-0). Air Force Leadership Studies I. F.
   Leadership and quality management fundamentals, officer professional knowledge, ethics, and values; communication skills heavily emphasized.

AS 302 03(3-2-0). Air Force Leadership Studies II. S.
   Officer professional development, emphasizing total quality management (TQM) in the Air Force environment, emphasis on communication skills.

AS 401 03(3-2-0). National Security Affairs/Active Duty I. F.

AS 402 03(3-2-0). National Security Affairs/Active Duty II. S.
   Professionalism, military justice system, military ethics, commissioning essentials, and emphasis on communication skills.

ATMOSPHERIC SCIENCE COURSES

Department of Atmospheric Science

College of Engineering

AT 150 02(2-0-0). Science of Weather and Climate. F, S.
   Prerequisite: High school algebra; high school chemistry or physics. Basic principles governing weather and climate. Contemporary topics including global warming, ozone hole, acid rain.
**AT 710 03(3-0-0). Geophysical Vortices.** F. Prerequisite: AT 602 or written consent of instructor. Observational, experimental, and theoretical aspects of geophysical vortices, such as hurricanes, polar lows, tornadoes, and dust devils.

**AT 711 02(2-0-0). Micrometeorology.** F. Prerequisite: M 340, AT 623 or written consent of instructor. Laminar and turbulent flow; momentum, heat, and water vapor transport near the surface; radiation, evaporation, and diffusion in boundary layer.

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

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

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

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

**AT 722 03(3-0-1). Atmospheric Radiation and Energetics.** S. Prerequisite: AT 622. Radiative transfer in the atmosphere; implications on remote sensing and energetics.

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

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

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

**AT 737 03(3-0-0). Satellite Observation of Atmosphere and Earth.** S. Prerequisite: AT 622, AT 650. Satellite measurements; basic orbits and observing systems; applications of remote probing and imaging to investigations of atmospheric processes.

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

**AT 742 03(2-0-0). Tropical Atmosphere.** F. Prerequisite: AT 605, AT 623, AT 655. Climatology and general circulation of the tropics; air-sea, cumulus energy, and momentum exchanges; tropical storm dynamics.

**AT 745 03(3-0-0). Advanced General Circulation.** S. Prerequisite: AT 622, AT 605. Theories of the atmospheric general circulation. Numerical modeling findings Index cycles, blocking action, transient vs. standing wave activity.

**AT 751 03(3-0-0). Weather Modification.** S. Prerequisite: AT 601. Physical basis, technology, potential, and consequences of intentional and inadvertent weather and climate modification.

**AT 753 03(3-0-0). Atmospheric Water Resources.** F. Prerequisite: AT 601. Hydrologic cycle; moisture transport and air-ground exchange; water budgets of meteorological phenomena; climatology of atmospheric water.

**AT 755 03(3-0-0). Theoretical and Applied Climatology.** F. Prerequisite: AT 606. Forcing functions; atmospheric response, feedback loops; climatic models, change hypotheses; applications to agriculture, industry, business.

**AT 770 03(3-0-0). Physical Oceanography.** F. Prerequisite: AT 602. Properties of sea water and ice; oceanic structure; dynamics of current systems; air-sea interactions; tides.

**AT 772 02(2-0-0). Aerosol Chemistry.** F. Prerequisite: C 114, MM CC 161, PH!PHCC 122 or PH!PHCC 142. Physics and chemistry of atmospheric aerosols including composition, surface properties, size, interaction with radiation sources, sinks.

**AT 784 Var. Supervised College Teaching.** F, S, SS.

**AT 786 Var. Practicum.**

**AT 795 Var. Independent Study.**

**AT 796 Var. Group Study.**

**AT 799A-R Var. Dissertation.**

**AMERICAN STUDIES COURSES**

**College of Liberal Arts**

**AUC 200 03(3-0-0). Self/Community in American Culture. 1600-1877.** F. Meaning and development of American culture, 1600-1877, through themes of self and community, in art, politics, society, and religion.

**AUC 201 03(3-0-0). Self/Community in American Culture Since 1877.** S. Meaning and development of American culture, 1877-present, through themes of self and community, in art, politics, society, and religion.

**AU 300/E 300 03(3-0-0). American Lives-Methods in American Studies.** F, S. Prerequisite: AUAUC 200, AUAUC 201. Credit not allowed for both AU 300 and E 300.

Methods and changing approaches of American Studies since 1950s using autobiography as organizing theme.

**AU 492 03(3-0-0). Seminar in American Studies.** Prerequisite: AU 300; senior status or written consent of instructor.
ANATOMY AND NEUROBIOLOGY COURSES

Department of Anatomy and Neurobiology
College of Veterinary Medicine and Biomedical Sciences

AY 160 01(1-0-0). Issues in Veterinary Medicine. F. Prerequisite: Written consent of instructor. Veterinary medicine from perspective of its history, current issues, and future directions.


AY 230/PS 230 03(3-0-0). Animal Anatomy and Physiology. S. Prerequisite: BY/LSCC 102, C/C CC 107. Credit not allowed for both AY 230 and PS 230. Comparative systemic anatomy and physiology of farm animals.

AY 231 02(1-2-0). Gross Anatomy of Domestic Animals. S. Prerequisite: AY 270/PS 270 or concurrent registration. Special fee, $55. Comparative gross anatomy of domestic animals.

AY 254/HD 254 03(3-0-0). Biological Aspects of Human Development. F, S. Prerequisite: BY/LSCC 102 or BY/BZCC 101 or BY/BZCC 110. Credit not allowed for both AY 254 and HD 254. Human embryology, genetics, developmental processes resulting in birth defects, human physical development through the lifespan.

AY 300/PS 300 04(4-0-0). Principles of Human Anatomy and Physiology. F, S, SS. Prerequisite: C/C CC 103 or C/C CC 107 or C/C CC 111; BY/LSCC 102 or BY/BZCC 101 or BY/BZCC 110. Credit not allowed for both AY 300 and PS 300. Anatomy and physiology of humans.

AY 301 05(3-2-1). Human Gross Anatomy. F, S, SS. Prerequisite: AY 300/PS 300. Special fee, $100. Structure and function of the human body. Study of prospected human cadavers; clinical applications; living anatomy.

AY 325 03(3-0-0). Cellular Neurobiology. F. Prerequisite: AY 300/PS 300 or HY 310. Cellular and molecular bases of nervous system function and behavior.

AY 331 04(3-2-0). Histology. F, S, SS. Prerequisite: AY 230/PS 230 or AY 300/PS 300. Also offered as an on-line course. Analysis of animal cells, tissues and organs emphasizing light microscopy.


AY 345 04(3-2-0). Functional Neuroanatomy. F. Prerequisite: AY 300/PS 300. Special fee, $45. Functional systems and circuits of the human brain and spinal cord.

AY 365 03(3-0-0). Nerve and Muscle-Toxins, Trauma, and Disease. S. Prerequisite: AY 300/PS 300 or BY 310. Understanding cellular and molecular basis of nerve and muscle activities in health and disease.

AY 384 Var [1-5]. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course.

AY 401 03(3-0-0). Animal Cell Ultrastructure. S. Prerequisite: AY 300/PS 300 or BY 310. Ultrastructure and function of animal cells; emphasis on organellar structure and function in mammalian tissues.

AY 404 02(1-3-0). Biological Preparation for Light Microscopy. S. Prerequisite: BY 310. Traditional and contemporary techniques for preparation of tissues for light microscopy.

AY 445 03(3-0-0). The Human Brain and Its Disorders. S. Prerequisite: AY 345. Principles of neuroscience; application to disorders of the human nervous system.

AY 475 04(0-8-0). Human Anatomy Dissection. F, S, SS. Prerequisite: AY 301 and written consent of instructor. Special fee, $100. Regional approach to gross human anatomy and laboratory dissection of human cadaver.

AY 495 Var. Independent Study.

AY 531 03(0-4-1). Domestic Animal Dissection. S. Prerequisite: AY 231. Detailed dissection of domestic animals; special projects or specimens will be included as available.

AY 545 05(3-4-0). Human Neuroanatomy. F. Prerequisite: AY 325. Special fee, $45. Human central nervous system structure and function presented from a systems perspective.


AY 610 01(1-0-0). Managing a Career in Science. F. Survival skills for professionals. How to succeed in science, including improving writing, teaching, speaking; finding the right job.

AY 619 06(0-15-1). Advanced Human Gross Anatomy. S. Prerequisite: Written consent of instructor. Special fee, $100. Advanced dissection of the human body; emphasis on clinical applications.

AY 631 01(0-0-1). Domestic Animal Anatomy-Case Discussions. S. Prerequisite: Concurrent registration in AY 531. Clinical case discussions utilized in advanced understanding of domestic animal anatomy and physiology.

AY 650 01(3-0-0). Transmission EM Laboratory. S. Prerequisite: AY 330. Operation of transmission electron microscope; preparation of samples; interpretation of images.
AY 652 01(0-3-0). Scanning EM Laboratory. S, SS. Prerequisite: AY 550. Operation of scanning electron microscope; preparation of samples; interpretation of images.

AY 672 A-B. Advanced Topics in Electron Microanalysis. A) Freeze fracture 02(1-3-0). SS. Prerequisite: AY 650. Special fee, $76. B) X-ray microanalysis 01(0-3-0). SS. Prerequisite: AY 652.

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


AY 696 Var [1-3]. Group Study in Neurosciences. Current topics in neuroscience; how to evaluate scientific presentations.


AY 784 Var. Supervised College Teaching. F, S, SS.

AY 792 01(0-0-1). Seminar.


BUSINESS ACCOUNTING COURSES

Department of Accounting

College of Business

BA 205 03(3-0-0). Fundamentals of Accounting. F, S, SS. For nonbusiness majors. Credit not allowed for both BA 205 and BA 210. Understanding of financial statements to support financial and managerial decision making.

BA 210 03(2-0-1). Accounting Information Systems I. F, S, SS. Credit not allowed for both BA 210 and BA 205. Use of accounting information by decision makers; development of the basic accounting model, and issues concerning income and cash flows.

BA 220 03(3-0-0). Accounting Information Systems II F, S, SS. Prerequisite: BA 210. Use of accounting information in decision making focusing on issues involving economic resources, debt, and equity capital.

BA 310 03(3-0-0). Financial Statement Analysis. F, S. Prerequisite: BA 220. Use of accounting information focusing on issues involving economic resources, debt, and equity capital. Analysis of balance sheet and income statement accounts.

BA 311 03(3-0-0). Intermediate Accounting I. F. Prerequisite: BA 220. Understanding of financial statements to support financial and managerial decision making.

BA 312 03(3-0-0). Intermediate Accounting II. S. Prerequisite: BA 311. Equity structure of corporations; analysis and interpretation of accounting data.

BA 321 03(3-0-0). Cost Management. F. Prerequisite: BA 220. Utilizing budgetary and cost accounting information for planning, controlling, and decision-making.

BA 350 03(3-0-0). Online Accounting Tools. S. Prerequisite: BA 220. Online resources available and tools required of today's professional accountant.


BA 430 03(3-0-0). Income Tax Accounting. F. Prerequisite: BA 210. Basic structure of federal income tax law; impact of taxes on decision making; social security taxes.

BA 431 03(3-0-0). Tax and Accounting Issues for Entrepreneurs. S. Prerequisite: BA 220. Accounting and taxation issues relevant to start-up and operation of small business enterprises.

BA 441 03(3-0-0). Auditing Practices. F. Prerequisite: BA 441. Seminar exploring various facets of the assurance services environment.

BA 487 Var. Internship. Supervised work experience in public, industry, or governmental accounting.

BA 495 Var. Independent Study.

BA 496 Var. Group Study.

BA 511 03(3-0-0). Advanced Accounting I. F. Prerequisite: BA 312. Accounting for business combinations and consolidations in corporate restructuring and alternative organizational forms.

BA 540 03(3-0-0). Professional Ethics and Responsibilities. F. Prerequisite: BA 441. Ethical practice of professional accounting.

BA 541 03(3-0-0). Contemporary Auditing. S. Prerequisite: BA 441. Seminar exploring various facets of the assurance services environment.

BA 550 03(3-0-0). Electronic Commerce Accounting Issues. F. Prerequisite: BA 350, BA 421. Electronic commerce resources available and tools required of today's professional accountant.

BA 561 03(3-0-0). Legal and Regulatory Issues in Accounting. S. Prerequisite: BG/BGCC 260. Contracts, ownership, bankruptcy (debtor/creditor relationship), formation of business entities, regulation of accounting profession.

BA 570 03(3-0-0). Governmental Accounting and Assurance Services. S. Prerequisite: BA 441. Accounting for, and financial reporting by, local governmental units and related assurance services.


BA 621 03(3-0-0). Advanced Accounting Information Systems. S. Prerequisite: BA 350, BA 421. Resources available and hands-on experience with the ERP Documentation.
BA 622 03(3-0-0). Advanced Cost and Managerial Accounting. S. Prerequisite: BA 321. Contributions of cost accounting to decision making and planning.

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

BA 631 03(3-0-0). Corporate Taxation I. F. Prerequisite: BA 220. Federal income tax principles pertaining to formation and operation of corporate entities.

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

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

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

BA 642 03(3-0-0). International Accounting. SS. Prerequisite: BA 220. Preparation for work with multinational companies in coordinating operations to adhere to global regulations and customs.

BA 679 03(3-0-0). Cells, Genes, and Molecules. F. Prerequisite: High school chemistry and biology. Intended for nonscience majors.

BC 103 03(3-0-0). Cells, Genes, and Molecules. F. Prerequisite: High school chemistry and biology. Intended for nonscience majors.

BCCC192 02(1-1-0). Biochemistry Freshman Seminar. F. Introduction to curriculum and career options for biochemistry majors.

BC 203 01(0-0-1). Seminar. Prerequisite: BCCC 192 or written consent of instructor.

BC 361 03(3-0-0). Survey of Biochemistry. F, S, SS. Prerequisite: C 245.

Introduction to chemical processes of living systems emphasizing structure and function of biological molecules.

BC 351 04(4-0-0). Principles of Biochemistry. F, S, SS. Prerequisite: C 245 or C 343 or concurrent registration in C 343. For majors in biological sciences, engineering, and preprofessional students in the health sciences. Structure and function of biological molecules; biocatalysis; metabolism and energy transduction; gene expression.

BC 352 01(3-0-0). Principles of Biochemistry Laboratory. F, S. Prerequisite: BC 401 or concurrent registration. 2 credits of college chemistry laboratory. Introduction to laboratory techniques in biochemistry.

BC 401 03(3-0-0). Comprehensive Biochemistry I. F. Prerequisite: C 245 or C 343 or concurrent registration in C 343; M/M CC 155 or M/M CC 160. Macromolecular structure and dynamics; membranes; enzymes; bioenergetics.

BC 403 03(3-0-0). Comprehensive Biochemistry II. S. Prerequisite: BC 401. Metabolic pathways and their regulation, cellular biochemistry.

BC 404 02(0-6-0). Comprehensive Biochemistry Laboratory. F, S. Prerequisite: BC 401 or concurrent registration, C 240 or C 344; NS 204. Experimental approaches to studying macromolecules, metabolism, and gene expression.


BC 408 02(1-3-0). Techniques in Structural Biology. S. Prerequisite: BC 454, BC 471, or BC 474. Structural biological methods used to elucidate macromolecular structure and function.


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

BC 465 03(3-0-0). Molecular Regulation of Cell Function. S. Prerequisite: NS 202; BC 403 or concurrent registration or BC 351. Molecular regulation of cell organization, membrane formation, organelle biogenesis, cell communication, shape and motility, growth, aging, and death.

BC 475 03(0-6-1). Mentored Research. F, S, SS. Prerequisite: BC 404. 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. F, S, SS. Prerequisite: Written consent of supervising instructor and department chair. Assist in teaching selected courses in biochemistry and molecular biology.

BC 493 01(0-0-1). Seminar. Prerequisite: BC 401 or concurrent registration.

BC 495 Var. Independent Study. Prerequisite: Minimum GPA of 3.0 and consent of laboratory mentor.

BC 496 Var. Group Study. Prerequisite: Written consent of supervising instructor and department chair. Faculty-directed exploration of areas of special interest in biochemistry and molecular biology.

BC 498 Var. [1-3]. Supervised College Teaching. F, S, SS.


BC 511 02(2-0-0). Structural Biology I. F. Prerequisite: BC 401 or concurrent registration, C 471 or concurrent registration. Structural principles of biological macromolecules and techniques of structural analysis.

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

BC 517 02(2-0-0). Metabolism. F. Prerequisite: BC 351 or BC 403. Design and regulation of metabolic pathways.

BC 519 03(3-0-0). Cellular Biochemistry. F. Prerequisite: BC 351 or BC 403. Cellular response to environment including mechanisms of membrane signal transduction, motility, organelle biogenesis, and proliferation.

BC 561 03(3-0-0). Biomolecular Spectroscopy. F. Prerequisite: BC 403. Spectroscopic methods and their application to proteins and nucleic acids.

BC 563 04(3-0-1). Molecular Genetics. F. Prerequisite: NS 201 and BC 401 or concurrent registration. 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 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 Educational Outreach. Biochemical and molecular biological foundations of molecular genetics/genetic engineering; molecular analysis of genes.

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

BC 663 03(3-0-0). Gene Expression. S. Prerequisite: BC 563. Eukaryotic transcription mechanisms with emphasis on methods of study and regulatory mechanisms.

BC 695 Var. Independent Study.

BC 698 Var. Research.


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

BUSINESS INFORMATION SYSTEMS COURSES

Department of Computer Information Systems
College of Business

BD 111 01(1-0-0). Software Productivity Tool Proficiency. F, S, SS. Credit not allowed for both BD 111 and BD 150. Certification of expertise in software packages such as Excel, Word, Windows, and PowerPoint.

BD 150 03(3-0-0). Business Computing Concepts and Applications. F, S, SS. Credit not allowed for both BD 150 and BD 111. System hardware, operating environments, and software applications.

BD 200 03(3-0-0). Information Technology. F, S. Overview of technology used in e-commerce, development of e-commerce sites, ethical and social issues of e-commerce.

BD 240 03(3-0-0). Program Design and Construction. F, S, SS. Software engineering methods including design, implementation, and testing using structured and event-driven techniques, logic, and data structures.

BD 245 03(3-0-0). Hardware and Software Concepts. F, S, SS. Fundamentals of computer system technologies including hardware, software, operating systems, and data communication.

BD 301 03(3-0-0). End User Computing. F, S, SS. End user applications in a Graphical User Interface environment including spreadsheet, word processing, and presentation graphics. Internet concepts.

BD 320 01(1-0-0). Project Management for Information Systems. F, S. Prerequisite: BD 240 with grade of C or better. Project management concepts including work breakdown structure, estimating, scheduling, tools, and reports.
BD 340 03(3-0-0). Visual Application Development. F. Prerequisite: BD 240 with grade of C or better.
Software engineering of business computer programs using GUIs, event-driven techniques, object-oriented techniques, and Web-based languages.

BD 345 03(3-0-0). Operating Environments and Systems. F. Prerequisite: BD 240 with grade of C or better; CS/CSCC 153 with grade of C or better.
Fundamentals of computer hardware and operating systems including Unix and Windows/NT server.

BD 350 03(3-0-0). Telecommunications and Networking. S. Prerequisite: BD 345.
Local Area Networks, Wide Area Networks, common carriers and packet-switched networks; protocols, interfaces, and system design.

BD 355 03(3-0-0). Business Database Systems. S. Prerequisite: BD 360.
Physical and logical design, implementation, and administration of databases.

BD 360 03(3-0-0). Systems Analysis and Design. F. Prerequisite: BD 240 with grade of C or better; CS/CSCC 153 with grade of C or better.
Systems development life cycle with traditional methodologies, processes, service, planning, and analysis.

BD 460 03(3-0-0). Object-Oriented Systems. F. Prerequisite: BD 355, BD 360.
Object-oriented concepts, development methodologies, techniques, and languages.

BD 462 02(2-0-0). Systems Development Project. S. Prerequisite: BD 320, BD 360.
Application of concepts, techniques, and tools used in analysis, design, and implementation of computer-based information systems in applied setting.

BD 487 02(0-6-0). Internship. Prerequisite: BD 355, BD 360.
Supervised and planned work experience paralleling concentration in industry.

BD 492 03(3-0-0). Seminar. Prerequisite: BD 460.
Current topics in computer-based information systems.

BD 495 Var. Independent Study.

BD 496 Var. Group Study.

BD 600 03(3-0-0). Application Software Infrastructure. F.
Design, construction, and testing of business application software infrastructure including hardware, operating software, and communications network.

BD 610 03(3-0-0). Enterprise Computing Planning and Design. S. Prerequisite: BD 565/BIL 565.
Enterprise application planning and design techniques; business process and data modeling.

BD 611 03(3-0-0). Enterprise Computing Implementation. F. Prerequisite: BD 610.
Implementation, customization, and interactions of enterprise computing modules and software interfaces.

BD 620 03(3-0-0). Advanced Information Systems Topics. S. Prerequisite: BD 605, BD 660.
Current computer-based information systems topics.

BD 655 03(3-0-0). Business Database Systems. S. Prerequisite: BD 605.
Database analysis, design, administration, data modeling, data sublanguages, query facilities; distributed database systems.

BD 678 03(3-0-0). Applied Information Systems Research. S. Prerequisite: BQ 270.
Information systems research methodologies and practice.

BD 695 Var. Independent Study.

BD 696 Var. Group Study.


BIOMEDICAL ENGINEERING COURSES

College of Engineering

BE 470 03(3-0-0). Biomedical Engineering. S. Prerequisite: AY 300/PS 300.
Application of engineering toward understanding human/animal physiology, diagnosis of disease, treatment, rehabilitation, human genome manipulation.

BE 486 A-B. Biomedical Clinical Practicum. F, S, SS. Prerequisite: AY 300/PS 300 and BE 470 or written consent of instructor. A) 02(1-3-0). B) 04(1-6-0).
Biomedical lab work or exposure to the hospital/clinical environment.

BE 586 A-B. Biomedical Clinical Practicum. F, S, SS. Prerequisite: ME 570; AY 300/PS 300 or PS 500 or written consent of instructor. 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.
BUSINESS FINANCE AND REAL ESTATE COURSES

Department of Finance and Real Estate
College of Business

BF 250 03(3-0-0). Personal Investments. F.
Investment in securities, insurance, real estate; use of credit in personal investment programs.

BF 300 03(3-0-0). Principles of Finance. F, S, SS. Prerequisite: BA 210, EC/ECCC 204. Credit not allowed for both BF 300 and BF 305.
Overview of financial markets and institutions, analysis of securities and investigation of financial management techniques.

BF 305 03(3-0-0). Fundamentals of Finance. F, S. Prerequisite: BA 205, EC/ECCC 204. Credit not allowed for both BF 305 and BF 300.
Role of finance in management of the firm; role, structure of financial markets and institutions, valuation of basic securities.

BF 311 03(3-0-0). Investments-Fixed Income Securities. F, S, SS. Prerequisite: BF 300 or BF 305.
Analysis of money market and long-term debt instruments. Coverage includes corporate, government, and mortgage-based obligations.

BF 312 03(3-0-0). Risk Management and Insurance. S. Prerequisite: BF 300 or BF 305.
Management of insurable risks for the individual and business firm.

BF 355 03(3-0-0). Investments-Equity Securities. F, S, SS. Prerequisite: BF 300 or BF 305.
Analysis of common stock and other equity securities; extensive portfolio management techniques.

BF 360 03(3-0-0). Real Estate Principles. F, S, SS. Prerequisite: EC/ECCC 204.
Broad survey of real estate emphasizing land use, urban structure and growth, market analysis, real estate finance and valuation, and property rights.

BF 370 03(3-0-0). Financial Management-Theory and Application. F, S, SS. Prerequisite: BF 300 or BF 305.
Theory and application of financial management to business firms; case problems used for illustration.

BF 460 03(3-0-0). Real Estate Finance and Investment. F. Prerequisite: BF 300 or BF 305, BF 360.
Financing of real estate resources: real estate financial markets, policies; use of leverage and real estate investment analysis in real estate investment programs.

BF 465 03(3-0-0). Real Estate Appraisal. S. Prerequisite: BF 360 or written consent of instructor
Various approaches to value as applied to real property; problems in appraising urban and rural property. Preparation of detailed appraisal reports.

BF 470 03(3-0-0). Financial Institutions and Derivatives. F. Prerequisite: BF 311.
Management of financial institutions with applications of derivative securities; valuation and modeling of derivatives.

BF 475 03(3-0-0). International Business Finance. F, S. Prerequisite: BF 300 or BF 305.
International financial management emphasizing markets, instruments, hedging techniques, and operating strategies.

BF 478 03(3-0-0). Contemporary Issues in Finance. F, S. Prerequisite: BF 370, BF 311 or BF 355.
Application of financial analysis and decision-making tools to current issues in financial markets, investments, and business finance.

BF 487 Var. Internship.

BF 495 Var. Independent Study.

BF 496 Var. Group Study.

Financial problems for various types of business organizations.

BF 610 03(3-0-0). Financial Markets. S.
Overview of financial instruments, markets, and institutions emphasizing fixed income securities.

BF 655 03(3-0-0). Investments. F.
Investment analysis and decision making emphasizing equity securities and portfolio management.

BF 660 03(3-0-0). Real Estate Investments. F.
Broad survey of real estate investment and development in our economy.

BF 665 03(3-0-0). Financial Engineering. S. Prerequisite: BF 610 or BF 655 or BF 675.
Using futures, options, swaps, and securitized transactions in financial management.

BF 675 03(3-0-0). International Finance. F.
Analysis of the foreign exchange market and international financial markets emphasizing international financial management.

BF 678 03(3-0-0). Financial Decisions-Theory and Practice. S. Prerequisite: BF 500.
Analysis of theory of corporate finance with emphasis on underlying assumptions and implications for financial decisions.

BF 695 Var. Independent Study.

BF 696 Var. Group Study.


BUSINESS GENERAL COURSES

College of Business

BG 100 03(3-0-0). Business Concepts and Issues. F, S, SS.
Business concepts: accounting, finance, information systems, management, marketing, international business, small business, ethics, diversity, careers.

BGCC 192 03(1-0-2). First-Year Seminar in Business. F, S, SS.
Development of university survival skills, as well as critical thinking skills, with emphasis on business applications.
BG 200 04(2-0-2). Business Communications and Report Writing. F, S. Prerequisite: CO/CVCC 150.
Theory and principles of business communication with emphasis on written communication and presentation of reports.

BGCC 205 03(3-0-0). Fundamentals of Business Law. F, S. SS. Credit not allowed for both BG/BGCC 205 and BG/BGCC 260.
Legal environment of business including norms, rules, laws, ethical principles, and values central to public life in the conduct of business.

BG 235 02(2-0-0). Inquiry Into Capitalism. F.
History and writings in development of capitalistic system.

BGCC 260 03(3-0-0). Legal Environment of Business. F, S. SS. Credit not allowed for both BG/BGCC 260 and BG/BGCC 205.
Norms, rules, laws, ethical principles, and values central to public life in the United States in the conduct of business.

BG 295 Var. Independent Study.

BG 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.

BG 367 03(3-0-0). Real Estate Law. S. Prerequisite: BG/BGCC 260 or HD 403.
Legal regulations applicable to real property ownership and transfer, to real estate agents, and to use of real property.

BG 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.

BG 430 03(3-0-0). Business and Its Environment. F, S.
Social responsiveness of managers as they face expectations in the firm's internal and external environment.

BG 479 03(3-0-0). Business Policy and Administration. F, S. SS. Prerequisite: BF 300, BK 300, BL 300, BN 320.
An integration of various business subject areas in terms of top-level policy and decision making.

BG 495 Var. Independent Study.

BG 605 03(3-0-0). Managerial Economics. S. Prerequisite: EC/ECC 202, M/M CC 141, BQ 270.
Economic analysis of management decision making involving productivity, cost, demand, price, profit, and value.

BG 615 04(4-0-0). Accounting Systems. F. Prerequisite: Admission to M.B.A. program.
Financial, managerial accounting information systems. Use of accounting information for purposes of management decision making, planning, and control.

BG 620 02(2-0-0). Management, Leadership, and Team Dynamics. F, S. Prerequisite: Admission to M.B.A. program.
Knowledge and skills related to management function, leadership in business organizations, and intra and interteam relationships.

BG 621 02(2-0-0). Strategic Management for Competitive Advantage. F. Prerequisite: Admission to M.B.A. program.
Working knowledge of the strategic dimension of management in a competitive environment, including business simulation.

BG 625 02(2-0-0). Managerial Communication Strategies. F, S.
Problem solving and strategic communication skills through experiential learning.

BG 630 02(2-0-0). Information Technology Infrastructure. F, S. Prerequisite: Admission to M.B.A. program.
Hardware, systems software, and communications technology infrastructure and its enterprise, process, and functional implications.

BG 631 02(2-0-0). Strategic Uses of Information Technology. F, S. Prerequisite: BG 610 or concurrent registration.
Strategic and tactical uses of information technology in the global business environment.

BG 635 02(2-0-0). Statistics and Economics for the World Market. F. S. Prerequisite: Admission to M.B.A. program.
Techniques for collecting, analyzing, and interpreting business and economic data.

BG 640 02(2-0-0). Financial Principles and Practice. F. S. Prerequisite: BG 615, BG 635.
Financial environment; tools and techniques of corporate financial decision making.

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

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

BG 650 02(2-0-0). Manufacturing and Service. F, S. Prerequisite: Admission to M.B.A. program.
Basic understanding of production systems, and functions of both line and staff components.

BG 655 04(4-0-0). Marketing Management. F. S. Prerequisite: BG 635.
Marketing systems including products and services, domestic and global markets, traditional and electronic modes.

BG 660 02(2-0-0). Social and Regulatory Issues in Business II. F, S.
Prerequisite: Admission to M.B.A. program.
Social, ethical, and global issues relevant to business decision making.

BG 661 02(2-0-0). Social and Regulatory Issues in Business III. F, S.
Prerequisite: BG 660 or concurrent registration.
Dispute resolution, employment relations, workplace safety, and consumer protection.

BG 665 04(4-0-0). Analysis of Dynamic Enterprises. S. SS. Prerequisite: BG 620, BG 621, BG 625, BG 630, BG 641, BG 650, BG 655.
Integrates skills and concepts through analysis and discussion of cases and articles based on actual business problems.

BG 675 03(3-0-0). International Business. S. Prerequisite: Nine credits of business and/or economics.
Managerial requirements for understanding and conducting multinational business operations.

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

BG 695 Var. Independent Study.

BIOTECHNOLOGY COURSES

College of Veterinary Medicine and Biomedical Sciences

BH 306 04(3-2-0). Bioprocess Engineering. S. Prerequisite: C/C CC 107 or C/C CC 114; PH/PHCC 121 or PH/PHCC 141. Material, energy balances, fluid flow, heat exchange, mass transfer; application to operations in food, fermentation, other bioprocess industries.

BH 450 02(0-0). Topics in Biotechnology. S. Prerequisite: BC 351 or BC 401, PH 300. Developments, trends in biotechnology; products from genetically engineered microorganisms, plant or animal cell cultures, advances in bioengineering.

BH 499 Var [1-3]. Biotechnology Thesis. Prerequisite: Twelve credits from biotechnology core, approval of program coordinator.

BIOAGRICULTURAL SCIENCES AND PEST MANAGEMENT COURSES

Department of Bioagricultural Sciences and Pest Management

BI 200 03(3-0-0). Principles of Plant Health. S. Major factors influencing the health of plants and the role of plant health in global affairs.

BI 384 Var [1-3]. Supervised College Teaching. F, S, SS.

BI 451 03(3-0-0). Integrated Pest Management. S. Prerequisite: EN 102 or PD 361 or W 208 or 10 credits of biology. Concepts of integrated pest management the strategies and tactics employed in the practical application of these concepts.

BI 497 Var. Internship.

BI 492 Var [1-3]. Seminar.

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

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

BI 551 04(3-0-1). Advanced Integrated Pest Management. S. Prerequisite: 10 credits of biology. Concepts of integrated pest management the strategies and tactics employed in the practical application of these concepts.

BI 584 Var [1-3]. Supervised College Teaching. F, S, SS.

BI 587 Var. Internship.

BI 594 Var [1-3]. Independent Study.

BI 596 Var [1-3]. Group Study.

BI 698 Var. Research.


BUSINESS MARKETING COURSES

Department of Marketing

College of Business

BK 300 03(3-0-0). Marketing. F, S, SS. Prerequisite: EA/EACC 202 or EC/ECCC 202. Credit not allowed for both BK 300 and BK 305. Market and buyer analysis, product and service development, pricing, promotion, advertising, selling, and distribution.

BK 305 03(3-0-0). Fundamentals of Marketing. F. S. Prerequisite: EC/ECCC 101 or EC/ECCC 202 or EA/EACC 202. Credit not allowed for both BK 305 and BK 300. Overview of marketing activities involved in provision of products and services to consumers, including target markets and managerial aspects.

BK 320 03(3-0-0). Integrated Marketing Communications. F, S. Prerequisite: BK 300 or BK 305. Principles and practices of managing promotional activities including advertising, sales promotion, and other major media.

BK 330 03(3-0-0). Business Customer Relationships. F. S. Prerequisite: BK 300 or BK 305. Managing relationships with distribution channel intermediaries and business customers.

BK 360/DM 360 03(3-0-0). Retailing. F, S, SS. Prerequisite: BK 300 or BK 305. Credit not allowed for both BK 360 and DM 360. Retail markets, institutions, operations, and problems.

BK 361 03(3-0-0). Buyer Behavior. F, S. Prerequisite: BK 200 or BK 305. Credit not allowed for both BK 361 and AM 472. Marketing analysis of buying behavior of individuals, households, businesses, and not-for-profit organizations.

BK 362 03(3-0-0). Professional Selling. F, S. Prerequisite: BK 300 or BK 305. Persuasive personal communications in selling consumer and industrial products and services.

BK 363 03(3-0-0). Sales Management. S. Prerequisite: BK 300 or BK 305. Recruiting, selecting, training, compensating, motivating, supervising, and evaluating a sales force.

BK 364 03(3-0-0). Product Development and Management. F. Prerequisite: BK 300 or BK 305. Consumer and industrial product development and management issues as an integral part of the marketing mix.
BK 365 03(3-0-0). International Marketing. F, S. Prerequisite: BK 300 or BK 305. Analysis of international markets and development of strategic and tactical options for marketing across national boundaries.

BK 410 03(3-0-0). Marketing Research. F, S. Prerequisite: BK 300 or BK 305. Role and methodology of research in business emphasizing selection of study's direction, collecting data, and choosing techniques for analyzing these data.

BK 440 03(3-0-0). Pricing and Financial Analysis in Marketing. F, S. Prerequisite: BK 300 or BK 305. Financial analysis involved in addressing marketing problems; advanced study of pricing strategy and tactics.

BK 479 03(3-0-0). Marketing Strategy and Management. F, S. Prerequisite: BK 410, BK 440. Marketing decisions involving integration of elements of the marketing mix.

BK 487 Var. Internship. Prerequisite: Marketing majors with written consent of instructor. Maximum of 6 credits allowed in course.

BK 492 03(0-0-3). Seminar. Prerequisite: BK 300 or BK 305; written consent of instructor.

BK 495 Var. Independent Study. Prerequisite: 2.75 GPA or better.

BK 496 Var. Group Study.

BK 615 02(2-0-0). Marketing Research and Needs Identification. S, SS. Prerequisite: Admission to graduate degree program. Analysis of consumer industrial product developments, market needs and research, and related management issues.

BK 625 02(2-0-0). Managing Customer Service. F. Prerequisite: Minimum of 9 graduate credits in management. Understanding impact of operations, human resources, and marketing on customer service.

BK 635 03(3-0-0). Managing Business Customer Relationships. F. Prerequisite: Market analysis, planning, and decision making in marketing to business, governments, and other organizations.

BK 640/BL 640 02(2-0-0). Supply Chain Management Strategies. F. Prerequisite: BL 600. Credit not allowed for both BL 640 and BK 640. How to create an effective supply chain management system to establish an efficient network for supplying final consumption.

BK 692 03(0-0-3). Seminar. Critical review and discussion of relevant marketing topics.

BK 695 Var. Independent Study. Prerequisite: 3.25 GPA or better.

BK 696 Var. Group Study.


**BUSINESS PRODUCTION AND OPERATIONS MANAGEMENT COURSES**

**Department of Management**

**College of Business**

BL 300 03(3-0-0). Production Fundamentals. F, S, SS. Prerequisite: ST/STCC 204 or ST/STCC 301. Fundamental concepts in design, planning, operation, and control of producing systems, and decision making in the production function.

BL 420 03(3-0-0). Macro Issues in Production Management. S. Prerequisite: BD 301, BL 300, BQ 375. Managerial decisions in broadly scoped production management issues; aggregate planning, project scheduling, manufacturing planning and control.

BL 471 03(3-0-0). Production Scheduling and Inventory Management. F, S. Prerequisite: BL 300. Micro applications of scheduling strategies and inventory management applied in day-to-day operations and material management; MRP II systems.

BL 487 Var. Internship.

BL 495 Var. Independent Study.

BL 565/BD 565 03(2-3-0). Enterprise Computing and Systems Integration. F. Prerequisite: Admission to M.S. program. Credit not allowed for both BL 565 and BD 565. Business issues of systems integration, implementation issues, business process reengineering, metrics, and accountability.

BL 600 03(3-0-0). Manufacturing Process and Systems Design. S. Prerequisite: BL 620, BL 625, BK 615. Strategic understanding of alternate manufacturing processes and systems design support needed to manage those processes.

BL 640/BL 640 02(2-0-0). Supply Chain Management Strategies. F. Prerequisite: BL 600. Credit not allowed for both BL 640 and BK 640. How to create an effective supply chain management system to establish an efficient network for supplying final consumption.

BL 695 Var. Independent Study.

**BUSINESS MANAGEMENT COURSES**

**Department of Management**

**College of Business**

BN 305 03(3-0-0). Fundamentals of Management. F, S, SS. Credit not allowed for both BN 305 and BN 320. Managerial process of planning, directing, and controlling inputs of an organization. Analysis, decision making, and survey of research literature.

BN 320 03(2-0-1). Organization Management. F, S, SS. Prerequisite: BG 200. Credit not allowed for both BN 320 and BN 305. Fundamentals of management and organizational behavior in the work environment.
BN 330 03(3-0-0). Organizational Theory. F, S. Prerequisite: BN 320 or BN 305. Design, structure, and change of organizations.

BN 340 03(3-0-0). Entrepreneurship in the Contemporary World. S. Prerequisite: BG 200. Concepts of entrepreneurship and role of entrepreneurs in the economy.

BN 410 03(3-0-0). Organizational Behavior. F, S. Prerequisite: BN 320. Behavior of people and groups as members of organizations.


BN 425 03(3-0-0). Strategic Communications in Organizations. F. Prerequisite: BD 200, BF 300, BK 300, BN 320. Strategic communications in organizations; contribution that organizational members make whether acting as individual or group communicators.

BN 440 03(3-0-0). New Venture Management. S. Prerequisite: BN 420. Theories and skills necessary for managing startup and existing small firms.

BN 450 02(2-0-0). Biomedical Entrepreneurship I. S. Prerequisite: BE 470 or BN 340 or written consent of instructor. Commercialization process for biomedical inventions; market and competitor analysis, regulations, patents; preliminary feasibility study.

BN 451 01(1-0-0). Biomedical Entrepreneurship II. F. Prerequisite: BN 450. Financing (especially regulatory financing) and operational issues.

BN 470 03(3-0-0). Managerial Decisions-Issues and Analysis. F, S. Prerequisite: BN 300, BN 320 or BN 305. Investigation and application of managerial decision-making processes and methods to solve problems in business functions.

BN 475 03(3-0-0). International Business Management. F, S. Prerequisite: BF 300, BK 300, BN 320. Multinational corporations: their scope, activities, managerial problems and decisions.

BN 487 Var. Internship.

BN 495 Var. Independent Study.

BN 496 Var. Group Study.

BN 608 03(3-0-0). Project Management. F. Prerequisite: Admission to graduate degree program. Project management using quantitative and computer-based tools.

BN 611 03(3-0-0). Management of Organization Development. S. Prerequisite: BN 320. Methods for managing organizational change.


BN 630 03(3-0-0). Management of Technology. F. Prerequisite: Admission to graduate degree program. Introduction to managing technological change in industries with short product life-cycle strategies.

BN 679 02(2-0-0). Strategic Management. S. Prerequisite: Thirty-one credits in M.S. Management Program. Integration of strategic management to create competitive advantages.

BN 695 Var. Independent Study.

BN 696 Var. Group Study.


BUSINESS INDUSTRIAL RELATIONS COURSES

Department of Management
College of Business

BP 310 03(3-0-0). Human Resource Management. F, S. Principles and practices of employee management including hiring, development, compensation, and employee relations.

BP 350 03(3-0-0). Employment Law and Policy. F. Legal principle and policy issues arising from the employment relationship.

BP 451 03(3-0-0). Human Resource Planning and Development. S. Prerequisite: BP 310. Human resource planning, recruitment, selection, training, and development.

BP 471 03(3-0-0). Labor Relations and Collective Bargaining. F, S. Managerial decision making and action in labor-management relations as affected by labor legislation and administrative practices.

BP 487 Var. Internship.

BP 495 Var. Independent Study.

BP 600 03(3-0-0). Strategic Human Resource Management. S. Prerequisite: BP 310. Strategic systems for employee management including planning, staffing, evaluation, development, reward, and maintenance.

BP 671 03(3-0-0). Labor Management Relations. S. Collective bargaining process, administration of contract, and impact of public policy on industrial relations.

BP 695 Var. Independent Study.

BUSINESS MANAGEMENT SCIENCE COURSES

Department of Computer Information Systems
College of Business

BO 270 03(2-2-0). Basic Business Statistics. F, S, SS. Prerequisite: ST/STCC 204. Statistical tools applied to business conditions and functions.
BQ 375 03(2-2-0). Models and Applications in Management Science. F, S. Prerequisite: ST/STCC 204. Introduction and application of operations research techniques to business decision problems.

BQ 570 03(3-0-0). Statistical Decision Making. F, SS. Prerequisite: BQ 270. Classical statistical techniques including hypothesis testing and multiple regression; model building, control charts, time series and forecasting.

**BIOLICAL SCIENCE COURSES**

**College of Natural Sciences**

- BY 103 04(3-2-0). Biology of Organisms-Animals and Plants. F, S. SS. Prerequisite: BY/LSCC 102. Special fee, $5. Diversity of animals and plants; their structural and functional characteristics.

- BY 220 03(3-0-0). Fundamentals of Ecology. F, S. Prerequisite: One course in biology; M/M CC 124 or M/M CC 141 or M/M CC 155. Credit not allowed for both BY 220 and BY 320. Also offered as online course. Interrelationships among organisms and their environments.

- BY 221 01(0-3-0). Introductory Ecology Field Laboratory. F, S. Prerequisite: BY 220 or concurrent registration. Special fee, $25. Field and laboratory exercises where students learn and apply methods in ecology.

- BY 310 04(3-3-0). Cell Biology. F, S. Prerequisite: One semester of organic chemistry or concurrent registration; two semesters of introductory biology. Structure and function of cells emphasizing molecular mechanisms. Communication, metabolism, motility, genetics, growth, reproduction.

- BY 311 04(3-2-0). Developmental Biology. S, SS. Prerequisite: BY 310 or written consent of instructor. Developmental aspects of growth and differentiation stressed in higher plants and animals.

- BY 320 03(3-0-0). Ecology. F, S. Prerequisite: One course in biology; M/M CC 155. Credit not allowed for both BY 320 and BY 220. Interrelationships among organisms and their environments using conceptual models and quantitative approaches.

- BZ 384 Var [1-3]. Supervised College Teaching. F, S, SS. Prerequisite: 3.0 overall GPA, written consent of instructor, grade of A in course with which student assists. Maximum of 6 credits allowed in course. Students assist faculty with various aspects of BY courses.

**BOTANY/ZOOLOGY COURSES**

**Department of Biology**

**College of Natural Sciences**

- BZ 100 03. Introduction to Biology. F, S, SS. Offered as telecourse only. Basic concepts in biology, including genetics, the human body, and interactions with their environment.

- BZCC 101 03(3-0-0). Humans and Other Animals. F, S, SS. Credit not allowed for students who have already taken BY/LSCC 102 or BY 103 or BZ/BZCC 110. Characteristics of animals, their evolution and diversity; humans considered as an animal.

- BZCC 104 03(3-0-0). Basic Concepts of Plant Life. F, S, SS. For non-science and physical science majors. Credit not allowed for students who have already taken BY/LSCC 102 or BY 103 or BZ/BZCC 120. Broad concepts of biology with major emphasis on plant life.

- BZCC 105 01(0-2-0). Basic Concepts of Plant Life Laboratory. F, S, SS. Prerequisite: BZ/BZCC 104 or concurrent registration. Special fee, $5. Modern biology exercises including viruses, Monera, Protista, fungi, plants, genetics, physiology, and ecology.

- BZCC 110 03(3-0-0). Principles of Animal Biology. F, S, SS. General features (body form, physiology, life history, ecology) and evolutionary relationships of major phyla of animals.

- BZCC 111 01(0-2-0). Animal Biology Laboratory. F, S, SS. Prerequisite: BZ/BZCC 110 or concurrent registration. Laboratory exercises demonstrating major features of animal biology and major phyla of animals.

- BZCC 120 04(3-2-0). Principles of Plant Biology. F, S. Prerequisite, $5. Diversity of relationships of plants and their structural and functional characteristics.

- BZCC 192 02(0-2-2). First-Year Seminar in Life Sciences. F, S. Restricted to Botany, Zoology, and Biological Science majors. Introduction to the resources and academic programs in biology; the role of biosciences.

- BZ 212 04(3-3-0). Animal Biology-Invertebrates. S. Prerequisite: BY 103 or BZ/BZCC 111. Special fee, $15. General biology of invertebrates; their characteristics, classification, and adaptations.

- BZ 214 04(3-3-0). Animal Biology-Vertebrates. F. Prerequisite: BY 103 or BZ/BZCC 111. Special fee, $9. General biology of vertebrates; their characteristics, classification, and adaptations.

- BZ 220 03(3-0-0). Introduction to Evolution. F, S. Prerequisite: BY 103 or BZ/BZCC 111 and BZ/BZCC 111 or BZ/BZCC 120. Fundamental concepts in evolutionary biology.

- BZ 223 03(2-0-0). Plant Identification. F, S. Prerequisite: BY 103 or BZ/BZCC 120. Relationships and identification of flowering plants.

- BZ 250 03(3-0-0). Economic Biology. F. Prerequisite: BY 103, or BZ/BZCC 110, BZ/BZCC 120. Plants and animals of economic importance to mankind.

- BZ 300 03(3-0-0). Animal Behavior. F. Prerequisite: BY 103 or BZ/BZCC 111. 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. Special fee, $15. Laboratory experiments in animal behavior; demonstrations and independent investigations.

- BZ 302 03(2-2-0). Poisonous Plants. F. Prerequisite: BY 103 or BZ/BZCC 120. Identification and toxic properties of certain plants; animal reactions to more important ones.
BZ 310/PS 310 03(3-0-0). Fundamentals of Physiology. S. Prerequisite: BY/LSCC 102 or BZ/BZCC 103 or BZ/BZCC 110; C 245 or concurrent registration. Credit not allowed for both BZ 310 and PS 310.

Basic mechanisms of physiology: comparative and quantitative.

*BZ 315 03(3-0-0). Marine Ecology. F. Prerequisite: BY 103 or BZ/BZCC 111 and BZ/BZCC 120. Marine organisms, habitats, and communities.

*BZ 321 03(1-4-0). Aquatic Vascular Plants. F. Prerequisite: BZ 223 or BZ 325 or written consent of instructor.

Taxonomic relationships and identification of aquatic vascular plants.

*BZ 325 04(3-2-0) Plant Systematics. S. Prerequisite: BY 103 or BZ/BZCC 120.

Principles and contemporary methods of classification of plants, and the application of modern phylogenetic theory in comparative biology.

*BZ 329 03(2-0-0). Herpetology. S. Prerequisite: BZ 214. Biology of amphibians and reptiles.

BZ 330 03(2-2-0). Mammalogy. F. Prerequisite: BY 103 or BZ/BZCC 111. Evolution, classification, and biology of mammals: practice in identifying and preparing specimens.

*BZ 332 04(3-2-0). Introductory Physiology. F. Prerequisite: BY/LSCC 102 or BY 103 or BZ/BZCC 120.

Principles and contemporary methods of classification of plants, and the application of modern phylogenetic theory in comparative biology.

*BZ 338 04(2-4-0). Introductory Mycology. F. Prerequisite: BY 103 or BZ/BZCC 120. Taxonomic decisions regarding species and higher categories.

*BZ 339 04(2-2-0). Ornithology. S. Prerequisite: BY 103 or BZ/BZCC 111 and BZ/BZCC 120.

Origin and contemporary methods of classification of birds, and the application of modern phylogenetic theory in comparative biology.

*BZ 344 03(2-0-0). Physiology of Plant Growth and Development. F. Prerequisite: BZ/BZCC 111. Physiology of jawless, cartilaginous, and bony fishes, with emphasis on maintaining homeostasis of the internal environment.

*BZ 401 03(3-0-0). Comparative Animal Physiology. F. Prerequisite: BY 103 or BZ/BZCC 111. Physiology of the nervous system, endocrine system, and skeletal system of animals.

*BZ 402 04(3-3-0). Chromosomes of Eukaryotes. S. Prerequisite: BY 310. Origin, evolution, structure, and function of eukaryotic chromosomes during interphase, mitosis, and meiosis.

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

*BZ 405 03(3-0-0). Fish Physiology. S. Prerequisite: BY 103, C 113, PH/PHCC 110. Physiology of jawless, cartilaginous, and bony fishes, with emphasis on maintaining homeostasis of the internal environment.

*BZ 421 03(1-4-0). Grass Systematics. S. Prerequisite: BZ 223 or BZ 325 or written consent of instructor.

Systematic relationships and identification of grasses and grass-like plants.

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

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

*BZ 425 03(2-0-0). History of Biology. S. Prerequisite: BY 103 or BZ/BZCC 111 and BZ/BZCC 120. History of biological concepts from prehistoric to modern times.

*BZ 433 03(3-0-0). Behavioral Genetics. F. Prerequisite: One course in genetics.

Genetics of behavioral characteristics in human and infrahuman species.

*BZ 440 03(3-0-0). Plant Physiology. F. S. Prerequisite: BY 103 or BZ/BZCC 120; C 245 or concurrent registration.

Functions and activities of plants.

*BZ 441 02(0-2-1). Plant Physiology Laboratory. F. S. Prerequisite: BZ 440 or concurrent registration.

Laboratory applications of plant physiology principles.

*BZ 445 03(2-2-0). Physiology of Plant Growth and Development. F. S. Prerequisite: BZ 440. Physiology of plant growth and development.

*BZ 446 02(2-0-0). Physiology of Seeds. F. Prerequisite: BZ 440. Physiology of plant growth and development.

*BZ 450 03(3-0-0). Plant Ecology. F. Prerequisite: BZ 223 or BZ 325. Physiology of plant growth and development.

Effects of environmental factors on germination, dormancy, and longevity of seeds.

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

*BS 462/MB 462/EN 462 05(3-4-0). Parasitology and Vector Biology. F. Prerequisite: BY 103 or BZ/BZCC 110, MB 301 or MB 302 or BZ 212. Credit allowed for only one of the following: BZ 462, MB 462, EN 462.

Protozoa, helminths, and insects and related arthropods of medical importance; systematics, epidemiology, host damage and control.
*BZ 470 04(2-4-0). Freshwater Biology. S. Prerequisite: BY 103 or BZ/BZCC 111. Biology and evolutionary ecology of freshwater organisms, including collection and identification.


+BZ 472 01(0-3-0). Stream Biology and Ecology Laboratory. F. Prerequisite: BZ 471 or concurrent registration. Special fee, $13. Field sampling and laboratory analysis of habitats, biota, and ecological relationships in running waters.

+BZ 474 03(2-2-0). Limnology. F. Prerequisite: BY 220 or BZ 470. Special fee, $13. Biology, chemistry, and physics of lakes including limnological methods.

+BZ 475 04(2-3-1). Advanced Ecology. F. Prerequisite: BY 220. Special fee, $15. Current theory in populations and community ecology; emphasis on field techniques and independent projects.

*BZ 476 03(3-0-0). Topics in Advanced Genetics. F. Prerequisite: BZ 350 or SC 330. Advanced topics in model genetic systems including molecular and developmental genetics.

+BZ 477 05(2-6-0). Field Biology. S, SS. Prerequisite: BY 103 or BZ/BZCC III, BZ/BZCC 120. Special fee, $125. Techniques useful in analysis of natural populations including field experience.

BZ 478 03(3-0-0). Molecular and Developmental Evolution. S. Prerequisite: M/M CC 155, ST/STCC 301 or ST/STCC 307 or EH/EBCC 307. Biological mechanisms of evolutionary change in populations and results of their operation.


BZ 495 Var [1-3]. Independent Study. Maximum of 7 credits allowed in course.

*BZ 505 03(2-3-0). Ecology of Parasitism. S. Prerequisite: BZ 462. Host, parasite, and environment as interacting systems.

*BZ 507 03(2-3-0). Parasitic Protozoa. S. Prerequisite: BZ 462. Protozoa as disease agents: classification, identification, transmission, and host-parasite relations.

BZ 510 03(3-0-0). Zoophysiologico Ecology. S. Prerequisite: One course in physiology, one course in ecology.

Concepts, principles, and examples of adaptive physiological strategies used by animals.

*BZ 530 02(2-0-0). Ecological Plant Morphology. S. Prerequisite: One course in ecology, written consent of instructor.

Adaptive significance and evolution of plant form and structure.

*BZ 535 03(3-0-0). Behavioral Ecology. S. Prerequisite: BY 103 or BZ/BZCC 111; BZ 300, M/M CC 155, one course in ecology.

Integrative approach to ecology, animal behavior, evolution; emphasis on foraging, social organization, communication in birds and mammals.

*BZ 536 03(3-0-0). Cellular Basis of Behavior. S. Prerequisite: AY 300/PS 300, BZ 300, or written consent of instructor.

Exploration of how nerve cells produce behavior in multi-cellular animals.

*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(4-0-0). 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 545/A 545 02(2-0-0). Plant Tissue Culture. F. Prerequisite: BZ 440. Credit not allowed for both BZ 545 and A 545. Theory, technology, and techniques of cell, organ, tissue, and protoplast culture of plants.

*BZ 546/A 546 01(0-2-0). Plant Tissue Culture Laboratory. F. Prerequisite: BZ 440 or concurrent registration. Credit not allowed for both BZ 546 and A 546. Laboratory techniques of cell, organ, tissue, and protoplast culture of plants.


*BZ 551 03(3-0-0). Plant Geography. S. Prerequisite: BZ 450. Floristic and ecological principles of plant geography.

*BZ 555 03(3-0-0). Reproductive Biology of Higher Plants. F. Prerequisite: BZ 223 or BZ 323 or written consent of instructor.

Reproductive processes influencing evolution in higher plant groups.

*BZ 560 03(1-2-2). Ethological Methods. S. Prerequisite: BZ 300. Ethological methods used in both descriptive and experimental studies of animal behavior.

BZ 561 03(3-0-0). Landscape Ecology. F. Prerequisite: One course in ecology, one course in statistics, and 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 562/MB 562/EN 562 05(1-8-0). Field Ecology of Disease Vectors. S. Prerequisite: BZ 462/MB 462/EN 462 or MB 300; EN 302. Credit allowed for only one of the following: BZ 562, MB 562, EN 562. Evolution, morphology, life cycles, and field biology of disease vectors; field techniques and experience in surveillance of arthropods and pathogens.

*BZ 570 03(3-0-0). Molecular Aspects of Plant Development. F. Prerequisite: BZ 150 or SC 330 or BC 463 or MB 450. Various aspects of plant development at the molecular level.

BZ 576 03(2-2-0). Biophysical Ecology. S. Prerequisite: BZ 450 or BZ 475, M/M CC 155, P/PHCC 110. Interactions of organisms with their environments to exchange energy and mass; physiological, behavioral, and ecological implications.
CHEMISTRY COURSES

Department of Chemistry
College of Natural Sciences

C CC 103 01(3-0-0). Chemistry in Context. F, S, SS. For students who do not plan to take additional courses in chemistry. Chemistry, chemical principles from more conceptual, less mathematical perspective; how chemical substances, chemical reactions affect our daily lives.

C CC 104 01(0-1-3). Chemistry in Context Laboratory. F, S, SS. Prerequisite: C CC 103 or concurrent registration. Laboratory applications of principles covered in C CC 103.

C CC 107 04(4-0-0). Fundamentals of Chemistry. F, S, SS. Prerequisite: M/M CC 121 or placement in M/M CC 121 or higher. For students in science-related programs requiring a year of chemistry. Quantitative reasoning but with less focus on mathematical calculations than C CC 111/C CC 112. Credit not allowed for both M/M CC 111 and C CC 112.

C CC 108 01(0-3-0). Fundamentals of Chemistry Laboratory. F, S, SS. Prerequisite: C CC 107 or concurrent registration. Credit not allowed for both C CC 108 and C CC 112.

C CC 111 04(3-0-1). General Chemistry I. F, S, SS. Prerequisite: M/M CC 121 or placement in M/M CC 124 or higher. Intended for science majors. Students should complete the sequence: C CC 111/ C CC 112/C CC 113/C CC 114. Credit not allowed for both C CC 111 and C CC 112.

C CC 112 01(0-3-0). General Chemistry Laboratory I. F, S, SS. Prerequisite: C CC 111 or concurrent registration. Credit not allowed for both C CC 108 and C CC 112.

C CC 114 01(0-3-0). General Chemistry Laboratory II. F, S, SS. Prerequisite: C CC 111 or concurrent registration. Laboratory applications of principles covered in C CC 111.

C CC 118 02(1-0-1). Introductory Seminar in Chemistry. F. Small-group discussions of aspects of University life and of chemistry.

C CC 245 04(4-0-0). Fundamentals of Organic Chemistry. F, S, SS. Prerequisite: C CC 107 or concurrent registration. Credit not allowed for both C CC 245 and C CC 107. Intended for students in science-related programs requiring a year of chemistry. For students who need only one semester of organic chemistry. Nomenclature, structure, bonding, reactions, mechanisms, synthesis, stereochemistry of organic compounds.

C CC 246 01(0-3-0). Fundamentals of Organic Chemistry Laboratory. F, S. Prerequisite: C CC 108 or C CC 112 or C CC 114; C CC 245 or concurrent registration. Credit not allowed for both C CC 246 and C CC 344. Special fee, $20.

C CC 261 03(3-0-0). Fundamentals of Inorganic Chemistry. S. Prerequisite: C CC 113. Preparation, structures, properties, and reactions of chemical elements and inorganic compounds; periodic trends, organizing principles; applications.

C CC 331 03(3-0-0). Quantitative Analysis. F, S. Prerequisite: C CC 113. Volumetric, spectrophotometric, electrochemical methods of analysis; analytical applications of acid-base, solubility, redox, and complex ion equilibria.

C CC 332 02(0-6-0). Quantitative Analysis Laboratory. F. S. Prerequisite: C CC 114 or concurrent registration. Special fee, $20.

Laboratory applications of principles presented in C CC 331.
C 334 01(0-3-0). Quantitative Analysis Laboratory. F, S. Prerequisite: C 114; C 331 or concurrent registration. Special fee, $20. Laboratory applications of principles presented in C 331.

C 341 03(3-0-0). Organic Chemistry I. F, S. Prerequisite: C 113. Intended for science majors. Students should plan to complete the sequence C 341/C 343/C 344. Credit not allowed for both C 245 and C 341. Structure, nomenclature, dynamics, spectroscopy, reactions of organic molecules.

C 343 03(3-0-0). Organic Chemistry II. F, S. Prerequisite: C 341. Continue studies of reactions and mechanisms of organic molecules.

C 344 02(0-6-0). Organic Chemistry Laboratory. F, S. Prerequisite: C 114; C 343 or concurrent registration. Credit not allowed for both C 344 and C 246. Special fee, $20. Laboratory applications of principles presented in C 341/C 343.

C 384 Var [1-3]. Supervised College Teaching. F, S, SS. Prerequisite: Twenty credits in chemistry, written consent of department head. Maximum of 10 credits allowed in course.

C 431 03(3-0-0). Instrumental Analysis. F. Prerequisite: C 332 or C 334, C 471 or C 476 or concurrent registration.

C 432 03(3-0-0). Clinical Chemistry. S. Prerequisite: C 344 or C 334; one semester of biochemistry. Principles and methodology of clinical chemistry. Laboratory experience in methodology and method development.

C 440 02(0-6-0). Advanced Organic Chemistry Laboratory. F. Prerequisite: C 343, C 344. Special fee, $20. Advanced techniques in organic synthesis, mechanisms of reactions, structure determination.

C 461 03(3-0-0). Inorganic Chemistry. S. Prerequisite: C 261; C 476 or concurrent registration. Concepts, models to explain structural, spectroscopic, magnetic, thermodynamic, and kinetic properties of inorganic compounds; symmetry, group theory.

C 462 02(0-6-0). Inorganic Chemistry Laboratory. S. Prerequisite: C 461 or concurrent registration. Synthetic techniques and instrumental methods in inorganic chemistry.

C 471 04(4-0-0). Fundamentals of Physical Chemistry. F. Prerequisite: C 113; M/M CC 161 or M/M CC 255; PH/PH CC 122 or PH/PH CC 142. Credit not allowed for both C 471 and C 474. Thermodynamics; electrolyte solutions; transport phenomena; kinetics, quantum theory, molecular structure, spectroscopy, statistical thermodynamics.

C 474 03(3-0-0). Physical Chemistry I. F. Prerequisite: C 113, M 261, PH/PH CC 142. Credit not allowed for both C 474 and C 471. Quantum chemistry, applications to bonding, molecular structure, and spectroscopy.

C 476 03(3-0-0). Physical Chemistry II. S. Prerequisite: C 474. Statistical thermodynamics; applications to phase and chemical equilibria; kinetics.

C 478 02(0-6-0). Physical Chemistry Laboratory. F, S. Prerequisite: C 471 or C 474; and C 332 or C 334 or CB 333. Planning and execution of physicochemical experiments; interpretation and presentation of experimental data; formal laboratory reports.

C 487 Var. Internship. Prerequisite: C 476. Maximum of 12 credits allowed for any combination of C 284, C 487, C 495, C 498. Supervised work experience in approved off-campus chemical laboratory setting. Consultation with faculty adviser/instructor.

C 493 02(0-0-2). Seminar. Prerequisite: C 476. Critical analyses of selected literature; develop presentation of technical topic; required oral presentation.

C 495 Var [1-3]. Independent Study. Prerequisite: Twenty credits in chemistry, written consent of laboratory mentor and department chair.

C 498 Var [1-3]. Research. Prerequisite: Twenty credits in chemistry, written consent of research mentor and department chair. Supervised laboratory research in chemistry, written report required.

C 511 03(3-0-0). Solid State Chemistry. F. Prerequisite: C 461, C 476. Physical and descriptive chemistry of solids including characterization and synthetic methods.

C 515 03(3-0-0). Polymer Chemistry. S. Prerequisite: C 343, C 476. Fundamentals of polymer chemistry: synthesis, characterization, physical properties.


C 531 03(3-0-0). Advanced Chemical Analysis I. F. Prerequisite: C 431 or concurrent registration. Chemical equilibria, electrochemistry, analytical separations, introduction to molecular spectroscopy.

C 532 03(3-0-0). Advanced Chemical Analysis II. S. Prerequisite: C 431. Advanced optics, instrumentation and methodology for analytical spectroscopy; computer applications.

C 537 03(3-0-0). Electrochemical Methods. S. Prerequisite: C 531. Theory and methods of electrochemistry, applications of modern electrochemical techniques.

C 541 03(3-0-0). Organic Spectroscopy. S. Prerequisite: C 440. Organic structure determination by spectroscopic methods.

C 543 03(3-0-0). Structure/Mechanism in Organic Chemistry. F. Prerequisite: C 343. Structure including stereochemistry and conformational isomerism; reactivity and mechanisms in organic chemistry.

C 545 03(3-0-0). Synthetic Organic Chemistry I. S. Prerequisite: C 543. Reactions and synthesis in organic chemistry.

C 547 03(3-0-0). Physical Organic Chemistry. S. Prerequisite: C 543. Theory and techniques in physical organic chemistry.


C 551 03(3-0-0). Organometallic Chemistry. S. Prerequisite: C 343. Descriptive and mechanistic organometallic chemistry applied to homogeneous catalysis and organic synthesis.
C 561 03(3-0-0). Advanced Inorganic Chemistry. F. Prerequisite: Written consent of instructor.
Chemistry of compounds of representative elements and transition metals.

C 563A-F 01(1-0-0) Physical Methods in Inorganic Chemistry. F.S. Prerequisite: C 561.

*C 565 03(3-0-0). Inorganic Mechanisms. F. Prerequisite: C 476 or written consent of instructor.
Fundamental tools, key principles, selected classic case histories of inorganic and organometallic mechanistic chemistry, emphasizing kinetic methods.

C 567 01(1-0-0). Crystallographic Computation. F, S. Prerequisite: C 476.
Theory and practice of structural computations using single crystal X-ray diffraction data.

*C 569 03(3-0-0). Chemical Crystallography. S. Prerequisite: C 476.
Theory and practice of determination of crystal and molecular structure by single crystal X-ray and neutron diffraction.

C 570 03(3-0-0). Chemical Bonding. F. Prerequisite: C 476.
Chemical bonding models; basis set expansion approach; origins of perturbation methods; electron correlation.

C 571 03(3-0-0). Advanced Physical Chemistry. F. Prerequisite: C 476.

*C 575 03(3-0-0). Chemical Thermodynamics. F. Prerequisite: C 476.
Thermodynamic concepts and their applications to chemical problems.

C 576 03(3-0-0). Statistical Mechanics. S. Prerequisite: C 476 or written consent of instructor.
Principles of statistical mechanics with application in the chemical sciences.

*C 577 03(3-0-0). Surface Chemistry. S. Prerequisite: C 471.
Capillarity; interfacial thermodynamics; electrical aspects of surface chemistry, adurbed layers.

*C 579 03(3-0-0). Chemical Kinetics. F. Prerequisite: C 476.
Elementary reactions, unimolecular reactions, reactions in solution, gas phase ion chemistry, photochemistry, and kinetic modeling.

C 651A-D Var 11-4. Special Topics in Chemistry. F, S. Prerequisite: Written consent of instructor.

C 695 Var [1-3]. Independent Study.

CHEMICAL AND BIORESOURCE ENGINEERING COURSES

Department of Chemical and Bioresource Engineering

College of Engineering

CBCC 1043(2-2-0). Strategies of Engineering Problem Solving. S. Prerequisite: CBCC 192.
Engineering approach to problem solving, computer programming, term project.

CBCC 192 03(2-2-0). Strategies of Engineering Design. Special fee, $12.
Engineering design and problem solving, measurements, calculations, and statistics, team projects; technical presentation skills.

CB 201 03(3-0-0). Material and Energy Balances. F. Prerequisite: C/C CC Ill, M/M CC 160, PH/PHCC 141, one course in computer programming.
Principles of chemistry, physics, and mathematics applied to development of material and energy balances; illustration of concepts.

CB 202 03(3-0-0). Thermodynamic Process Analysis. S. Prerequisite: CB 201.
Thermodynamic fundamentals and applications to ideal and non-ideal mixtures, power cycles, and chemical equilibrium.

CB 204/ EV 204 03(2-2-0). Agricultural and Environmental Measurements. S. Prerequisite: PH/PHCC 110 or PH/PHCC 141. Credit not allowed for both CB 204 and EV 204.
Measurement techniques for analysis and design of agricultural and environmental systems based on engineering principles.

CB 330 03(3-0-0). Process Simulation. F. Prerequisite: CB 202, concurrent registration in M 340.
Analysis of chemical engineering problems by numerical simulation.

CB 331 03(3-0-0). Momentum Transfer and Mechanical Separations. F. Prerequisite: CB 201, M 340; CB 202 or ME 237.
Fluid properties; conservation equations; compressible and incompressible flow; pumping and metering; mixing; separation of fluid-solid mixtures.
CB 332 03(3-0-0). Heat Transfer and Thermal Separations. F. Prerequisite: M 340; CB 331 or CE 300 or concurrent registration.
Conservation of energy; thermal processes; steady and unsteady conduction; convective heat transfer; radiation; heat exchange equipment design.

CB 333 02(0-6-0). Momentum and Heat Transfer Laboratory. S. Prerequisite: CB 332.
Momentum and heat transfer experimentation; rheology, heat exchangers, steam condensation, drying.

CB 341 04(4-0-0). Equilibrium-Styled Separations. S. Prerequisite: CB 202 or ME 237; one course in physical chemistry.
Thermodynamics of phase equilibrium; distillation; absorption and stripping; washing and extraction; energy conservation; process economics.

CB 360/SC 360 03(2-2-0). Geographic Information Systems in Agriculture. F. Prerequisite: CB 110. Credit not allowed for both CB 360 and SC 360.
Introduction to geographic information systems and global positioning systems with applications to agriculture.

CB 405 03(3-0-0). Nonpoint Source Pollution. F. Prerequisite: One course in soil science, hydrology, or fluid mechanics.
Principles, processes, impacts, and control of nonpoint source pollution of surface and groundwater.

CB 406 03(3-0-0). Introduction to Transport Phenomena. F. Prerequisite: C 474, CB 332.
Fundamental treatment of momentum and mass transport processes; dimensional analysis for parameter identification and order of magnitude estimation.

CB 420 03(3-0-0). Chemical Reactor Design. S. Prerequisite: M 340, one course in physical chemistry.
Mechanisms and rates of chemical reactions; design of homogeneous and heterogeneous reactors; enzyme reactions.

CB 430 04(4-2-0). Process Control and Instrumentation. S. Prerequisite: CB 332, CB 341, CB 420.
Measurement and control of process variables; transient behavior of chemical processes; feedback, feedforward, and computer control concepts.

CB 439/CE 439 03(2-3-0). Environmental Engineering Chemical Concepts. F. Prerequisite: C 113, M 340. Credit not allowed for both CB 439 and CE 439.
Application of chemical principles to environmental engineering problems.

CB 442/EV 442 03(3-0-0). Rate-Controlled Separations. F. Prerequisite: CB 331 or CE 300, M 340. Credit not allowed for both CB 442 and EV 442.
Diffusion, convective mass transfer; packed tower operations; electrophoretic and membrane separations; selection and sequencing of separations.

CB 443/EV 443 02(0-6-0). Mass Transfer and Separation Laboratory. F. Prerequisite: CB 341 or CB 442/EV 442 or concurrent registration. Credit not allowed for both CB 443 and EV 443.
Mass transfer experimentation: evaporation, distillation, solvent extraction, ion exchange, gas absorption, humidification.

CB 451 03(3-0-0). Chemical Engineering Design I. F. CB 341, CB 420, CB 442/EV 442 or concurrent registration.
Process synthesis and simulation; engineering economics principles.

CB 452 03(2-2-0). Chemical Engineering Design II. S. Prerequisite: CD 451.
Design projects requiring students to complete a process design with cost estimation; technical progress and final reports.

CB 460 03(3-0-0). Engineering Law and Ethics. S. Prerequisite: CO/COCC 150.
Legal system as it applies to engineers, managers, and consultants, including professional registration, liability, and ethics.

CB 462 03(3-0-0). Environmental Law. F, S. Prerequisite: CO/COCC 150.
Laws and regulations governing air, surface, and groundwater quality, solid, hazardous, and toxic wastes.

CB 464 04(3-2-0). Soil and Water Engineering. S. Prerequisite: CB 331 or CE 300 or SC 240.
Control of the soil-water-plant medium for optimum plant growth and environmental protection.

CB 466/ME 440 04(6-3-2-0). Design of Off-Highway Vehicles. F. Prerequisite: ME 237, CE 261 or CE 262. Credit not allowed for both CB 466 and ME 440.
Power sources, transmissions, wheels, tracks, and human factors for off-highway vehicles, tillage, and earthmoving machinery.

CB 470 01(0-0-1). Engineering Design I. S. Prerequisite: CB 201 or CB 264/EV 204.
Selection of engineering design project; development of project proposal.

CB 471 03(2-2-0). Engineering Design II. F. Prerequisite: CB 470.
Engineering project requiring each student to work on an individual basis with advisor; technical progress reports, final project report.

CB 493 01(0-0-1). Seminar.

CB 494-B Var. Independent Study.

CB 494-B Var. Group Study.

CB 501 03(3-0-0). Chemical Engineering Thermodynamics. F.
Definition, correlation, and estimation of thermodynamic properties; nonideal chemical and physical equilibria.

CB 502 03(3-0-0). Advanced Reactor Design. S. Prerequisite: CB 503 or written consent of instructor.
Nonideal flow and tracers, reactions and diffusion, evaluation of complex kinetics, stability of reactors; biochemical reactor examples.

CB 503 03(3-0-0). Transport Phenomena Fundamentals. S. Prerequisite: CB 466.
General topics in transport phenomena: analytical and numerical solutions of laminar flows; perturbation techniques; coupled transport.

CB 504 03(3-0-0). Fundamentals of Biochemical Engineering. F. Prerequisite: MB 300; M/M C1 C2 or CB 420 or concurrent registration.
Application of chemical engineering principles to enzyme kinetics, fermentation and cell culture, product purification, and bioprocess design.

CB 514 03(3-0-0). Polymer Science and Engineering. F. Prerequisite: C 343, C 474.

CB 521 03(3-0-0). Mathematical Modeling for Chemical Engineers. F. Prerequisite: CB 420, CB 442/EV 442, one course in computer programming.
Application of mathematical models to analysis and design of chemical reactors and separation processes.
CB 523 03(3-0-0). Separation Processes. S. Prerequisite: CB 341, CB 442/EV 442.
Integration of processes, multistage separations, continuous contacting devices, energy requirements.

CB 524 03(3-0-0). Environmental Biotechnology. S. Prerequisite: MB 300, CB 420 or CB 504 or CB 439/CE 439.
Use of microorganisms for pollution control. Biodegradation kinetics, bioreactor design, and in situ bioremediation.

CB 530 03(3-0-0). Irrigation Management for Water Quality. F. Prerequisite: CB 464.
Environmental impacts of irrigation, reduced environmental impact by improved design and management of irrigation; sustainability.

CB 531 CE 531 03(3-0-0). Groundwater Hydrology. F. Prerequisite: CE 300 or CB 331 or ME 342. Credit not allowed for both CB 531 and CE 531.
Groundwater occurrence, distribution, movement, exploration and recharge, well hydraulics and design, interaction of ground and surfacewater.

CB 532 03(3-0-0). Drainage and Wetlands Engineering. S. Prerequisite: CB 464.
Drainage and wetlands design for agricultural and natural resource applications. Water table modification for nonpoint sources pollution control.

CB 533 03(3-0-0). Water Control and Measurement. S.
Flow regulation and measurement in gravity flow irrigation systems for efficient and equitable water distribution among users.

CB 534/CE 534 03(2-3-0). Groundwater Measurements. F. Prerequisite: CB 531/CE 531 or concurrent registration. Credit not allowed for both CB 534 and CE 534.
Groundwater measurements of hydraulic properties and water quality using laboratory and field methods.

CB 535 03(3-0-0). Surface Irrigation Systems. F. Prerequisite: CB 464.
Design and evaluation of surface irrigation systems. Water measurements, conveyance and control structures, land forming.

CB 536 03(3-0-0). Sprinkler and Trickle Irrigation Systems. S. Prerequisite: CB 464, CE 300.
Basic principles, design, and evaluation of pressurized irrigation systems.

CB 537 01(0-3-0). Surface Irrigation Laboratory. F. Prerequisite: CB 535 or concurrent registration.
Outdoor laboratory experiments in surface irrigation.

CB 542 03(2-0-0). Engineering Applications of GIS and GPS. F.
Integration of GIS and GPS in the planning and decision-making process; application to case study.

CB 545/CE 545 03(3-0-0). Management and Monitoring of Water Quality. F. Prerequisite: CE 312/BE 312 or ER 418. Credit not allowed for both CB 545 and CE 545.
Management activities, information needs, data analysis protocols, network design, case studies.

CB 547/ST 547 03(3-0-0). Statistics for Environmental Monitoring. S. Prerequisite: ST/STC 301. Credit not allowed for both CB 547 and ST 547.
Applications of statistics in environmental pollution studies involving air, water, or soil monitoring; sampling designs; trend analysis; censored data.

CB 567 03(1-4-0). Monitoring and Evaluation of Irrigation Systems. SS. Prerequisite: CB 464, written consent of instructor.
Monitoring, evaluation, and feedback principles and practices applied to irrigation systems in northern Colorado.

*CB 568 03(1-0-2). Irrigation System Management. SS. Prerequisite: CB 567.
Principles of irrigation system management; analysis of case studies of irrigation systems around the world.

CB 603 03(3-0-0). Advanced Mass Transfer. S. Prerequisite: CB 503.
Molecular and turbulent diffusion and interphase mass transport. Applications to continuous contact separation processes.

CB 610 02(0-0-2). Irrigation Field Trip. SS. Prerequisite: CE 300 or SC 370.
Site visitations to observe various irrigation methods, practices, and water diversions in Colorado.

CB 621 03(3-0-0). Advanced Process Control. F. Prerequisite: CB 430.
Application of modern control theory to chemical processes. Computer control aspects emphasized.

CB 638/CE 638 03(3-0-0). Groundwater Quality and Contaminant Transport. S. Prerequisite: CB 531/CE 531. Credit not allowed for both CB 638 and CB 638.

CB 693 Var. Seminar I.

CB 695A-B Var. Independent Study.

CB 696A-B Var. Group Study.


CB 704 03(3-0-0). Advanced Fermentation Technology. S. Prerequisite: CB 504.
Media and air sterilization; scale-up; continuous culture; mixed cultures; fermentor design and instrumentation; recovery of fermentation products.

CB 705 03(3-0-0). Enzyme Technology. S. Prerequisite: CB 504.
Enzyme kinetics and preparation, soluble and immobilized enzyme technology.

CB 723 03(2-2-0). Biosorption Processes. S. Prerequisite: CB 504.
Analysis of processes used to recover and purify fermentation products.

CB 733/CE 733 03(3-0-0). Flow in Porous Media. S. Prerequisite: CE 300; CB 531/CE 531 or SC 470. Credit not allowed for both CB 733 and CE 733.
Mechanics of single and two-phase fluids in soils and porous rocks with application to infiltration, drainage, and petroleum production.

*CB 767 03(3-0-0). Advanced Irrigation Topics. S. Prerequisite: CB 535; CB 536.
Advanced topics selected from soil-water-plant relationships, irrigation hydraulics, irrigation management, developments in equipment.
CB 7844-B Var. Supervised College Teaching. F, S, SS.

CB 793A-B Var. Seminar II.

CB 795A-B Var. Independent Study.


**CIVIL ENGINEERING COURSES**

**Department of Civil Engineering**

**College of Engineering**

CE 104 01(3-0-0). Surveying. F. Prerequisite: M/M CC 125.
   Surveying fundamentals for civil engineering applications: leveling, horizontal and vertical control, horizontal curves, instrument operation, error.

CE 105 01(1-0-0). Civil Engineering Computing. F, S.
   Equation solver software with emphasis on TK Solver and applications in civil engineering.

CE 106 02(2-0-0). Introduction to Engineering Computer Graphics. F, S. Prerequisite: M/M CC 125.
   Creation and production of engineering drawings using AutoCad, including layering, annotated, and three-dimensional drawings.

CE 108 03(3-3-0). Civil Engineering Principles I. F.
   Civil engineering profession, computer applications and programming related to civil engineering; introduction to surveying.

CECC 192 03(2-2-0). Civil Engineering Principles II. S. Prerequisite: CE 108.
   Introduction to the profession and academic principles of civil engineering design; graphical, oral, and written communication; team projects.

CE 208 03(2-2-0). Civil Engineering Analysis I. F. Prerequisite: CECC 192.

CE 209 03(2-2-0). Civil Engineering Analysis II. S. Prerequisite: CC CC 111, CE 208, CE 260.
   Behavior and properties of construction materials, instrumentation, use of statistical tools, material standards, material selection, quality control.

   Forces using vector notation; static equilibrium of rigid bodies; friction, virtual work, centroids, and moments of inertia.

CE 261 03(3-0-0). Engineering Mechanics-Dynamics. F, S. Prerequisite: CE 260; CBCC 192 or CE 108 or MECC 192.
   Kinematics and kinetics of particles and rigid bodies; concepts of work-energy and impulse-momentum; computer applications; vector notation.

CE 262 04(3-2-0). Engineering Mechanics. F. Prerequisite: M/M CC 161, PH/PHCC 141.
   Forces, static equilibrium, mass center, moments of inertia, kinematics and kinetics of particles and rigid bodies.

CE 300 04(3-3-0). Fluid Mechanics. F, S. Prerequisite: CE 261 or CE 262, M/E 237.
   Fluid properties, statics, kinematics, and dynamics of fluid motion including viscous and gravitational effects.

CE 308 03(2-2-0). Civil Engineering Synthesis I. F. Prerequisite: CE 209; concurrent registration in CE 300.
   Civil engineering systems, simulation and optimization techniques, statistical tools and their use in civil engineering, risk analysis.

CE 309 03(2-2-0). Civil Engineering Synthesis II. S. Prerequisite: CE 308.
   Civil engineering infrastructure systems, numerical and decision analysis techniques, statistical and risk analysis, project management.

CE 322/EV 322 03(3-0-0). Basic Hydrology. F, S. Prerequisite: CE 300 or ER 416 or CB 331; ST/STCC 301 or ST/STCC 309 or CE 308, or written consent of instructor. Credit not allowed for both CE 322 and EV 322.
   Hydrologic cycle, soil moisture, ground water, runoff processes, water contamination, applications in water resources and environmental engineering.

CE 350 03(2-3-0). Soil Engineering for Nonengineers. F, S. Prerequisite: CE 359.
   Concepts of soil mechanics and soil behavior, elementary application to compaction, seepage, earth pressure, foundations, and slopes.

CE 359 03(3-0-0). Basics of Statics and Strength of Materials. F, S. Prerequisite: M/M CC 125, M/M CC 141, PH/PHCC 110 or PH/PHCC 121 or PH/PHCC 141.
   Forces and their components; static equilibrium; friction; section properties; stresses and deformations of elastic solids, combined stresses.

CE 360 03(3-0-0). Mechanics of Solids. F, S. Prerequisite: CE 260 or CE 262.
   Stresses and deformations in structural members and machine elements; combined stresses, stress transformation.

   Credit not allowed for both CE 362 and CE 363.
   Behavior of materials including metals, woods, plastics, and bituminous and Portland cement concretes; testing techniques and material standards.

CE 363 01(3-0-0). Material Properties. F, S. Prerequisite: CE 360.
   Credit not allowed for both CE 363 and CE 362.
   Mechanical properties of metals, woods, and plastics; testing techniques and standards.

CE 367 03(3-0-0). Structural Analysis. F, S. Prerequisite: CE 360.
   Determination of actions in and deformations of determinate and indeterminate structures.

CE 370 03(2-0-0). Introductory Structural Engineering. F, S. Prerequisite: CE 359, F 432.
   Behavior, design basics and construction concerns for structural members and systems of steel, reinforced or prestressed concrete, or masonry.

CE 384 var [1-5]. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course.
CE 401 03(3-0-0). Hydraulic Engineering. S. Prerequisite: CE 300.
Basic principles of fluid mechanics applied to practical problems in hydraulic engineering.

CE 408 03(2-2-0). Civil Engineering Design I. F. Prerequisite: CE 309.
Design of civil engineering systems, nontechnical and economic design considerations, project organization, design project development and presentation.

+CE 409 03(2-2-0). Civil Engineering Design II. S. Prerequisite: CE 408. Special fee, $11.
Group design projects of civil engineering systems, engineering business and management concepts, professional issues, project presentation.

CE 413 03(3-0-0). Environmental River Mechanics. S. Prerequisite: CE 300 or ER 416.
Fluvial geomorphology, sediment transport, river response with special emphasis on environmental aspects.

CE 423 03(3-0-0). Groundwater Engineering. S. Prerequisite: CE 300 or ER 416 or CB 331.
Development of groundwater resources; origin, movement, distribution of water below ground surface.

CE 438/EV 438 04(4-0-0). Pollution Control Engineering. F. Prerequisite: CE 113, CE 300 or CB 331 or ME 342. Credit not allowed for both CE 438 and EV 438.
Environmental engineering approaches to designing water supply, wastewater removal, and pollution control.

Application of chemical principles to environmental engineering problems.

CE 450 04(3-0-0). Introduction to Geotechnical Engineering. S. Prerequisite: CE 360.
Soil behavior, stress-strain and strength properties, application to earth pressure, slope and foundation problems.

CE 466 03(2-3-0). Design and Behavior of Steel Structures. S. Prerequisite: CE 367.
Loads acting on a structure; behavior and design of steel members, connections, and systems.

CE 467 03(2-3-0). Design of Reinforced Concrete Structures. F. Prerequisite: CE 367.
Design and behavior of reinforced concrete structural members.

+CE 469 01(1-0-0). Design Practice I. F. Prerequisite: CE 367. Special fee, $11.
Design of civil engineering systems, consideration of non-engineering factors in the design process, development of design project proposals.

+CE 470 02(1-2-0). Design Practice II. S. Prerequisite: CE 469. Special fee, $11.
Class project in design of civil engineering systems; development of final project design and project reports.

CE 474 03(3-0-0). Engineering Planning and Management. S. Prerequisite: CE 360.
Planning, organizing, and managing engineering projects, including engineering estimating, engineering economy, and CPM scheduling.

CE 478 03(3-0-0). Transportation Engineering. F. Prerequisite: CE 300, ST/STCC 309.
Transportation planning, design, and operation emphasizing systems approach to urban transportation problems.

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

CE 496 Var. Group Study.

CE 502 03(3-0-0). Fluid Mechanics. F. Prerequisite: CE 300.
Fundamental physical concepts of fluid mechanics; ideal and viscous fluid flows; boundary-layer concepts.

CE 504 02(2-3-0). Wind Engineering. F. Prerequisite: AT 440 or CE 300.
Influence of wind on humanity. Applications to structures, air pollution, wind energy, agricultural aerodynamics, snow movement, human comfort.

CE 505 02(3-0-0). Experimental Methods and Measurements. S. Prerequisite: CE 300 or CE 360.
Design experiments; instrumentation and experimental techniques; data acquisition and processing; error analysis.

+CE 510 03(3-0-0). Operation of Hydraulic Systems. F. Prerequisite: CE 401. Special fee, $41.
Operational management systems, data collection, real-time control, management modeling, rehabilitation and retrofit, maintenance.

Analysis and design of hydraulic structures which make up components of water resource systems.

+CE 515 03(3-0-0). Hydropower. F. Prerequisite: CE 401, CE 322/ EV 322.
Operation of hydropower generating and pump storage stations, characteristics of systems loads, hydraulics, storage of water, optimum power production.

CE 520 03(3-0-0). Physical Hydrology. F. Prerequisite: CE 322/ EV 322.
Hydrologic, atmospheric processes in the water cycle; linear systems, hydrologic response; geomorphologic description of hydrologic processes, response.

+CE 521 03(3-0-0). Hydrometry. S. Prerequisite: CE 322/ EV 322.
Principles, methods, instruments, and equipment for measuring water quantity and water quality variables in nature.

CE 522 03(3-0-0). Engineering Hydrology. S. Prerequisite: CE 520.
Hydrologic design under uncertainty; conventional and remote sensing; design flows and storm; river routing; reservoir design, watershed models.

CE 524/ER 524 04(3-0-1). Modeling Watershed Hydrology. S. Prerequisite: CE 322/ EV 322 or ER 416, ST 304 or ST/STCC 309. Credit not allowed for both CE 524 and ER 524.
Development and application of watershed models: structure, calibration, evaluation, sensitivity analysis, simulation.

CE 531/CB 531 03(3-0-0). Groundwater Hydrology. F. Prerequisite: CE 360 or CB 331 or ME 342. Credit not allowed for both CE 531 and CB 531.
Groundwater occurrence, distribution, movement, exploration and recharge, well hydraulics and design, interaction of ground and surface water.

CE 534/CB 534 03(3-0-0). Groundwater Measurements. F. Prerequisite: CE 531/CB 531 or concurrent registration. Credit not allowed for both CE 534 and CB 534.
Groundwater measurements of hydraulic properties and water quality using laboratory and field methods.

CE 537 03(3-0-0). Residuals Management. S. Prerequisite: CE 300.
Planning and design for processing and disposal of residuals including solid wastes, sludges, hazardous wastes.
CE 538 03(3-0-0). Aqueous Chemistry. S. Prerequisite: C 113, M 340. Principles of solution chemistry applied to aquatic systems.

*CE 539 03(2-3-0). Water and Wastewater Analysis. F. Prerequisite: C 113, M 340. Chemical and biological methods of assessing water quality; significance of chemicals in aquatic systems.

CE 540 03(3-0-0). Treatment of Water Contaminants I. F. Prerequisite: M 340, CE 434/ENV 438, CB 331 or CE 300 or ME 342. Evolution of practice, modeling approaches for process design, spectrum of contaminants, process design for removal of particles.

CE 541 04(3-1-0). Treatment of Water Contaminants II. S. Prerequisite: CE 540, C 471 or C 474. Reaction theory, filtration, adsorption, ion exchange, gas transfer, oxidation, membranes, biological reactors, disinfection.


CE 544 03(3-0-0). Water Resources Planning. F. Prerequisite: CE 322/ENV 322. Planning concepts; economic and financial analysis; multiobjective planning; multinational planning; related topics.

CE 545/CE 545 03(3-0-0). Management and Monitoring of Water Quality. F. Prerequisite: CE 322/ENV 322 or ER 418. Credit not allowed for both CE 545 and CB 545. Management activities, information needs, data analysis protocols, network design, case studies.

CE 546/CE 546 03(3-0-0). Water Resources Systems Analysis. S. Prerequisite: CE 322/ENV 322, EN 510/M 510, or concurrent registration in each. Applications of systems analysis and optimization techniques in water resources planning and management.

CE 550 03(3-0-0). Foundation Engineering. F. Prerequisite: CE 450. Mechanics and methodology of foundation engineering; selection and design of foundation systems on soft, firm, and expansive soils; special problems.

*CE 553 03(3-0-0). Earth and Earth-Retaining Structures. S. Prerequisite: CE 450. Load on conduits, retaining walls, braced cuts, sheet pile walls, slope stability; embankments.

CE 558 03(3-0-0). Geoenvironmental Engineering Principles. F. Prerequisite: CE 450. Basic principles of geoenvironmental engineering practice, including use of clay soils in waste containment and in situ remediation systems.

CE 560/ME 560 03(3-0-0). Advanced Mechanics of Materials. F. Prerequisite: CE 360. Analysis of stress and strain failure theory; selected topics in solid mechanics, plate analysis, introduction to elastic stability.

CE 562 03(3-0-0). Fundamentals of Vibrations. S. Prerequisite: CE 261, CE 360. Free and forced vibrations of single, two, and multiple degree of freedom systems; closed-form and numerical solutions.

CE 564 03(3-0-0). Analysis of Continua. F. Prerequisite: CE 300 or CE 360, M 340. Cartesian tensors, linear algebra, tensor calculus, and variational principles as applied to analysis of continua media.

CE 566 03(3-0-0). Intermediate Structural Analysis. F. Prerequisite: CE 367. Work and energy concepts, curved members and arches, matrix analysis of linear systems, numerical techniques.


CE 569/F 569 03(3-0-0). Intermediate Design of Wood Structures. F. Prerequisite: CE 367, F 432. Credit not allowed for both CE 509 and F 569. Characteristics of structural products and their consideration in design; behavior of glulam members, wood trusses, and other wood structural systems.

CE 575 03(2-2-0). Expert System Applications in Engineering. F. Prerequisite: M 340. Construction of expert systems and decision aids for practical applications in typical engineering domains.

CE 577 03(2-2-0). GIS in Civil and Environmental Engineering. S. Prerequisite: CE 300, CE 322/ENV 322. GIS technology for spatial design/analysis; applications in facilities management, urban infrastructure, water resources, environmental engineering.

CE 578 03(3-0-0). Infrastructure Engineering and Management. S. Prerequisite: Ten credits of engineering, economics, public administration, or planning courses. Infrastructure program planning, management, and engineering. Problems, tools of analysis, solution strategies. Use of decision support systems.

CE 584 Var. Supervised College Teaching. F, S, SS.


*CE 603 03(3-0-0). Wind Effects on Structures. S. Prerequisite: CE 504. Analysis of wind effects on buildings and structures: deterministic and probabilistic methods; aerodynamic loading and response; codes and standards.

*CE 604 03(3-0-0). Turbulent Transport and Diffusion. S. Prerequisite: CE 502 or CE 504. Engineering concepts for transport of pollutants, toxic and flammable species, sand, and snow. Fluid modeling, numerical and analytical approaches.

*CE 607 03(3-0-0). Computational Fluid Dynamics. S. Prerequisite: CE 502 or AT 601, M 350. Unique fluid mechanics aspects of advection, boundary conditions, and turbulence models. Solutions of elliptic, parabolic, and hyperbolic problems.

CE 610 03(3-0-0). Special Topics in Hydraulics. S. Prerequisite: CE 502. Advanced topics in hydraulics, hydromechanics, environmental hydraulics, and computational hydraulics.

CE 612 04(4-0-0). Open Channel Flow. S. Prerequisite: CE 502. Steady, uniform, and non-uniform flow; backwater curves; flow through bridge piers, transitions, and culverts; spatially varied and unsteady flow.
CE 614 03(3-0-0). Hydraulics of Closed Condits. S. Prerequisite: CE 502.
Pipe transmission and distribution systems design including flow control, flow measurement, energy dissipation, pump selection, transients, cavitation.

CE 622 03(3-0-0). Risk Analysis of Water/Environmental Systems. F. Prerequisite: CE 322/ EV 322.
Risk and uncertainty analysis applied to hydrology, hydraulics, groundwater, water resources, and environmental engineering systems.

CE 623 03(3-0-0). Water Quality Hydrology. S. Prerequisite: CE 322/ EV 322.
Effects and dispersion of natural, municipal, industrial, toxic, and other water pollutants on natural and impounded waters.

CE 631 03(3-0-0). Solutions to Groundwater Problems. S. Prerequisite: CB 538, M 340.
Numerical flow models; finite difference and finite element methods; parameter identification, stochastic modeling and advanced analytical solutions.

CE 633 03(3-0-0). Groundwater Contaminant Transport Modeling. F. Prerequisite: CE 310, M 340; concurrent registration in CE 423 or CB 331/CE 531.
Numerical modeling, transport, control and cleanup, applied to complex groundwater contamination problems found in the field.

CE 635 03(3-0-0). Quantitative Hydrogeology. F. Prerequisite: CE 300, M 340; concurrent registration in CE 423 or CB 331 or CE 551.
Geostatistics, modeling fracture flow; saltwater intrusion, heat transfer; conjunctive use; optimal groundwater management; solution nonlinear problems.

CE 638/ CB 638 03(3-0-0). Groundwater Quality and Contaminant Transport. S. Prerequisite: CE 531/ CB 531. Credit not allowed for both CE 638 and CB 638.

CE 659/ 639 03(3-0-0). Technology Assessment and Social Forecasting. F. Prerequisite: CE 544. Credit not allowed for both CE 639 and S 639.
Interrelationship between technology and society emphasizing procedures for evaluating impacts and forecasting alternatives.

CE 665 03(3-0-0). Advanced Soil Mechanics. F. Prerequisite: CE 450.
Soil behavior, principles of mechanics of soils, effective stress principle, shear strength and consolidation of soils.

CE 666 03(3-0-0). Finite Element Method. S. Prerequisite: M 340.
Theory and application in elasticity, porous flow, heat conduction, and other engineering problems.

CE 667 03(3-0-0). Advanced Structural Analysis. S. Prerequisite: CE 566.
Analysis program development, application of finite element analysis, computer-assisted analysis, introduction to nonlinear analysis.

CE 669 03(3-0-0). Advanced Design of Metal Structures. S. Prerequisite: CE 466.
Behavior of steel, aluminum, and cold formed members. Development of elastic and inelastic code provisions. LRFD design methods, building systems.

CE 684 Var. Supervised College Teaching. F, S, SS.

CE 695A-I Var. Independent Study.


CE 703 03(3-0-0). Special Topics in Fluid Mechanics. F. Prerequisite: CE 502 or written consent of instructor.
Advanced topics in fluid mechanics; associated experimental and numerical techniques.

CE 716 03(3-0-0). Erosion and Sedimentation. F. Prerequisite: CE 502.
Sediment properties; resistance to flow; incipient motion and bedforms; sediment transport, reservoir sedimentation.

CE 717 03(3-0-0). River Mechanics. S. Prerequisite: CE 716.
Characteristics of rivers, mechanics of sediment and water discharge, emphasizing alluvial systems, channel stabilization, control, response.

CE 721 03(3-0-0). Stochastic Water and Environmental Systems. S. Prerequisite: CE 622.
Stochastic analysis of water and environmental systems. Simulation, forecasting, spatial analysis, modeling changes, stochastic differential equations.
CE 722 03(3-0-0). Large Scale Hydrology. F. Prerequisite: CE 520. Global and regional scale hydrologic processes; land/atmosphere interaction; scaling in hydrology; geomorphoclimatic structure of hydrologic response.

CE 733/CR 735 03(3-0-0). Flow in Porous Media. S. Prerequisite: CE 300, CE 531/CR 531 or SC 470. Credit not allowed for both CE 733 and CR 735. Mechanics of single and two-phase fluids in soils and porous rocks with application to infiltration, drainage, and petroleum production.

CE 751 03(3-0-0). Soil Dynamics. S. Prerequisite: CE 450. Soil behavior under dynamic loading; stress wave propagation; foundation response to vibratory and transient loading; elements of earthquake effects.

CE 754 03(3-0-0). Special Topics in Geotechnical Engineering. S. Prerequisite: CE 655, written consent of instructor. Advanced topics in geotechnical engineering including cold regions problems, expansive/ collapsible soils, computer applications.


CE 767 03(3-0-0). Structural Dynamics and Earthquake Engineering. F. Prerequisite: CE 562, CE 667. Analysis, behavior, and design of structural systems subjected to dynamic loads, including earthquakes, wind, and ocean waves.


CONSUMER AND FAMILY STUDIES COURSES

College of Applied Human Sciences

CF 179 02(2-0-0). Introduction to Consumer and Family Studies. S. Career options in consumer and family studies and professional leadership responsibilities.

CF 479 02(0-0-2). Colloquium-Consumer and Family Studies. F. Prerequisite: CF 179 or written consent of instructor. Current topics and issues related to professional roles, responsibilities, and opportunities.

CF 487A-C Var. Internship.

CF 494 Var. Independent Study.

CF 590 Var [1-3]. Workshop.

CF 687 Var [1-15]. Internship.

CF 692 Var [1-3]. Seminar.

CF 694 Var [1-3]. Independent Study.

CF 698 Var. Research.


CELL AND MOLECULAR BIOLOGY COURSES

Office of Provost/Academic Vice President

CM 501 04(4-0-0). Advanced Cell Biology. F. Prerequisite: BY 310 or written consent of instructor. Cell structure and organelle function.

CM 595 Var. Independent Study.

CM 640 03(3-0-0). Creative Science Writing. S. Consideration of creative writing techniques and their relevance to traditional science/nature writing.

CM 666. PL 666 03(3-0-0). Science and Ethics. S. Credit not allowed for both CM 666 and PL 666. Ethical issues of research on humans and animals; biosafety; fraud and deception in science; genetic engineering.


CM 701-A. Topics in Cell and Molecular Biology. F. S. Prerequisite: C-E, H-I) BC 403, CM 501, M/M CC 255. F-4) C 344.

CM 702A-G. Methods in Cell and Molecular Biology, F, S. Prerequisite: BC 403, CM 501, M/M CC 255.
A) Principles of light and electron microscopy 01(0-3-0). B) Mammalian cell culture techniques 01(0-3-0). C) Immunohistochemical techniques 01(0-3-0). D) Radiation cytogenetics 01(0-3-0). E) Flow cytometry and cell sorting 02(0-4-0). F) Synthesis of peptide compounds 01(0-2-0). G) Protein sequencing 01(0-2-0).

CM 710/PO 710 03(0-4-1). Techniques in Molecular Biology and Genetics. S. Prerequisite: BC 463 or BZ 350 or MG 450 or SC 330 or BC 346. Credit not allowed for both CM 710 and PO 710. Genetic manipulation of bacteria, bacteriophage, and yeast including experiments in molecular cloning and gene expression.

CM 792 01(1-0-0). Cell and Molecular Biology Seminar. F. S. Prerequisite: CM 501 or concurrent registration. Preparation and presentation of cell and molecular biology seminars.

CM 784 Var. Supervised College Teaching. F, S, SS.

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

CM 795 Var. Independent Study.

CM 796 Var. Group Study.

COMPOSITION COURSES

Department of English
College of Liberal Arts

COCC 150 (3-0-0). College Composition. F, S, SS. Prerequisite: Composition Placement Examination. Expository and argumentative writing emphasizing purpose and audience; writing and reading processes; development of ideas; coherence; effective style.

COCC 192 (0-0-3). Academic Writing. F, S. Prerequisite: Composition Placement Examination. Academic writing, critical thinking, and critical reading through study of a key academic issue.

COCC 300 (3-0-0). Writing Arguments. F, S, SS. Prerequisite: CO/COSC 150. Reading, analyzing, researching, and writing arguments.

COMPUTER SCIENCE COURSES

Department of Computer Science
College of Natural Sciences

CO 401 (3-0-0). Advanced Composition. F, S. Prerequisite: CO/COSC 302 or CO/COSC 301A or 301B or 301C or 301D or 301E or 301F or 301G. Advanced expository and persuasive writing emphasizing modes, strategies, and styles for a variety of audiences and purposes.

CS 101/EE 181 (3-2-0). Engineering Computing. F. Prerequisite: High school algebra and geometry. Credit allowed for only one of the following: CS 101, CS/CSCC 151, EE 101. Programming emphasizing Pascal with applications to engineering problems.

CS 110 (4-3-0). Personal Computing. F, S, SS. Personal computing: hardware/software concepts, operating system commands, word processing, spreadsheets, programming.

CS 151 (4-3-0). C++ for Scientists and Engineers. F, S. Prerequisite: M/M CC 124, M/M CC 126. Credit allowed for only one of the following: CS 101, CS/CSCC 151, EE 101. Structured programming in C++ language syntax including problem solving and basic data structures with a strong science/engineering approach.


CSCC 153 (4-3-0). Java Programming. F, S, SS. Prerequisite: M/M CC 118 or M/M CC 121. Credit not allowed for both CS/CSCC 153 and CS 154.

Object-oriented programming using Java language syntax. Classes, standard class package; problem solving, basic data structures.

CS 154 (2-3-0). C++ to Java Programming Module. F, S. Prerequisite: College-level C++ course. Credit not allowed for both CS 154 and CS 153.


CS 166/M 166 (4-0-0). Discrete Structures. F, S. Prerequisite: CS/CSCC 151 or CS/CSCC 153 or CS 134, M/M CC 124. Credit not allowed for both CS 166 and M 166.

Algorithms, mathematical induction, graphs, and trees, counting methods, difference equations, recursion, probability, introduction to mathematical logic.

CS 200 (4-3-0). Algorithms and Data Structures. F, S. Prerequisite: CS/CSCC 153 or CS 134, CS 166/M 166. Data structures; abstract data types, complexity analysis; sorting, searching, hashing; examples from operating systems and graphics.

CS 253 (4-2-0). Computer Programming Languages. F, S. Prerequisite: CS/CSCC 166/M 166, CS 200. Programming paradigms and associated languages, syntax, semantics, and translation of programming languages.

CS 270 (4-3-0). Computer Organization. F, S. Prerequisite: CS 166/M 166, concurrent registration in CS 200, M/M CC 124. Representation of data, arithmetic, assembly language, digital logic, digital systems, memory organization and architecture.

CS 301 (4-4-0). Foundations of Computer Science. F, S. Prerequisite: CS/CSCC 166/M 166, CS 200, M/M CC 161, M 229. Finite state machines, regular expressions, push down automata, context free grammars, Turing machines, the halting problem.

CS 314 (4-3-0). Software Development Methods. F, S. Prerequisite: CS 253. Methods used to develop large-scale software projects in industry emphasizing design, implementation, and testing.

CS 370 (4-3-0). System Architecture and Software. F, S. Prerequisite: CS 200, CS 270, ST/STCC 301 or ST/STCC 309. Introduction to operating systems including memory organization, I/O control, multitasking, process control, coordination, and resource management.

CS 410 (4-3-0). Introduction to Computer Graphics. F, S. Prerequisite: CS 314, M 229. Graphics hardware and software; drawing simple objects; coordinate transformations in 2D and 3D; modeling and viewing complex 2D and 3D objects.

CS 414 (4-3-0). Object-Oriented Design. S. Prerequisite: CS 314. Object-oriented methods for largescale software systems. Software design for reuse using patterns. Development of WWW applications in languages, e.g., Java.

CS 415 (0-2-0-6). Software Development Project I. F. Prerequisite: CS 314. Group software development project in a realistic setting. Requirements specification, prototyping, and design of software products.

CS 416 (0-2-0-6). Software Development Project II. S. Prerequisite: CS 415. Implementation, testing, and delivery of software products.
CS 420 04(3-3-0). Introduction to Analysis of Algorithms. F. Prerequisite: CS 301.

Orders of magnitude, upper and lower bounds, recurrence relations; P, NP completeness; approximate algorithms and search.

CS 430 04(3-2-0). Database Systems. S. Prerequisite: CS 314.

Database analysis, design, administration, implementation, hierarchical, network relational models; data sublanguages; query facilities.

CS 440 04(3-2-0). Introduction to Artificial Intelligence. F. Prerequisite: CS 253, CS 301.

Symbolic computation through programming languages LISP and PROLOG; applications of symbolic computing in artificial intelligence.

CS 451 04(3-3-0). Operating Systems. F. Prerequisite: CS 370.

Operating system design and implementation, file systems, distributed operating systems, case studies.

CS 453 04(3-0-1). Introduction to Compiler Construction. F. Prerequisite: CS 253, CS 301.

Functional components of a compiler: modules, interfaces, lexical and syntax analysis, error recovery, resource allocation, code generation.

CS 457 04(3-3-4). Computer Networks and the Internet. S. Prerequisite: CS 370.

Principles of communications, local area networks, communication protocols, TCP/IP, and the Internet.

CS 470 04(3-2-0). Computer Architecture. S. Prerequisite: CS 370.

Instruction set; control: hardwired, microprogramming; memory; arithmetic; I/O and buses; performance evaluation; pipelining; RISC.

CS 475 04(3-3-0). Parallel Programming. S. Prerequisite: CS 370.

Parallel programming techniques for shared-memory and message-passing systems; process synchronization, communication; example languages.


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 486, CS 495.

CS 510 04(3-3-0). Computer Graphics. S. Prerequisite: CS 410.

Displaying 3D objects with realistic shading and lighting calculations. Hidden surface removal, Gouraud and Phong shading, and ray tracing.

CS 514 04(3-3-0). Software Engineering Methods. F. Prerequisite: CS 414 or written consent of instructor.

Software development process, software project management, software metrics, formal methods, testing and verification, software tools, design methods.

CS 515 02(0-6-0). Software Engineering Project I. F. Prerequisite: CS 514 or concurrent registration.

Practical application of advanced technical and management issues in software development through group software development project.

CS 516 02(0-6-0). Software Engineering Project II. S. Prerequisite: CS 515.

Coding, testing, and maintenance phases of development.

CS 517 04(3-3-0). Advanced Software Engineering Methods. F. Prerequisite: CS 314.

Rigorous techniques for modeling, specifying, and analyzing software requirements and designs; reusable software development.

CS 520 04(3-3-0). Analysis of Algorithms. F. 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 or written consent of instructor.

Achieving high reliability and fault tolerance. Fault modeling, testing, reliability evaluation, redundancy, fault tolerance.

CS 540 04(3-3-0). Artificial Intelligence. S. Prerequisite: CS 440.


CS 545 04(3-3-0). Machine Learning. S. Prerequisite: CS 440.

Computational methods that allow computers to learn; neural networks, decision trees, genetic algorithms, bagging and boosting.

CS 551 04(3-3-0). Principles of Operating Systems. F. Prerequisite: CS 431.

Distributed operating systems, memory management, computer security, client-server computing, distributed resource management failure recovery.

CS 555 04(3-3-0). Algorithmic Language Compilers. S. Prerequisite: CS 420, CS 453.

Compiler construction, lexical scanner generators, parser generators, dataflow analysis, optimization.

CS 570 04(3-3-0). Advanced Computer Architecture. F. Prerequisite: CS 470.

Pipelined CPU design. Superciral arichitectures 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.

CS 612 04(3-2-0). Topics in Computer Graphics. F. Prerequisite: CS 510.

Computer graphics research topics.

CS 614A-F Var [1-4]. Advanced Topics in Software Engineering. S. Prerequisite: CS 514.


CS 620A-E Var [1-4]. Topics in Computing Theory. F. Prerequisite: CS 520 or written consent of instructor.


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 653A-B Var 11-4. Advanced Topics in Programming Languages. F, S. Prerequisite: Written consent of instructor. 
A) Language design and definition. Semantics, type theory. 
B) Language implementation. Data dependence analysis; parallel code generation.

CS 670A-F/EE 670A-F Var [1-4]. Topics in Architecture/Systems. F, S. Prerequisite: CS 570 or EE 554 or written consent of instructor. Credit not allowed for both CS 670A-F and EE 670A-F. 
A) Data flow. B) Performance evaluation and modeling. 
C) Distributed systems. D) Architecture of advanced systems. 

CS 675 04(3-3-0). Advanced Parallel Computing. S. Prerequisite: Written consent of instructor. 
A) Language design and definition. Semantics, type theory. 
B) Language implementation. Data dependence analysis; parallel code generation.
DM 130 03(3-0-0). Design Appreciation. F, S. 
Impact of elements and principles of design on everyday life.

DM 172 03(3-0-0). Consumers in the Marketplace. F, SS. 
Consumer rights and responsibilities to ensure well-being and social responsibility.

DM 229 03(3-0-0). Professional Communication and Ethics. F. 
Understanding demands and expectations of the professional in design, apparel, and merchandising.

DMCC 263 03(3-0-0). Historical Perspectives of Material Culture. F, S. 
Analytical and chronological study of significant, multidimensional human experiences related to apparel, textiles, and interior environments.

DM 300 03(3-0-0). Retail Sales and Customer Strategies. S. 
Examine selling practices and their impact on business and consumers in the global marketplace.

DM 320 03(3-0-0). Finance-Personal and Family. F, S. 
Management of income, expenditures, credit, savings, investment, insurance, taxes, and assets considering legislation and economic conditions.

DM 360/BK 360 03(3-0-0). Retailing. F, S, SS. Prerequisite: BK 300 or BK 305. Credit not allowed for both DM 360 and BK 360.
Retail markets, institutions, operations, and problems.

DM 372 03(3-0-0). Trends and Lifestyle Analysis. F, S, SS. 
Prerequisite: LI 301. Strategies for understanding, tracking, and analyzing consumer and lifestyle trends.

DM 400 02(0-2-1). U.S. Travel-New York City. S. Prerequisite: Six semester credits in design, merchandising, and consumer science courses or written consent of instructor. 
Interview/analyze designers, manufacturers, buying offices, retail stores, magazine firms, consumer agencies, etc.


DM 492 01(0-0-1). Preinternship Seminar. Prerequisite: Written consent of instructor. 
Background information necessary to apply for and complete an internship experience.

DM 495 Var. Independent Study. 
Maximum of ten credits allowed in course.

DM 496 Var. Group Study.

DM 684 Var [1-6]. Supervised College Teaching. F, S.

DM 687 Var. Internship.

DM 695 Var. Independent Study.

DM 698 Var. Research.


ENGLISH COURSES

Department of English
College of Liberal Arts

E CC 140 03(3-0-0). The Study of Literature. F, S, SS. 
Basic principles of reading literary texts.

E 160 03(3-0-0). Mythical and Biblical Backgrounds. F, S, SS. 
Central myths and stories of classical and Biblical traditions necessary to understanding Western culture.

E 179 03(3-0-0). Western American Literature. F, S, SS. 
Trans-Mississippi West in fiction and other literary forms.

E 219 03(3-0-0). Beginning Creative Writing. F, S. Prerequisite: E/F CC 140. 
Basic techniques of writing fiction and poetry; may include some elements of drama.
E 233 03(3-0-0). Introduction to Humanities. F, S.
Great literature of Western cultural tradition from ancient times to present.

E 236 03(3-0-0). Literature of Social Protest. F, S. Offered only through Division of Educational Outreach. Social problems and alienation of the individual as viewed by modern writers.

E 237 03(3-0-0). Introduction to Science Fiction. F, S.
Historical development and major themes of science fiction, featuring authors such as Wells, Huxley, Bradbury, and LeGuin. Focus on the interplay between science and society.

E CC 232 03(3-0-0). American Drama. F.
History and development of American writings from 16th-century Middle, Early Modern, Modern) with emphasis on grammar, vocabulary, and phonology.

E CC 233 03(3-0-0). Introduction to Humanities. F, S.
Interrelationships of literature, art, music, and society.

E 234/ET 234 03(3-0-0). Native American Literature. S. Credit not allowed for both E 234 and ET 234. Native American writings and their significance in American culture.

E 320A-D 03(3-0-0). Introduction to the Study of Language. F, S, SS.

E 322 03(3-0-0). English Language for Teachers I. F.
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 326 03(3-0-0). Development of the English Language. S.
Chronological study of four historical stages of English (Old, Middle, Early Modern, Modern) with emphasis on grammar, vocabulary, and phonology.

E 330 03(3-0-0). Images of Women in Literature. S.
Selected world literature ranging from ancient world to present, considered in light of various complexities of gender relations.

E 331 03(3-0-0). Modern Women Writers. S.
Selected 20th-century women writers in variety of genres emphasizing relationships between gender, writing, and reading.

E 333 03(3-0-0). Literature and Social Sensitivity. F, S, SS.
Contemporary American literature of special relevance to social issues.

E 334 03(3-0-0). Twentieth-Century Gay and Lesbian Fiction. S.
Twentieth-century fiction by gay and lesbian authors on gay and lesbian themes.

E 335 03(3-0-0). American Folklore. S.
Regional, ethnic, and urban folklore in America.

E 336 03(3-0-0). Goddess Religions. F.
Ancient goddess religions and their uses and reinterpretations by the contemporary women's spirituality movement.

E 337 03(3-0-0). Western Mythology. S.
Major themes in western myth: classical, Biblical, and Germanic.

F 341 03(3-0-0). Principles of Literary Criticism. F, S, SS.
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.
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.
Shakespeare's development as a poet and dramatist after Hamlet.

E 345 03(3-0-0). American Drama. F.
Development of indigenous, native drama, emphasizing O'Neill, Miller, Williams, and Albee.

F 353 03(3-0-0). Russian and Soviet Literature in Translation. S.
Prerequisite: One course in literature or HY 235. Russian and Soviet literature from Pushkin to present.
E 356 03(3-0-0). Asian Literature. F.
Masterpieces of classical and contemporary literature of China, India, and Japan.

E 371 03(3-0-0). American Authors to 1870. F. Prerequisite: One course in literature.
In-depth study of selected American authors before 1870.

E 372 03(3-0-0). American Authors Since 1870. F. S. Prerequisite: One course in literature.
In-depth study of selected American authors since 1870.


E 401 03(3-0-0). Teaching Reading. F. S. Prerequisite: CO/COCC 301 D.
Theory and pedagogy for understanding, interpreting, and evaluating print and visual texts.

E 402 03(3-0-0). Teaching Composition. F. S. Prerequisite: CO/COCC 301 A or B or C or D.
Theory and practice of the analysis and the teaching of writing.

E 403 03(3-0-0). Nature Writing. S. Prerequisite: One course in literature or CO/COCC 301 A-D or E 311 A-C.
American and English writers who interpret nature and the landscape; critical analysis and application of their techniques to current interpretive problems.

E 405 03(3-0-0). Adolescents' Literature, F.S.
Survey of literature for adolescents emphasizing development of critical ability, appreciation, and taste.

E 406-A D 03(3-0-0). Topics in Literary F. S. Maximum of 6 credits allowed in course.
Exploring literacy through written theory: A) Literacy and cultural difference. B) Literacy and gender. C) Literacy and technology. D) Literacy and education.

E 412-A-C Var [1-3]. Creative Writing Workshop. S. Prerequisite: A) Grade of B or better in E 311 A. B) Grade of B or better in E 311 B. C) Grade of B or better in E 311 A or E 311 C. Maximum of 8 credits allowed per subtopic.

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 422 03(3-0-0). African-American Literature. F. Prerequisite: One course in literature.
African-American literature as a distinct tradition of writing and protest.

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: One course in literature.
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 434 03(3-0-0). American Fiction, 1865-1914. F. Prerequisite: One course in literature.
Form, content, and context of American fiction, 1865-1914: James, Twain, Crane, Wharton, Norris, and others.

E 435 03(3-0-0). American Fiction, 1914-1945. F. Prerequisite: One course in literature.
Form, content, and context of American fiction, 1914-1945: Hemingway, Faulkner, Fitzgerald, Catier, Dos Passos, and others.

E 436 03(3-0-0). American Fiction, 1945-Recent. S. Prerequisite: One course in literature.
Form, content, and context of American fiction from 1945 to present: Kesey, Updike, Heller, Pynchon, Barthes, Vonnegut, and others.

E 437 03(3-0-0). Heritage of the West. S. Prerequisite: One course in American history.
Western American literature, primarily fiction, focusing on the basic foundations of Western American society and attitudes.

E 438 ET 438 03(3-0-0). Contemporary Native American Literature. F. Credit not allowed for both E 438 and ET 438.
Contemporary fiction, poetry of Native Americans emphasized as distinctive tradition in American literature and cultural expression of indigenous peoples.

E 439 03(3-0-0). Novel in the American West. F. Prerequisite: E 179 or E 270.
History and development of American Western novels, including thematic and stylistic considerations. Writers will include Wister, Cather, and Steinbeck.

E 443 03(3-0-0). English Renaissance Drama. F. Prerequisite: One course in literature.
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.
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.
Realism and anti-realism in modern British and European drama.

E 452 03(3-0-0). Masterpieces of European Literature. F. Prerequisite: One course in literature.
Selected works of European literature through the 19th century.

E 455 03(3-0-0). 20th-Century European Literature. S. Prerequisite: Two courses in literature.
20th-century fiction and poetry of continental Europe in translation.

E 460 03(3-0-0). Chaucer. S. Prerequisite: E 160, E 341, and one other upper-division E prefix course.
Chaucer's works in medieval context.

E 463 03(3-0-0). Milton. F. Prerequisite: E 160, E 341, and one other upper-division E prefix course.
Milton's poetry and prose emphasizing Paradise Lost.

E 465 03(3-0-0). Topics in Literature and Language. S.
Maximum of 9 credits allowed in course.
Selected issues in literature and language.
E 470 03(3-0-0). Individual Author. F, S, SS. Prerequisite: E 341 and one other upper-division E prefix course. Maximum of 6 credits allowed in course.

Intensive study of works of a single major author.

E 475 03(3-0-0). American Poetry. F. Prerequisite: E 240. Major American poets through the 19th century including Whitman, Dickinson, and Frost.

E 476 03(3-0-0). English Poetry I. S. Prerequisite: E 240. Major English poets of Renaissance and neoclassical periods including Spenser, Donne, Jonson, Milton, Dryden, and Pope.

E 477 03(3-0-0). English Poetry II. S. Prerequisite: E 240. Major English poets of the 19th century including Blake, Wordsworth, Byron, Keats, and Browning.

E 478 03(3-0-0). Modern Poetry. F. Prerequisite: E 240. Major British and American poets from late 19th century to Second World War.

E 487A-B. Internship. Prerequisite: 2.5 GPA; written consent of adviser. Maximum of 4 credits allowed in E 487 A and B. A) Supervised work experience. Var [1-3]. Maximum of 3 credits allowed in course. B) Literacy editing. 01(0-6-1).


E 501 03(3-0-0). Theories of Writing. F. Prerequisite: E 402. Theoretical approaches to the nature of the composing process.

E 502S(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 507 03(3-0-0). Special Topics in Linguistics. F, S. Prerequisite: Written consent of instructor. Theoretical and practical perspectives on language and learning skills necessary for basic academic reading and writing.

E 513A-C 03(3-0-0). Form and Technique in Modern Literature. F. Prerequisite: Written consent of instructor. 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. 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. Major grammatical structures of English in relation to second language acquisition and teaching.

E 520 03(3-0-0). English Phonetics and Phonology. S. Articulatory phonetics, phonological theory and analysis with principal applications to American English and to pedagogy.

E 521 03(3-0-0). Advanced Syntax. S. Recent generative theories of language structure and research in second language acquisition and pedagogy.

E 522 03(3-0-0). Semantics, Pragmatics, and Discourse. F. 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. 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 600 03(3-0-0). Research Methods and Theory. F. Materials and methods of literary scholarship: bibliography, documentation, textual criticism, editing, and literary criticism.

E 601 Var [2-3]. Research in Teaching English as Second Language. F. Prerequisite: E 526. Evaluation and design of research in language acquisition.

E 603 03(3-0-0). Computers and Composition. S. Relationship of computer-assisted instruction to rhetoric and composition.

E 605 03(3-0-0). Reading/Writing Connection. S. Theoretical understanding of reading and writing processes; practical implications for professional writers and teachers of writing.

E 615 03(3-0-0). Reading Literature-Recent Theories. F, S. Recent developments in structuralist/poststructuralist theories of discourse.


E 631 03(3-0-0). Crossing Boundaries. F, S. Cross-topical studies of literature.


E 641 Var [1-5]. Nonfiction Workshop. F, S. Prerequisite: E 640C or written consent of instructor. Writing workshop exploring various areas within literary nonfiction.

E 679 01(1-0-0). Community Service Learning in TESOL. F, S. Opportunities to learn, practice, and develop skills by serving the community teaching English as a second language.
E 684A-E Var [1-5]. Supervised College Teaching. F, S
E) Computer-assisted instruction.

E 687A-M Var [1-5]. Internship.
A) Teaching college English. B) Composition supervision/
administration. Prerequisite: E 550, E 684A. C) Literary editing.
D) Teaching ESL. E-L) ESL adult learning. F) ESL supervision/

E 692 01(0-0-1). Communication Development Seminar. S
Forum for faculty and student work in progress.

E 695 Var. Independent Study.

AGRICULTURAL AND RESOURCE ECONOMICS COURSES

Department of Agricultural and Resource Economics
College of Agricultural Sciences

EA 202 03(3-0-0). Agricultural and Resource Economics. F, S
Credit not allowed for both EA/EACC 202 and EC/ECCC 202.
Introduction to decision-making by consumers, firms, and
government, and resulting allocation of resources through markets.

EA 205 03(2-2-0). Farm and Ranch Management. F
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Application of economic concepts and management functions to
production, financial, and marketing decisions involved in farm or
ranch business.

EA 228 03(3-0-0). Agricultural Business Management I. F
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Principles of management and marketing applied to agribusiness
with emphasis on cooperatives.

EA 240/ECCC 240 03(3-0-0). Issues in Environmental Economics. F, S
Credit not allowed for both EA/EACC 240 and
EC/ECCC 240. Also offered as correspondence course.
Discussion and economic analysis of current environmental issues
with special emphasis on the impact of economic growth.

EA 305 03(2-2-0). Farm and Ranch Records and Analysis. F
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Utilization of records in farm management; analytical methods,
budgets, and planning techniques for improved decision making.

EA 308 03(3-0-0). Agricultural Finance. F
Prerequisite: EA/EACC 202 or EC/ECCC 202. Special fee, $5.
Monetary affairs of farming and ranching emphasizing agricultural
credit, facilities, procurement, extension, and management.

EA 310 03(3-0-0). Agricultural Marketing. F, S, SS
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Market structure, behavior, and performance including futures
market and market games theory.

EA 328 03(3-0-0). Small Agribusiness Management. F, S
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Apply business principles to small agribusinesses and cooperatives.

EA 335/EC 335 03(3-0-0). Introduction to Econometrics. F, S
Prerequisite: EC/ECCC 204, ST/STCC 301. Credit not allowed for both
EA 335 and EC 335.
Estimating statistical regression models of economic relationships;
treatment of special problems that may arise in analysis of economic
data.

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

EA 342 03(3-0-0). Economic Analysis-Water Resource Development. S
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Water resources evaluation, concepts, issues, and problems;
techniques employed in analyzing and evaluating water use in
alternative situations.

EA 344/EC 344 03(3-0-0). Economics of Energy Resources. S
Prerequisite: EA/EACC 202 or EC/ECCC 202. Credit not allowed for both
EA 344 and EC 344.
Supply, consumption trends and projected demand for alternative
energy resources in domestic and world perspective; economics of
public energy policies.

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

EA 375 03(3-0-0). Agricultural Law. F, S
Laws, regulations, case decisions affecting ranching and farming in
the Rocky Mountain area.

EA 392 01(0-0-1). Professional Seminar. F
Outcomes assessment; exposure to and preparation for employment
in agricultural and resource economics.

EA 402 03(2-2-0). Agricultural Production Management. F
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Economic principles of agricultural production decisions. Linear
programming analysis of production levels, least cost rations, and farm
planning.

EA 409 03(3-0-0). Farm and Ranch Appraisal. S
Prerequisite: EA 205 or EA 305.
Principles and procedures for appraising farms, ranches, and other
rural property; case studies applying various approaches to valuing
rural property.

EA 412 03(3-0-0). Agricultural Commodities Marketing. S
Prerequisite: EA 310. Special fee, $10.
Agricultural marketing and agribusiness principles applied to current
marketing problems relating to livestock and field and horticultural
crops.

EA 415 03(3-0-0). International Agricultural Trade. F
Prerequisite: EC/ECCC 204.
Agricultural trade patterns and institutions; trade theory with
applications to agriculture. Current issues in agricultural trade.

EA 428 03(3-0-0). Agricultural Business Management II. S
Economic analysis, organization, and management practices of
agriculture and food industries.
EA 430 03(3-0-0). Agricultural Prices and Commodity Trading. F
Prerequisite: EA 335 or EC 335.
Price discovery under imperfect competition in agriculture; influence of
government programs; techniques of price analysis related to
commodity trading.

EA 460 03(3-0-0). Economics of World Agriculture. S
Prerequisite: EA/EACC 202 or EC/ECCC 202.
Relationships between developed and developing nations affecting
agricultural growth and productivity.

*EA 463 03(3-0-0). Issues in Development Economics. S
Prerequisite: EC/ECCC 204.
Analysis of current problems confronting developing countries:
unemployment, international trade; development financing; and
inflation.

EA 475 03(3-0-0). Water Law. F, S. Prerequisite: EA 375 or written
consent of instructor.
Law as it governs acquisition of water rights under riparian and
appropriations systems; interstate waters and agencies of distribution.

EA 478 03(3-0-0). Agricultural Policy. S
Prerequisite: EA/EACC 202
or EC/ECCC 202 or EA/EACC 240 or EC/ECCC 240.
Formation and administration of public policies affecting United
States agricultural industry and rural areas.

EA 484 Var [1-5]. Supervised College Teaching. F, S.
Maximum of 10 credits allowed in course.

EA 487 Var. Internship.

EA 495 Var. Independent Study.

EA 496 Var. Group Study.

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

EA 508 03(3-0-0). Financial Management in Agriculture. S
Prerequisite: EA 308.
Systematic approach to understanding and applying financial
management in farm businesses.

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

EA 530 03(3-0-0). Agricultural Price Analysis. S
Prerequisite: EA 430.
Agricultural commodity prices related to neoclassical economics;
current literature emphasizing management problems.

EA 535/EC 535 03(3-0-0). Applied Econometrics. F, S
Prerequisite: EA 335, EA 335, EC 304, EC 306, M/M CC 315.
Credit not allowed for both EA 535 and EC 355.
Econometric techniques applied to testing and quantification of
theoretical economic relationships drawn from both microeconomics,
macroeconomics.

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

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

EA 542 03(3-0-0). Economics of Water Resource Planning. S
Prerequisite: EC 306, M/M CC 141.
Benefit-cost analysis of public water development programs;
economic analysis of selected water allocation issues; groundwater,
pollution, pricing.

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

EA 563/EC 563 03(3-0-0). Regional Economics-Theory, Methods,
and Issues. F. Prerequisite: EC 306, concurrent registration in
M/M CC 315.
Credit not allowed for both EA 563 and EC 563.
Tools and methods of regional economics, including supply,
demand, and externality analyses. Applications to current urban and
regional policy issues.

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

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

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

*EA 624 03(3-0-0). Agribusiness Economics I. S.
Prerequisite: EC 306.
U.S. and developing food and fiber systems are compared. Economic
contribution of food and input-output analysis shows economic
contribution of sector, food security.

*EA 625 03(3-0-0). Agribusiness Economics II. S.
Prerequisite: EC 306.
Economic and business analyses of domestic and international food
industries including projections with explanations of food price
margins.

EA 635/EC 635 03(3-0-0). Econometric Theory I. S.
Prerequisite: EA 535/EC 535.
Credit not allowed for both EA 635 and EC 635.
Theory of mathematical statistics and classical linear regression
model in context of economic application.

EA 660 03(3-0-0). Economics of Agricultural Development. S
Prerequisite: EA 460.
Developments in agriculture related to food supply and economic
growth in developing countries.

EA 678 03(3-0-0). Agricultural Policy. F
Prerequisite: EA 478.
Public policy in agriculture emphasizing economic criteria for
policy; considerations of welfare and economic efficiency.

EA 695 Var. Independent Study.

"EA 715 03(3-0-0). Mathematical Optimization. F. Prerequisite: EA 505 or EC 506, M/M CC 315. Mathematical optimization problems arising in application of economic theory to agricultural and natural resources.

"EA 725/EC 725 03(3-0-0). Capital Theory, Risk and Uncertainty. F. Prerequisite: Written consent of instructor. Credit not allowed for both EA 725 and EC 725. Debates about causes, consequences, and remedies.

ECONOMICS COURSES

Debates about causes, consequences, and remedies.

ECONOMICS COURSES

Department of Economics
College of Liberal Arts


EC 202 03(2-0-1). Principles of Microeconomics. F, S, SS. Prerequisite: M/M CC 118 or M/M CC 120A-B. Credit not allowed for both EC/ECCC 202 and EA/EACC 202. Introduction to decision-making by households, firms, and governments, and resulting allocation of resources through markets.

EC 204 03(2-0-1). Principles of Macroeconomics. F, S, SS. Prerequisite: EC/ECCC 202 or EA/EACC 202. Determinants of national output, employment, and price level; inflation and unemployment; fiscal and monetary policy.

EC 210 03(3-0-0).微观经济学. F, S, SS. Prerequisite: EA/EACC 202 or EC/ECCC 202. Relationship between economics, law, and workplace policy.

EC 211 03(3-0-0). Gender in the Economy. S. Role gender plays in economies; the way gender affects economic outcomes for individuals and societies.

EC 212 03(3-0-0). Racial Inequality and Discrimination. F. Prerequisite: EA/EACC 200 or EC/ECCC 200. Credit not allowed for both EC/ECCC 240 and EA/EACC 240. Also offered as correspondence course. Focus on race and discrimination in the economy.

EC 240/EACC 240 03(3-0-0). Issues in Environmental Economics. F, S. Credit not allowed for both EC/ECCC 240 and EA/EACC 240. Also offered as correspondence course. Discussion and economic analysis of current environmental issues with special emphasis on the impact of economic growth.

EC 300 03(3-0-0). Managerial Economics. F, S. Prerequisite: EA/EACC 202 or EC/ECCC 202. Applied microeconomics emphasizing use of empirical demand, production, and cost functions in business decisions under alternate market structures.

EC 304 03(3-0-0). Intermediate Macroeconomics. F, S, SS. Prerequisite: EC/ECCC 204, M/M CC 141. Also offered as correspondence course. Analysis of inflation, growth, debt, and public policy.

EC 306 03(3-0-0). Intermediate Microeconomics. F, S, SS. Prerequisite: EC/ECCC 204, M/M CC 141. Analysis of competitive and noncompetitive markets in terms of efficiency of resource utilization.

="EC 310 03(3-0-0). Poverty and the Welfare State. S, SS. Prerequisite: EC/ECCC 101 or EC/ECCC 202 or EA/EACC 202. Description and analysis of U.S. poverty; the "underclass"; feminization of poverty; working poor; the welfare state.

EC 315 03(3-0-0). Money and Banking. F, S, SS. Prerequisite: EC/ECCC 204. Also offered as an on-line course. Monetary theory and policy; description of financial institutions and markets.

EC 320 03(3-0-0). Economics of Public Finance. F, S, SS. Prerequisite: EC/ECCC 204. Impact of taxes, government expenditure on allocation of resources, distribution of income; evaluation of government expenditure program; tax policies.

EC 332/P 332 03(3-0-0). International Political Economy. F, S. Prerequisite: EC/ECCC 202 or EA/EACC 202 or PO/POCOCC 232. Credit not allowed for both EC 332 and PO 332. Theory of relations between international politics and economics. Policy implications of different theories and case studies.

EC 335/EA 335 03(3-0-0). Introduction to Econometrics. F, S. Prerequisite: EC/ECCC 204, ST/STCC 301. Credit not allowed for both EC 335 and EA 335. Estimating statistical regression models of economic relationships; treatment of special problems that may arise in analysis of economic data.

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

EC 344/EA 344 03(3-0-0). Economics of Energy Resources. S. Prerequisite: EA/EACC 202 or EC/ECCC 202. Credit not allowed for both EC 344 and EA 344. Supply, consumption trends and projected demand for alternative energy resources in domestic and world perspective; economics of public energy policies.


EC 463 03(3-0-0). Regional Economics-Tools/Analysis/Policy. S. Prerequisite: EC 306.
Introduction to economic importance of location for firms, consumers, and policy makers. Basic tools, applications, and student research.

Place of the economy in different societies: nature and evolution of capitalism; crisis of command economies and capitalist restoration.

EC 372 03(3-0-0). History of Economic Institutions and Thought. S. Prerequisite: EC/ECCC 101 or EC/ECCC 202 or EA/EACC 202.
Origins and development of capitalist institutions including contemporary issues of alienation, loss of community, and changing values.

EC 376 03(3-0-0). Marxist Economic Thought. S. Prerequisite: EC/ECCC 101 or EC/ECCC 202 or EA/EACC 202.
Marxist critique of capitalism and orthodox economics in both its original 19th-century and contemporary settings.

EC 379/479 03(3-0-0). Economic History of the United States. F. Prerequisite: EC/ECCC 101 or EC/ECCC 202 or EA/EACC 202; or any two courses in American history. Credit not allowed for both EC 379 and 479.
Economic analysis of growth and welfare from beginning of industrialization to present.

EC 404 03(3-0-0). Macroeconomic Policy. S. Prerequisite: EC 304. Alternative macroeconomic policies, policy coordination; application to current macroeconomic problems, policies, proposals.

EC 410 03(3-0-0). Labor Economics. S. Prerequisite: EC 306. Capital/labor relationships; supply, demand of labor, wage determination; role of unions; unemployment and instability; structure of modern working class.

EC 435 03(3-0-0). Economic Forecasting. S. Prerequisite: EC/ECCC 204, EC 355/EA 335 or ST 304.
Theory and techniques used in economic forecasting as practiced by economists in industry, government, and academic life.

EC 440 03(3-0-0). International Economics I. F. Prerequisite: EC 306.
Theory of international trade; payments, commercial policies, and economic integration.

EC 442 03(3-0-0). International Economics II. S. Prerequisite: EC 304.
Balance of payments, adjustment mechanisms, and international monetary systems.

EC 451 03(3-0-0). Economics of Regulation. S. Prerequisite: EC 306. U.S. regulatory history, institutions, and environment; economic justifications for and effects of regulation; evaluation of deregulation movement.

EC 460 03(3-0-0). Economic Development. F. Prerequisite: EC 304. Economic problems of underdeveloped nations.

EC 474 03(3-0-0). Recent Economic Thought. S. Prerequisite: EC 304, EC 306.
Neotraditional schools of economic thought, such as institutionalism and neo-Marxism, that critique neoclassical economic theory.

EC 484 Var [1-3]. Supervised College Teaching. F, S, SS. Prerequisite: EC 304, EC 306, written consent of instructor. Assistance in teaching introductory economics courses.

EC 487 Var [1-3]. Internship.

EC 492 03(0-0-3). Seminar. Summarizes, evaluates, and applies issues and policies chosen by the instructor. Emphasis on student participation, debate, and research.

EC 495 Var. Independent Study.

EC 504 03(3-0-0). Macroeconomic Analysis I. F. S. Prerequisite: EC 304, EC 306. Analysis of national income, employment, price levels, growth, and policies to achieve national economic goals.

EC 505 03(3-0-0). Political Economy I. F. S. Prerequisite: EC 372 or EC 376 or EC 474.
Classical, liberal, conservative, modern liberal, and radical paradigms on relationship of the state to the market system.

EC 506 03(3-0-0). Microeconomic Analysis I. F. S. Prerequisite: EC 306, M/M CC 315. Price theory: analyses of demand, production, and costs, analysis of various market structures, factor markets; general equilibrium, welfare economics.

EC 510 03(3-0-0). Labor Market Analysis. F. Prerequisite: EC 304, EC 306. Determination of wages and employment. Focus on theoretical and applied controversies.

EC 515 03(3-0-0). Financial Institutions-Structure/Regulation. F. Regulation of financial institutions in the U.S.: international banking and international financial institutions, and financial modernization.

EC 520 03(3-0-0). Economics of Taxation. S. Prerequisite: EC 320. Analysis and evaluation of tax policy in terms of efficiency and equity.

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

EC 535/EA 535 03(3-0-0). Applied Econometrics. F. S. Prerequisite: EC 315/EA 335, EC 304, EC 306, M/M CC 315. Credit not allowed for both EC 535 and EA 535. Econometric techniques applied to testing and quantification of theoretical economic relationships drawn from both microeconomics, macroeconomics.

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

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

EC 563/EA 563 03(3-0-0). Regional Economics—Theory, Methods, and Issues. F. Prerequisite: EC 306, concurrent registration in M/M CC 315. Credit not allowed for both EC 563 and EA 563. Study of tools and methods of regional economics, including supply, demand, and externality analyses. Applications to current urban and regional policy issues.

*EC 570 03(3-0-0). Evolution of Economic Thought. F. Prerequisite: EC 304, EC 306. From Plato and Aristotle to the modern period.

*EC 579 03(3-0-0). U.S. Economic History. F. Prerequisite: EC 370/470', or EC 304, EC 306. History and economic analysis of growth, transformation, and institutional change.


EC 506 03(0-0-3). Microeconomic Analysis II. F. Prerequisite: EC 306 or EC 506. Analysis of welfare foundations of public expenditure, including cost-benefit analysis.

EC 760 03(3-0-0). Theories of Economic Development. S. Prerequisite: EC 460 or written consent of instructor. Analysis of fundamentals of economic development (processes, problems, and strategies) with special reference to developing nations.

*EC 770 03(3-0-0). Economic Thought and Systems. S. Prerequisite: EC 570. Aspects of modern economic thought and comparative economics selected according to backgrounds and interests of the class.

EC 784 Var. Supervised College Teaching. F, S, SS.

EC 795 Var. Independent Study.

EDUCATION COURSES

School of Education
College of Applied Human Sciences

EDCC 192 03(1-0-2). Learning and Community. F Perspectives on college learning, motivation and group dynamics for first year students.

ED 255 02(2-0-0). Introduction to Education. F, S, SS. Overview of teaching profession emphasizing teaching opportunities, licensure, and University professional program.

EDCC 275 03(3-0-0). Schooling in the United States. F, S, SS. Prerequisite: Consent of Teacher Licensure Office. Social, political, historical, and economic forces that shape U.S. system of public schooling (K-12).

ED 296 Var. Group Study.

ED 320 03(0-0-3). Educational Psychology. F, S, SS. Prerequisite: Completion of 30 credits of course work; intent to apply to the Teacher Licensure Program. Offered only through the Division of Educational Outreach. Psychological conditions of classroom learning and teaching including understanding needs of exceptional children in the classroom.

ED 331 01(2-0-0). Educational Technology. F, S, SS. Prerequisite: BD 111 or BD 150 or CS 110 or computer proficiency exam; completion of 30 credits of course work; consent of Teacher Licensure Office. Skills and strategies for use of appropriate technology in education.

ED 340 03(1-2-1). Literacy and the Learner. F, S, SS. Prerequisite: Completion of 30 credits of course work; consent of Teacher Licensure Office. Understanding and supporting literacy development. Field experiences, service learning experiences.

ED 350 03(2-1-2). Instruction I—Individualization/Management. F, S, SS. Prerequisite: ED 310/EDCC 275, ED 340, concurrent reg. in ED 386; admission to Teacher Licensure Program. Theory, research, and practice of teaching at the junior high/middle school level; adapting instruction for individuals and learners with special needs.
ED 386 Var [1-3]. Practicum-Instruction I. Prerequisite: ED 310/EDCC 275, ED 340, concurrent registration in ED 350; admission to Teacher Licensure Program.

ED 400 03(2-2-0). Diagnostic Teaching of Reading. F, S. Prerequisite: EDCC 275, ED 340, HD 217, HD 310, HD 400.
Development of the knowledge base, skills, and strategies for teaching reading from birth to age 8. Service learning experiences.

ED 425 04(2-4-0). Early Childhood Education I. F, S. Prerequisite: ED 310/EDCC 275; admission to Teacher Licensure Program.
Integrated methods; theoretical bases; teacher's role; appropriate curriculum; measurement; environments; pedagogy; instructional design and decisions.

ED 426 04(1-4-1). Early Childhood Education II. F, S. Prerequisite: ED 425.
Integrated methods; organizing/presenting materials/activities; applying decisions; managing groups; individual instruction; assessment/evaluation.

EDCC 430 03(2-2-0). Diversity and Communication. F, S. SS. Prerequisite: ED 310/EDCC 275; admission to Teacher Licensure Program.
Perspectives on the educational needs of diverse learners; effective communication strategies; service learning experiences.

ED 450 04(4-2). Instruction II-Objectives and Assessment. F, S. SS. Prerequisite: ED 350, ED 386; concurrent reg. in ED 486J.
Theory, research, and practice of standards-based instruction: assessment, literacy and technology.

ED 460 04(0-2-3). Methods and Materials in Teaching Science. F. Prerequisite: ED 320; admission to Teacher Licensure Program.
Current trends in science education, K-12; techniques of experimentation demonstrations; study of equipment, facilities, and resource materials.

ED 462 04(0-4-0). Methods and Materials in Teaching Languages. F. Prerequisite: ED 320; admission to Teacher Licensure Program.
Current trends in language learning, K-12; techniques of foreign language proficiency test.

ED 463 04(0-0-4). Methods in Teaching Language Arts. F, S. Prerequisite: ED 320, admission to Teacher Licensure Program.
Objectives, content, and methods of teaching English, speech, and journalism in secondary schools.

ED 464 04(0-0-4). Methods and Materials in Teaching Mathematics. S. Prerequisite: ED 320, 18 credits in mathematics, admission to Teacher Licensure Program.
Problems and techniques of teaching secondary mathematics; evaluation of student achievement and teacher effectiveness.

ED 465 04(4-6-0). Methods and Materials in Social Studies. S. Prerequisite: ED 320, admission to Teacher Licensure Program.
Methods of teaching social studies; sources of information and teaching materials and literature for social studies teachers.

ED 466 04(4-0-0). Methods and Assessment in K-12 Art Education. F. Prerequisite: ED 310/EDCC 275; admission to Teacher Licensure Program.
Objectives, methods, and resource materials for teaching art in elementary and secondary schools.

ED 470 03(0-0-3). Methods in Elementary Physical Education Curricula. F. Prerequisite: ED 320, admission to Teacher Licensure Program.
Methods and materials in construction of a physical education curriculum and for teaching of physical education in elementary schools.

ED 471 04(0-0-4). Methods in Secondary Physical Education Curriculum. F, S. Prerequisite: ED 320, admission to Teacher Licensure Program.
Methods and organization in construction of a physical education curriculum and for teaching of physical education in secondary schools.

ED 475 04(2-3-0). Elementary School Music Methods. F. Prerequisite: ED 320, MU 217, admission to Teacher Licensure Program.
Materials and teaching techniques for grades K-6; musical concepts and skills, individual and group activities, evaluation of pupil progress.

ED 476 02(1-3-0). Choral Methods for Secondary Schools. F. Prerequisite: ED 320, MU 217, admission to Teacher Licensure Program.
General music classes, choral techniques and literature; current practices and trends.

ED 477 02(1-3-0). Instrumental Methods for Secondary Schools. F. Prerequisite: ED 320, MU 217, admission to Teacher Licensure Program.
Organization and administration of instrumental music, grades 5-12.

ED 485A-B Var [6-14]. Student Teaching. F, S. Prerequisite: ED 450 and appropriate special methods courses.

ED 486A-J Var. Practicum. Prerequisite: A-F, J) Admission to Teacher Licensure Program. I) ED 400 or concurrent registration.

A) Professional relations. B) Assessment of learning.

ED 494 Var. Independent Field Studies.
Specialized field study in the public schools under direction and supervision of faculty.

ED 495 Var. Independent Study.

ED 496 Var. Group Study.

ED 501 03(3-0-0). Reading in the Content Areas. SS. Prerequisite: ED 320.
Specific methods, materials, and techniques for helping students become more efficient in reading content area material.

ED 502 03(3-0-0). Human Relations in Education. F, S, SS. Prerequisite: Bachelor's degree or VE 300.
Human relations in an individual's educational, organizational, and social activities as applied to various educational settings.

ED 525A-B 02(0-2-2). Expert Teaching. F, S, SS. Prerequisite: Bachelor's degree, admission to Teacher Licensure Program.
ED 530 02(0-2-1). Computer Applications in Effective Instruction. S, SS. Prerequisite: Bachelor's degree, admission to Teacher Licensure Program.
Increasing instructional effectiveness through the use of computer technology.

ED 550 03(3-0-0). Guidance-Organization and Supervision. F. Prerequisite: ED 485A or B.
Administrative, supervisory process in relationship to guidance program; law, ethics; program development; other aspects of pupil-personnel services.

ED 551 03(3-0-0). 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.

ED 590 Var. Workshop.

ED 591B-D Var. Workshop.
B) Instruction. D) Community partnerships.

ED 600 03(3-0-0). Introduction to Research Methods. F, S, SS.
Methods of research, scientific methods, problem identification, research design, preparation and evaluation of research reports.

ED 602 03(0-0-2). Action Research. SS. Prerequisite: ED 600.
Provide educators with knowledge and skills to plan and implement school-based research to improve teaching and learning.

ED 606 03(3-0-0). Measurement: Concepts. F, S, SS. Prerequisite: ED 600.
Concepts of measurement and descriptive data analysis.

ED 619 03(0-0-3). Curriculum Development. S, SS. Prerequisite: ED 485A or B.
Principles and procedures for school personnel in planning the public school curriculum.

ED 620 02(0-0-2). Philosophy of Education. S. Prerequisite: Written consent of department head.
Contemporary philosophies as related to principles and practices in education.

ED 622 03(3-0-0). Innovative Social Studies Teaching. SS. Prerequisite: ED 485A or B.
Current trends in secondary school social studies teaching and curriculum techniques and materials for value formulation, decision-making skills, concepts, generalizations, and attitudes.

ED 623 03(0-2-2). Innovative Science Teaching. SS. Prerequisite: ED 485A or B. For K-12 science teachers.
Innovative trends in curriculum and methodology of science teaching.

ED 628 03(0-0-3). Models of Teaching. F. Prerequisite: ED 320. Also offered as telecourse.
Exploration of pedagogical topics and skill development related to instructional approaches.

ED 629 03(0-0-3). Communication and Classrooms. S. Prerequisite: ED 320 or written consent of instructor. Also offered as telecourse.
Exploration of pedagogical topics and growth experiences related to classroom management and presentation skills.

ED 631 03(0-0-3). Community Education. S. Prerequisite: Written consent of department head. Offered only through the Division of Education Outreach.
Overview of community education movement, concept, programs, leadership, and financing.

ED 635 03(0-0-3). Educators, Systems, and Change. F. Prerequisite: ED 485A or B. Offered only through the Division of Educational Outreach. Also offered as telecourse.
Process of change in education, focusing on teacher's role as leader and facilitator.

ED 645 03(0-0-3). Leadership and Ethics in Public Education. SS. Prerequisite: Admission to Administrator Licensure Program.
Focus on leadership functions for public schools in making decisions and ethical dimensions of leadership.

ED 646 03(0-0-3). School Resource Management. SS. Prerequisite: Admission to Administrator Licensure Program.
School resource management including fiscal, personnel, and organization.

ED 647 02(0-0-2). School Culture, Climate, and Communications. SS. Prerequisite: Admission to Administrator Licensure Program; concurrent registration in ED 645, ED 646.
Assist public school leaders in their facilitation role in enhancing human relations and communication within schools and communities.

ED 650 03(0-0-3). Individual Guidance and Counseling. F, SS.
Prerequisite: Bachelor's degree.
Theory and techniques of individual guidance and counseling.

ED 651 03(0-0-3). Group Guidance and Counseling. S, SS.
Prerequisite: ED 650.
Theory and techniques of group guidance and counseling.

ED 652 03(3-0-0). Ethics in Counseling/Career Development. SS.
Prerequisite: Admission to Counseling and Career Development Program.
Awareness and critical analysis of ethical and legal issues in counseling and career development.

ED 660 03(3-0-0). Career Development Counseling. S, SS.
Prerequisite: VE 500.
Career development programs and processes over the life span with particular attention to career choice.

ED 684 Var. Supervised College Teaching. F, S, SS

ED 686A-F Var. Practicum. 

ED 687A-D Var. Internship. 
A) Administration. C) Guidance and counseling. D) Principal.

ED 693A-F Var. Seminar. 

ED 694 Var. Independent Field Studies.

ED 695A-E Var. Independent Study. 

ED 696 Var. Group Study.

ED 698 Var. Research.


ED 709 03(0-0-3). Leadership Development. S, SS. Prerequisite: VE 601.
Principles, theories, attributes, and skills related to individual leadership development.
ED 713 03(0-0-3). Teaching, Learning, and Professional Growth. S, SS. Prerequisite: Admission to Ph.D. program or written consent of instructor. Teaching, learning, and professional development perspectives related to educational change and reform.

ED 714 03(0-0-3). Education Policy Analysis. S, SS. Prerequisite: Admission to Ph.D. program, Administrator Licensing Program or written consent of instructor. Frameworks for analyzing, designing policy proposals, and implementing plans.

ED 715 03(0-0-0). Critical Issues for Special Populations. F, SS. Prerequisite: Admission to Ph.D. program or written consent of instructor. Social and cultural issues related to special populations are researched and analyzed to understand policy that guides educational decisions.

ED 787 Var. Internship. Prerequisite: Admission to Ph.D. program or written consent of instructor.

ED 792A-C Var. Seminar. Prerequisite: Admission to Ph.D. program or written consent of instructor. A) Educational leadership. B) Teaching and learning. C) Special needs.

**ELECTRICAL ENGINEERING COURSES**

*Department of Electrical and Computer Engineering College of Engineering*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Prerequisites</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE 101/CS 101 03(2-2-0).</td>
<td>Engineering Computing. F.</td>
<td>Prerequisite: High school algebra and geometry. Credit allowed for only one of the following: CS 101, CSC/CSCC 151; EE 101.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 102 04(3-2-0).</td>
<td>Digital Circuit Logic. S.</td>
<td>Boolean algebra; Karnaugh maps; multiplexers, decoders, ROMs, PLAs, flip-flops, counters; sequential networks; state tables.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EECC 192 03(2-0-0).</td>
<td>Electrical Engineering Fundamentals. F.</td>
<td>Prerequisite: High school algebra and geometry. Programming emphasizing Pascal with applications to engineering problems.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 201 03(2-0-0).</td>
<td>Circuit Theory. F.</td>
<td>Corequisite: M/M CC 161, PH/PHCC 142. Basic circuit analysis techniques and applications to engineering design problems.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 202 04(3-0-4).</td>
<td>Circuit Theory Applications. S.</td>
<td>Prerequisite: EE 201. Tri and sinusoidal response of networks; modeling of active devices.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 332 03(3-0-0).</td>
<td>Electronics Principles II. S.</td>
<td>Prerequisite: EE 331. Discrete and integrated-circuit amplifiers-frequency response, negative feedback, digital logic circuits.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 341 03(2-0-0).</td>
<td>Electromagnetic Fields and Devices I. F.</td>
<td>Prerequisite: M 340 or M 345. Basic concepts of electrostatic and magnetostatic fields.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 342 03(3-0-0).</td>
<td>Electromagnetic Fields and Devices II. S.</td>
<td>Prerequisite: EE 341. Basic concepts of time varying electromagnetic fields and transmission lines.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 343 04(4-0-0).</td>
<td>Electrodynamics for Computer Engineers. F.</td>
<td>Prerequisite: EE 202 and M 340 or M 345. Fundamentals of electrodynamics with emphasis on time-varying fields and transmission lines.</td>
<td>(4-0-0)</td>
</tr>
<tr>
<td>EE 362 03(0-0-0).</td>
<td>Electromechanical Devices. S.</td>
<td>Prerequisite: EE 311, EE 331, EE 341. Operating principles and analysis of electromechanical devices including transformers, motors, and generators.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 372 03(3-0-0).</td>
<td>Physical Electronics. S.</td>
<td>Prerequisite: EE 341, PH/PHCC 142. Electrical, optical, magnetic, and thermal properties of materials used in electrical engineering devices.</td>
<td>(3-0-0)</td>
</tr>
<tr>
<td>EE 395 Var. Independent Study.</td>
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<tr>
<td>EE 401 03(1-4-0).</td>
<td>Senior Design Project I. F, S, SS.</td>
<td>Prerequisite: EE 312, EE 332, and EE 342 or EE 343. Advanced project, formal report, and oral presentation.</td>
<td>(1-4-0)</td>
</tr>
<tr>
<td>EE 402 03(1-4-0).</td>
<td>Senior Design Project II. F, S, SS.</td>
<td>Prerequisite: EE 401. Advanced project, formal report, and oral presentation.</td>
<td>(1-4-0)</td>
</tr>
<tr>
<td>EE 404 02(1-3-0).</td>
<td>Experiments in Optical Electronics. F.</td>
<td>Corequisite: EE 441. Experiments in optical electronics and lasers.</td>
<td>(1-3-0)</td>
</tr>
<tr>
<td>EE 411 04(3-0-0).</td>
<td>Control Systems. F.</td>
<td>Prerequisite: EE 312. Control system analysis and design for linear systems: stability and performance; time and frequency domain techniques.</td>
<td>(3-0-0)</td>
</tr>
</tbody>
</table>
and dc machinery, transformers, and circuit breakers; power symmetrical components and fault studies; power system stability, associative processors, parallel and distributed computers, text search processors.

EE 412 03(3-0-0). Telecommunications I. F. Prerequisite: EE 303/ST 303, EE 312.
Digital communication (source coding; modulation and detection; channel coding), analog communication (modulation).

EE 422 03(3-0-0). Telecommunications II. S. Prerequisite: EE 421.
Issues of source coding, detection and estimation, and equalization; introduction of information theory.

EE 441 03(3-0-0). Optical Electronics. F. Prerequisite: EE 342.
Concepts of modern physics, optical properties of atoms, light sources, lasers, optical detectors, optical cavities, and optical fiber transmission.

EE 444 03(3-0-0). Antennas and Radiation. F. Prerequisite: EE 342.
Retarded potential theory, antenna arrays, long wire antennas, dipoles, aperture antennas, receiving antennas.

EE 450 01(0-3-0). Digital System Design Laboratory. F. Prerequisite: EE 451.
Small digital circuits are designed and simulated using very high speed hardware description language and synthesis tools.

EE 451 03(3-0-0). Digital System Design. F. Prerequisite: EE 251; concurrent registration in EE 450.
State machines with PLAs as controllers and small computers; timing and race elimination considerations; state and microprogramming implementation.

EE 452 03(3-0-0). Principles of Digital Computing and Networking. S. Prerequisite: EE 251.
Introduction to digital computing and networking; basic organizations of computers, networks, and computer arithmetic.

EE 453 03(3-0-0). Digital Systems Testing I. F. Prerequisite: EE 251.
Fault modeling, test generation algorithms, fault simulation, functional testing, design for testability, built-in self-testing.

EE 454 03(3-0-0). Database Computers. F. Prerequisite: EE 251 or CS 370.
Computer architectures for database processing. Data filters, associative processors, parallel and distributed computers, text search processors.

EE 457 03(3-0-0). Optical Information Processing. F. Prerequisite: EE 312, EE 342 or EE 343.
Introduction to optical systems for signal and information processing with emphasis on Fourier optics.

EE 461 03(3-0-0). Power Systems I. F. Prerequisite: EE 342, EE 362.
Design, analysis, and operation of power equipment including ac and dc machinery, transformers, and circuit breakers; power semiconductor devices.

EE 462 03(3-0-0). Power Systems II. S. Prerequisite: EE 461.
Power system modeling; load flow and economic dispatch; symmetrical components and fault studies; power system stability.

EE 471 03(3-0-0). Semiconductor Devices. F. Prerequisite: EE 332, EE 372, EE 342 or EE 343.
Semiconductor physics, device fabrication technology, analog and bipolar and field-effect transistors.

EE 472 03(3-0-0). MOS Integrated Circuits. S. Prerequisite: EE 332.
MOS transistor theory, design rules, layout design, gate, cell and circuit design, memories, clocking strategies, MOS technologies.

EE 495 Var. Independent Study.

EE 501 01(0-2-0). Analog Circuits Laboratory I. F. Corequisite: EE 532.
Operational amplifier circuits are built and tested.

EE 502 01(0-2-0). Analog Circuits Laboratory II. S. Corequisite: EE 533.
Active analog filters are built and tested.

EE 512 03(3-0-0). Digital Signal Processing. F. Prerequisite: EE 312 or written consent of instructor.
Discrete time signals and systems, digital filter design and implementation, fast algorithms, quantization effects.

EE 514 03(3-0-0). Applications of Random Processes. F. Prerequisite: EE 303/ST 303, EE 312.
Bit-error rates, signal-to-noise power ration, signal detection, signal estimation, Wiener filter, application.

EE 521 03(3-0-0). Satellite Communication. S. Prerequisite: EE 421.
Principles of satellite communication systems engineering.

EE 525 3(3-0-0). Fiber Optic Communications. S. Prerequisite: EE 471.
Optoelectronic and optical components for fiber optics; communications systems physical layer issues and examples.

EE 532 03(3-0-0). Passive and Active Filters. F. Prerequisite: EE 312, EE 332.
Passive, active transfer functions; maximally flat and equal ripple designs; terminated LC ladder design; parameter sensitivity; operational amplifier models.

EE 533 03(3-0-0). Operational Amplifier Circuits. S. Prerequisite: EE 332.
Active filter implementations with operational amplifiers; nonideal amplifier; cascade, multiple feedback, leapfrog implementations; switched capacitor filters.

EE 534 03(3-0-0). Analog Integrated Circuit Design. F. Prerequisite: EE 332.
Design methods for state-of-the-art analog integrated circuits, including CMOS op-amps, comparators, and phase-locked loops.

EE 535 01(0-2-0). Analog Integrated Circuit Laboratory. F. Corequisite: EE 534.
Analog integrated circuits are designed and simulated using modern software tools.

EE 543 03(3-0-0). VLSI Plasma Processing. F. Prerequisite: EE 332, EE 342.
Fundamental processes in gas discharges; elementary gas phase chemistry, basic surface physics; transport of materials between surface and gas phase.

EE 546 03(3-0-0). Laser Fundamentals and Devices. S. Prerequisite: EE 441.
Amplification of light, laser excitation mechanisms, laser devices, characteristics and design.

EE 549 03(3-0-0). Radar Systems and Design. S. Prerequisite: EE 444 or written consent of instructor. Fundamental ideas of radar operation and basic design of various radar types including current topics.

EE 550A-B. Microprocessors Based Systems. F. Prerequisite: EE 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.

EE 553 03(3-0-0). Digital Systems Testing II. S. Prerequisite: EE 453. Fault modeling for CMOS, test generation for static and dynamic CMOS, design for robust testability, self-checking circuits.

EE 554 03(3-0-0). Computer Architecture. F. Prerequisite: EE 251 or EE 550A. Current machine architectures such as SIMD, MIMD, and stack machine; overlap pipeline, parallel, and associative processing.

EE 557 03(3-0-0). Digital Optical Computing. S. Prerequisite: EE 441 or EE 451 or EE 554 or written consent of instructor. Optical devices; optical disk, holographic memories; interconnection networks. Optical systems for numerical and nonnumerical data processing.

EE 562 03(3-0-0). Power Electronics I. F. Prerequisite: EE 332. Switch mode and resonant converters, control using switch averaged dynamic models, modeling of all circuit components including sources, loads, and switches.

EE 563 03(3-0-0). Power Electronics II. S. Prerequisite: EE 562. Electrical energy, processing circuits, lightweight power management, and power conversion circuits, emphasizing small signal transfer functions.

EE 570 03(3-0-0). Compound Materials and Devices. S. Prerequisite: EE 471. III-V and II-VI alloy semiconductors; bandgap engineering; quantum well heterostructures; HEMT, HBT, and high-performance devices; GaAs ICs.

EE 571 03(3-0-0). VLSI System Design. F. Prerequisite: EE 451. Design of integrated circuits at the system level including cell design, digital systems, parallel architecture, systolic arrays.

EE 573 03(3-0-0). Polarimetry. F, S. Prerequisite: EE 342. Polarization in optical and high frequency systems.

EE 574 03(3-0-0). Optical Materials and Devices. S. Prerequisite: EE 441 or EE 471. Semiconductor light emitters and detectors, dielectrics, and light reflection from, and propagation through, anisotropic dielectrics.

EE 576 03(3-0-0). VLSI Processing-Science and Technology I. S. Prerequisite: EE 472. Physics, chemistry of VLSI processing including plasma, thermal techniques of oxidation, deposition; photolithography, etching, cleaning, process modeling.

EE 578 03(3-0-0). VLSI Processing-Science and Technology II. S. Prerequisite: EE 576. Advanced VLSI processes for microelectronic fabrication.

EE 611 03(3-0-0). Nonlinear Control Systems. F. Prerequisite: EE 412. Controller analysis and design for nonlinear systems.

EE 612 03(3-0-0). Robust Control Systems. S. Prerequisite: EE 411. Introduction to modern robust control theory techniques for analysis and design of large-scale uncertain multivariable systems.

EE 614 03(3-0-0). Principles of Digital Communications. S. Prerequisite: EE 514. Information theory, optimal receiver design, waveform coding, error correcting coding.


EE 642 03(3-0-0). Time Harmonic Electromagnetics. S. Prerequisite: EE 641. Maxwell's equations, radiation, boundary value problem, dyadic Green's functions, scattering theory.

EE 647 03(3-0-0). Microwave Nondestructive Evaluation. S. Prerequisite: EE 548. Fundamental physical and theoretical principles of microwave nondestructive testing/evaluation methods and their applications.

EE 652 03(3-0-0). Estimation and Filtering Theory. S. Prerequisite: EE 411 or EE 421; ST 525. Optimal Kalman filter estimators; smoothing and prediction; applications to communications and controls.

EE 653 03(3-0-0). Digital Image Processing. F. Prerequisite: EE 512. Image enhancement, restoration and encoding techniques, segmentation and texture analysis. Pattern classification, decision functions, learning systems.

EE 654 03(3-0-0). Design Automation. F. Prerequisite: EE 472 or EE 571. Advanced logic design methods; digital system modelling, simulation, and testing; design for testability; CAD systems.

EE 655 03(3-0-0). Multidimensional Digital Signal Processing. S. Prerequisite: EE 512 or written consent of instructor. Multidimensional signals and systems, 2-D transforms, stability methods, design and implementations, spectral factorization, and image modeling.

EE 656 03(3-0-0). Neural Networks and Adaptive Systems. F. Prerequisite: EE 512. Various adaptation rules, neural network paradigms, learning, stability and convergence, applications in signal/image processing and control.

EE 657 03(3-0-0). Advanced Computer Networks. F. Prerequisite: EE 421 or CS 457 or ST 420. Computer network architectures, protocols, random access, performance models, priority mechanisms, circuit switching, integrated traffic, ISDN.

EE 660 03(3-0-0). Advanced Topics in VLSI Design. S. Prerequisite: EE 571. VLSI synthesis, optimization, and other issues.

EE 670A-C/S 670A-F Var [1-4]. Topics in Architecture/Systems. F, S. Prerequisite: EE 554 or CS 570 or written consent of instructor. Credit not allowed for both EE 670A-F and CS 670A-F.

A) Data flow. B) Performance evaluation and modeling.
C) Distributed systems. D) Architecture of advanced systems.

EE 670A-C/S 670A-F Var [1-4]. Topics in Architecture/Systems. F, S. Prerequisite: EE 554 or CS 570 or written consent of instructor. Credit not allowed for both EE 670A-F and CS 670A-F.

A) Data flow. B) Performance evaluation and modeling.
C) Distributed systems. D) Architecture of advanced systems.

EE 670A-F/CS 670A-F Var [1-4]. Topics in Architecture/Systems. F, S. Prerequisite: EE 554 or CS 570 or written consent of instructor. Credit not allowed for both EE 670A-F and CS 670A-F.

A) Data flow. B) Performance evaluation and modeling.
C) Distributed systems. D) Architecture of advanced systems.
EE 671 03(3-0-0). Thin Film Physical Vapor Deposition. F. Prerequisite: One course in thermodynamics or written consent of instructor. Thermodynamic and kinetic foundations; high vacuum; RF and DC discharges; evaporation and sputtering; novel deposition technologies.

EE 672/PH 672 03(3-0-0). Principles of Semiconductors. S. Prerequisite: EE 471 or PH 531. Credit not allowed for both EE 672 and PH 672. Electronic properties of semiconductors: band structure, statistics, transport properties, photoelectric properties, potential barriers, interfaces.

EE 673 03(3-0-0). Thin Film Growth. F. Prerequisite: One course in thermodynamics or written consent of instructor. Microstructures of physically vapor-deposited films; thin-film morphological development; atomic processes of condensation, nucleation, and growth.

EE 695 Var. Independent Study.


EE 712 03(3-0-0). Topics in Control Theory. S. Prerequisite: EE 411. Adaptive control of deterministic systems, stochastic control, system identification, and nonlinear systems.

EE 721 03(3-0-0). Topics in Communication Theory. S. Prerequisite: EE 521. Detection and estimation theory; radar-sensor problems; nonlinear modulation, information theory, communication systems.

EE 742 03(3-0-0). Topics in Electromagnetics. S. Prerequisite: EE 641. Applications of wave propagation and scattering to microwave radar, Doppler radar, meteorological radar applications.

EE 744 03(3-0-0). Topics in Plasma Dynamics. S. Prerequisite: EE 543. Kinetic equations, nonlinear theory of waves and instabilities; plasma fluctuation and radiations; plasma diagnostics and plasma heating.

EE 752 03(3-0-0). Topics in Signal Processing. F. Prerequisite: EE 512; EE 514 or ST 525. Adaptive filtering, spectral estimation, sonar/radar signal processing, and detection/classification schemes.

EE 773 03(3-0-0). Topics in Solid State Electronics. F. Prerequisite: EE 672/PH 672 or EE 471. Advanced principles of microwave devices, solar cells, theory of solids, or transport in materials.

EE 777 03(3-0-0). X-Ray Lasers. S. Prerequisite: EE 546. Fundamentals, design, and implementation of soft X-ray lasers and X-ray optics.

EE 795 Var. Independent Study.


ENGINEERING COURSES

College of Engineering

EGCC 100 02(1-2-0). Engineering Greatness. F. Will not meet degree requirements in the College of Engineering. Problem solving, team, and attitudinal skills for engineers and scientists.

EG 192 01(0-0-1). Seminar. Engineering/society/humanities relationships. Combined program requirements and opportunities.

EG 384 Var [1-5]. Supervised College Teaching. F, S, SS. Prerequisite: Written consent of instructor.

EG 410 03(3-0-0). Systems Engineering and Optimization. S. Prerequisite: M/M CC 255 or M 261. Methodologies, philosophies, and applications of systems engineering approach.

EG 510/M 510 03(3-0-0). Linear Programming and Network Flows. F, S, SS. Prerequisite: M 261 or M/M CC 315. Credit not allowed for both EG 510 and M 510. Optimization methods; linear programming, simplex algorithms, duality, sensitivity analysis, minimal cost network flows, transportation problem.

EG 511 03(3-0-0). Dynamic Programming. F. Prerequisite: M 261 or M/M CC 315 and some knowledge of FORTRAN. Theory, applications of dynamic programming, hierarchical optimization; sequential decision problems, resource allocation, general networks, decomposition.

EG 517 03(3-0-0). Linear Multivariable Systems. F. Prerequisite: EE 411 or EE 421 or ME 417. Analysis of linear continuous and discrete time multivariable systems; modern methods for design of linear multivariable control systems.

EG 518 03(3-0-0). Optimal Control. S. Prerequisite: EG 517. Theory and application of optimal control and optimal estimation theory; continuous and discrete time systems; Pontryagin maximum principle.

EG 520/M 520 03(3-0-0). Nonlinear Programming. S. Prerequisite: EG 510/M 510. Credit not allowed for both EG 520 and M 520. Theoretical, computational, practical aspects of nonlinear programming (NLP); unconstrained, constrained NLP; quadratic programming; large-scale NLP.

EG 610 03(3-0-0). Engineering Decision Support/Expert Systems. S. Prerequisite: EG 510 or M 510. Decision support systems for complex engineering problems; multi-criteria decision making and optimization; hybrid knowledge-based/algorithms methods.
ENVIRONMENTAL HEALTH COURSES

Department of Environmental Health
College of Veterinary Medicine and Biomedical Sciences

EHCC 110/PSCC 110(3-0-1). Human Health and Environmental Perspectives. F, S, SS. Prerequisite: High school level biology. Credit not allowed for both EHCC 110 and PSCEC 110. Survey of health and wellness, physical activity and nutrition, the environment, drugs and health, diseases and injuries, sexuality and pregnancy.

EH 220 03(3-0-0). Environmental Health. F, S. Prerequisite: BC 103 or BY/LCC 110 or BY/LCC 110 or BY/LCC 110 or BY/LCC 120 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.

EH 230 02(0-0-4). Environmental Health Field Methods. S. Prerequisite: EH 220, high school chemistry. Special fee, $25. Field and laboratory techniques necessary for practice of environmental health.

EHCC 307/STCC 307 03(3-0-0). Introduction to Biostatistics. F, S, SS. Prerequisite: M/M CC 121. Credit allowed for only one of the following: EH/EHCC 307 or ST/STCC 307, ST/STCC 301, ST/STCC 309, ST 311. Biostatistical methods: confidence intervals, hypothesis tests, simple correlation and regression, one-way analysis of variance.

EH 320 03(0-0-4). Environmental Health Water Quality. F. Prerequisite: EH 230, MB 300 or concurrent registration. Water quality and treatment technologies for practice of environmental health.

EH 332 03(3-0-0). Principles of Epidemiology. S. Prerequisite: EH/EHCC 307 or ST/STCC 307; MB 149 or MB 300. Use of epidemiological methods in studying distribution of diseases in human populations.

EH 350 03(0-0-4). Industrial Hygiene and Air. S. Prerequisite: AH 300/PS 300, EH 230. Industrial and airborne hazards, disease prevention, hazard control and evaluation.

EH 410 03(3-0-0). Environmental Health Waste Management. S. Prerequisite: C 343, EH 230. Recognition and management of impacts, occupational and environmental, in handling hazardous and solid waste.

EH 430 03(3-0-0). Human Disease and the Environment. S. Prerequisite: EH 320, EH 446. Overview of the human diseases which are associated with the environment.

EH 446 03(3-0-0). Environmental Toxicology. F. Prerequisite: C 245 or C 343. Essentials of environmental toxicology based on problem-oriented discussions addressing environmental impacts of organic/inorganic chemicals.

EH 460 02(2-0-0). Environmental Health Program Management. F. Prerequisite: EH 320, EH 350. Development of skills in communication, program management, crisis resolution, and conflict resolution in environmental health entities.

EH 487 02(0-0-1). Internship—Environmental Health. F, S. Professional field practice in environmental health with a public or private sector agency.

EH 492 01(0-0-1). Environmental Health Seminar. S. Networking, preparation of resume, and statement of qualifications for professional internship or employment.

EH 494 Var. Independent Study in Environmental Health. Prerequisite: EH 220. Directed independent study or project under faculty guidance.

EH 502 03(3-0-0). Fundamentals of Toxicology. F. Prerequisite: AH 300/PS 300, C 245 or C 343. Fundamental principles of toxicology; dose-response, organ targets, toxic agents.

EH 515 03(0-0-3). Women’s Health. F. Prerequisite: WS 200 or written consent of instructor. Current issues in women’s health.

EH 520 03(1-0-2). Advanced Environmental Health. F, SS. Prerequisite: MB 300, C 343. Issues relating to environmental health problem definition, evaluation, and control using interdisciplinary focus.

EH 526 03(3-0-0). Industrial Hygiene. F. Prerequisite: C 245 or C 341; PH/PHCC 110 or PH/PHCC 121; EH 520 or concurrent registration. Theory and application of industrial hygiene principles to management of the occupational environment.

EH 527 01(0-3-0). Industrial Hygiene Laboratory. S. Prerequisite: EH 526. Theory, rationale, and practice of measurement in industrial hygiene. Emphasizes use of quantitative information in occupational health.

EH 532 03(2-0-1). Epidemiologic Methods. F. Prerequisite: EH/EHCC 307 or ST/STCC 307. Method of epidemiologic investigation and study design. Applications to disease control with literature examples.

EH 533/MB 533 02(0-0-1). Epidemiology of Infectious Diseases/Zoonoses. S. Prerequisite: MB 300. Credit not allowed for both EH 533 and MB 533. Epidemiologic features of infectious and parasitic diseases that have a major impact on community medicine.

EH 536 03(3-0-0). Advanced Occupational Health. S. Prerequisite: EH 446 or EH 526. Advanced topics in occupational health emphasizing contemporary issues, topics, trends, and problems in the field of industrial hygiene.

EH 542 03(3-0-0). Biostatistical Methods for Qualitative Data. F. Prerequisite: ST/STCC 301. Statistical analysis of categorical data as obtained in epidemiology, toxicology, occupational health, and clinical sciences.

EH 544/ST 544 03(3-0-0). Biostatistical Methods for Quantitative Data. S. Prerequisite: EH/EHCC 307 or ST/STCC 307 or ST/STCC 301. Credit not allowed for both EH 544 and ST 544. Regression and analysis of variance methods applied to both observational studies and designed experiments in the biological sciences.
EH 547 03(0-6-0). Equipment and Instrumentation. S. Prerequisite: EH 446. Special fee, $25.
Sample collection, quality control, theory and application of equipment and instrumentation for analysis and confirmation of organic-inorganic chemicals.

EH 550 03(3-0-0). Principles of Ergonomics. F.
Theory and practice of ergonomics.

EH 551 03(3-0-0). Ergonomics in Product and Process Design. S.
Prerequisite: EH 550 or written consent of instructor. Application of ergonomics to design of products and processes with respect to health, safety, function, and quality.

EH 601 04(2-0-2). Advanced Toxicology I. S. Prerequisite: EH 502.
Biochemical and metabolic processes involved in mechanisms of toxicity. Research methods and understanding of current literature.

EH 636 03(3-0-0). Industrial Hygiene Control Methods. S.
Prerequisite: EH 526; EH 536 or concurrent registration. Controlling occupational exposures to chemical agents, emphasizing local exhaust ventilation, personal protective devices.

*EH 648 03(3-0-0). Environmental Health Risk Assessment. S.
Prerequisite: EH 446 EH 520.
Epidemiologic analyses of effects of chemicals using risk assessment, management, and communication approaches.

EH 656 03(3-0-0). Occupational Noise Control. F. Prerequisite: EH 527. Also offered through the Division of Educational Outreach. Measurement and control of industrial or environmental noise emphasizing practical solutions.

*EH 658 03(3-0-0). Environmental/Occupational Epidemiology. S.
Prerequisite: EH 532. Epidemiologic analyses of effects of exposure to environmental and occupational health hazards.

Training to conceptualize and execute an independent research project.

EH 670 Var [1-3]. Directed Readings. F, S, SS. Prerequisite: EH 520.
Advanced study through supervised readings on specialized topics.

EH 684 Var [1-3]. Supervised College Teaching. F, S, SS.
Participation in environmental health course teachings under guidance of faculty in classroom, laboratory, or field.

EH 687 Var [1-4]. Internship.
Advanced study or research in environmental health with a governmental agency, private sector entity, or research facility.

EH 692 01(1-0-0). Seminar.
Professional seminar series with student interaction on weekly basis; topics presented by outside experts, faculty, or doctoral candidates.

EH 693A-C 01(0-0-0). Research Seminar.
Presentation of student research and discussion of publications from scientific literature. A) Epidemiology. B) Industrial hygiene. C) Toxicology.

EH 695 Var. Independent Study.
Specialized study in a defined area under supervision of environmental health faculty.


EH 698 Var [1-6]. Research. Prerequisite: Written consent of research mentor.
Master's-level research and preparation of thesis.

*EH 701 03(3-0-0). Environmental Carcinogenesis. F. Prerequisite: BC 402.
Molecular and cellular mechanisms by which environmental carcinogens exert effects.

EH 702 04(2-0-2). Advanced Toxicology II. F. Prerequisite: EH 601.
Role of cellular information systems in toxic mechanisms: DNA expression, signal transduction and control of cellular processes.

EH 726 03(3-0-0). Aerosols and Occupational Health. F.
Prerequisite: EH 636 or written consent of instructor. Properties and behavior of industrial aerosols, emphasizing measurement and control of dust related to disease.

EH 784 Var [1-3]. Supervised College Teaching. F, S, SS.
Participation in environmental health course teachings under guidance of faculty in classroom, laboratory, or field.

EH 787 Var [1-6]. Internship.
Advanced study or research in environmental health with a governmental agency, private sector entity, or research facility.

EH 792 01(0-0-1). Seminar.
Professional seminar series with student interaction on weekly basis; topics presented by outside experts, faculty, or doctoral candidates.

EH 795 Var. Independent Study.
Specialized study in a defined area under supervision of environmental health faculty.

Doctoral-level research and preparation of dissertation.

ENTOMOLOGY COURSES

Department of Bioagricultural Sciences
and Pest Management
College of Agricultural Sciences

ENCC 102 03(3-0-0). Insects, Sciences, and Society. F, S.
How insects develop, behave, and affect human activity. What every student should know about the most diverse life form on Earth.

EN 103 01(0-2-0). Insects, Science, and Society Laboratory. F, S.
Prerequisite: EN/ENCC 102 or concurrent registration. Recognition and classification of insects; demonstrations.

EN 300/AN 300B 01(1-0-0). Topics in Livestock Entomology. S.
Prerequisite: AN 100. Credit not allowed for both EN 300 and AN 300B. Identification, biology, and management of insect, tick, and mite pests.

EN 302 02(2-0-0). Applied and General Entomology. F.
Biological and management of insects.

EN 303A-C. Entomology Laboratory. F. Prerequisite: EN 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).
EN 306 03(2-0-0). Range and Livestock Insects. F. Prerequisite: BY 103 or BZ/BZCC 111.
Biological and control of arthropod pests attacking range land and range livestock in intermountain West.

EN 310/ PD 310/W 310 02(2-0-0). Fundamentals of Pesticides. F., SS. Prerequisite: Introductory biological science or introductory chemistry.
Credit allowed for only one of the following: EN 310, PD 310, W 310.

EN 320 03(2-2-0). Entomology. F. Prerequisite: Introductory biological science or introductory chemistry.
Credit allowed for only one of the following: EN 320, PD 320, W 320.

EN 332 03(3-0-0). Integrated Pest Management. F. Prerequisite: BY/LSCC 102 or BZ/BZCC 112. Credit not allowed for both EN 332 and PD 332. Special fee, $6.

EN 342 04(3-0-0). Principles of Systematic Zoology. S. Prerequisite: BY 110 or BZ/BZCC 111. Credit not allowed for both EN 342 and BZ 424.

EN 445 04(2-4-0). Aquatic Insects. F. Prerequisite: BY 103 or BZ/BZCC 111.

EN 451 04(3-0-0). Principles of Systematic Zoology. S. Prerequisite: BY 110 or BZ/BZCC 111. Credit not allowed for both EN 451 and BZ 451.

EN 453 03(3-0-0). Insect Behavior. S. Prerequisite: EN 302. Principles of insect function.

EN 457 03(3-0-0). Environment of Pesticides. S. Prerequisite: One course in soils, organic chemistry, or plant physiology, or written consent of instructor. Credit allowed for only one of the following: EN 458, PD 458, W 458.

EN 462/MB 462/BZ 462 05(3-4-0). Parasitology and Vector Biology. F. Prerequisite: BY 103 or BZ/BZCC 110; MB 301 or MB 302 or BZ 212. Credit allowed for only one of the following: EN 462, MB 462, BZ 462.

EN 507 03(3-0-0). Insect Behavior. S. Prerequisite: One course in biology.
Behavior of insects and related arthropods with special attention to social behavior.

EN 508/PD 508/W 508 03(3-0-0). Environmental Fate of Pesticides. S. Prerequisite: One course in soils, organic chemistry, or plant physiology, or written consent of instructor. Credit allowed for only one of the following: EN 508, PD 508, W 508.

EN 510/ PD 510 03(3-0-0). Insect-Plant Disease Relationships. F. Prerequisite: One entomology or plant disease course. Credit not allowed for both EN 510 and PD 510.

EN 511/ PD 511 01(0-2-0). Insect-Plant Disease Relationships Laboratory. F. Prerequisite: EN 510/PD 510 or concurrent registration. Credit not allowed for both EN 511 and PD 511.

EN 525 03(3-0-0). Insect Physiology. S. Prerequisite: EN 302. Principles of insect function.

EN 540 03(2-0-1). Insecticide Toxicology/Resistance Management. F. Prerequisite: BY 103 or BZ/BZCC 110; C 245.

EN 543/PD 543/W 543 03(3-0-0). International Crop Protection. S. Prerequisite: Crop protection course and/or written consent of instructor. Credit allowed for only one of the following: EN 543, PD 543, W 543.

EN 551 03(1-4-0). Immature Insects. S. Prerequisite: EN 303A or B or C.
Characteristics of immature forms of orders and families of insects emphasizing those important to humans.

EN 556/PD 556/W 556 03(3-0-0). Biological Control of Plant Pests. F. Prerequisite: Ten credits of biology. Credit allowed for only one of the following: EN 556, PD 556, W 556.
Management of insect pests of plants, plant pathogens, and weeds using biological control agents such as insects, bacteria, viruses, and fungi.

EN 562/MB 562/BZ 562 05(1-8-0). Field Ecology of Disease Vectors. Prerequisite: EN 462/MB 462/BZ 462 or MB 301; EN 402. Credit allowed for only one of the following: EN 562, MB 562, BZ 562.

EN 570 03(3-0-0). Chemical Ecology. F. Prerequisite: C 245 or C 341.
Chemical interactions among animals, plants, fungi, and microorganisms.

EN 575/MB 575 03(3-0-0). Molecular Entomology. S. Prerequisite: Twelve credits in biology, cell biology, genetics, or microbiology. Credit not allowed for both EN 575 and MB 575.
Application of molecular and biotechnologies to entomological topics.

EN 576/MB 576/DS 576 03(3-0-0). Bioinformatics. F., S. Prerequisite: BC 463 or BY 310 or CM 501 or EN 575/MB 575 or MB 450. Concurrent registration in EN 576 with instructor consent. Access to campus network. Credit not allowed for both EN 576 and MB 576.

EN 611A-3 01(0-2-0). Skill Module. F., S, SS.
EARTH RESOURCES COURSES

Department of Earth Resources
College of Natural Resources

+ERCC 130 03(3-0-0). Earth System Science. F, S, SS. Credit allowed for only one of the following: ER/ERC 130, ER/ERC 140, ER 150/ERC 192A. Special fee, $5.

Descriptive, dynamic, and interaction of the four earth science subsystems: tectonics, surficial processes, oceanography, and atmospheric sciences.

+ERCC 140 04(3-3-0). Physical Geology. F, S, SS. Credit allowed for only one of the following: ER/ERC 130, ER/ERC 140, ER 150/ERC 192A. Special fee, $4.

Develops scientific understanding and thinking skills through introduction to earth processes, materials, resources, and hazards.

+ER 154 03(3-0-0). Historical and Analytical Geology. S. Prerequisite: ER/ERC 130 or ER/ERC 140 or ER 150/ERC 192A. Special fee, $12.

Physical and biological history of Earth with introduction to laboratory, computer, and field techniques.

+ERCC 192A 04(2-3-1). Physical Geology and Freshman Seminar. F. Credit allowed for only one of the following: ER/ERC 130, ER/ERC 140, ER 150/ERC 192A. Special fee, $20.

Surface and internal processes responsible for shaping the earth, earth materials and landforms; current earth science issues.

+ERCC 192B 02(0-0-2). First-Year Seminar in Earth Resources. F. Special fee, $15.

Introduction to critical issues in earth resources.

+ER 232 05(3-0-0). Mineralogy and Mineral Optics. F. Prerequisite: ERCC 192A 04(2-3-1). First-Year Seminar in Earth Resources. F, S, SS. Special fee, $6.

Crystallographic lattices, symmetry, and morphology; crystal chemistry; models and natural crystals.

ER 272 03(3-0-0). Oceanography I. F.

General survey of the geology and physics of the oceans and their basins.

ER 274 03(3-0-0). Oceanography II. S.

General survey of the chemistry, sedimentation, biology, and pollution of the oceans.

ERCC 304 03(3-0-0). Principles of Watershed Management. F, S.

Effects of land use practices on watersheds; hydrology, soil loss, and water quality.

+ER 342 03(2-3-0). Paleontology. F. Prerequisite: ER 154. Special fee, $6.

Description of invertebrates, vertebrates, and plants and their distribution in earth history.

+ERCC 344 04(3-0-0). Stratigraphy and Sedimentology. F. Prerequisite: ER 154. Special fee, $20.

Description, genesis, correlation and age of sediments, sedimentary rocks and layered rock sequences.

+ER 364 04(3-3-0). Igneous and Metamorphic Petrology. S. Prerequisite: ER 232. Special fee, $13.

Identification, classification, geochemistry, petrogenesis of igneous and metamorphic rocks; textural interpretation of hand samples and thin sections.

+ER 366 04(3-3-0). Sedimentary Petrology and Geochemistry. F. Prerequisite: ER 154. Special fee, $20.

Composition, identification, and classification of sedimentary rocks; geochemical processes affecting sedimentary rocks and surficial deposits.

+ER 372 04(3-0-0). Structural Geology. S. Prerequisite: ER 154, M/M CC 125, concurrent registration in PH/PHCC 141. Special fee, $20.

Stress and strain in rocks, geometry of deformed rocks, and tectonic principles.

+ERCC 376 03(1-4-0). Geologic Field Methods. S. Prerequisite: ER 344, ER 372 or concurrent registration. Special fee, $40.

Scientific surveying, and mapping methods used in geologic field studies; proposal, map, and report preparation.

ER 384 Var 1-5. Supervised College Teaching. F, S, SS. Prerequisite: Written consent of instructor. Instruction and practice in laboratory instruction in lower-division departmental courses.

+ER 406 03(3-0-0). Seasonal Snow Environments. S. Prerequisite: Written consent of instructor. Special fee, $40.

Evaluation of the physical environment; characteristics of snow; methods of studying snow; snow safety.

ER 416 03(3-0-0). Land Use Hydrology. F. Prerequisite: SC 240, ST/STCC 201.

Analysis of hydrologic processes, erosion, and slope stability, and effect of land use management activities; watershed restoration.


Instrument and field techniques in watershed science. Project design and data analysis.

ER 418 03(3-0-0). Land Use and Water Quality. S. Prerequisite: C/C CC 107, ER 416.

Physical, chemical, biological water quality parameters affecting land use; land management to maintain water quality; water quality standards, legislation.

ER 419 02(4-0-0). Water Quality Laboratory for Wildland Managers. S. Corequisite: ER 418. Special fee, $47.

Sampling and determination of water quality parameters.

+ER 420 02(0-6-0). Watershed Field Practicum. F. Corequisites: ER 416 and ER 417 or written consent of instructor. Special variable ($50-$80) fee determined by department.

Field visits to watershed management projects and sites of significant field studies.

+ER 434 03(3-0-0). Geology of National Parks and Monuments. F. Prerequisite: ER/ERC 130 or ER/ERC 140. Special fee, $20.

Geology of outdoor museums with consideration of environmental problems.

+ER 436 06(0-18-0). Geology Summer Field Practicum. S. Corequisites: ER 416 and ER 417 or written consent of instructor. Special variable ($50-$80) fee determined by department.

Geologic mapping, measuring sections, interpreting geologic history in Colorado. Required comprehensive reports, geologic maps, and cross sections.

+ER 440 03(2-2-0). Watershed Problem Analysis. S. Prerequisite: CE 322/ENV 322, ER 416. Special fee, $45.

Hydrologic analysis and problem solving in watershed management.

+ERCC 446 03(3-0-0). Environmental Geology. S. Prerequisite: ER 454 or concurrent registration. Special fee, $20.

Geology applied to environmental problems.
ER 447 03(2-3-0). Mineral Deposits. F. Prerequisite: ER 372. Occurrence, origin, and exploration of economic metallic mineral deposits.

ER 450 03(3-0-0). Marine Geology. F. Prerequisite: ER/ERCC 130 or ER/ERCC 140 or ER 272. Geology of oceans including structure, geomorphology, sedimentation.

+ER 452 04(3-3-0). Hydrogeology. F. Prerequisite: ER/ERCC 140 or ER 150/ERCC 192A or GR 210; PH/PHCC 141; M/M CC 161 or M/M CC 255 or written consent of instructor. Special fee $60, $10. Interaction of water and geologic materials; surface and groundwater; quantitative analysis and geologic effects on quality and flow of groundwater.

ER 454 04(3-4-0). Geomorphology. S. Prerequisite: ER/ERCC 140 or ER 150/ERCC 192A or GR 210; M/M CC 155 or M/M CC 160. Special fee $25. Origin of landform; morphology and processes.

ER 460 04(3-3-0). Advanced Petrology and Geochemistry. F. Prerequisite: ER 364. Petrology of igneous and metamorphic rocks; magma generation and emplacement; thermodynamics; quantitative methods; isotopes; ore deposits.

+ER 465 04(3-3-0). Eolian and Fluvial Transport Processes. F. Prerequisite: PH/PHCC 141 or written consent of instructor. Special fee $12. Fundamental physical principles of eolian and fluvial transport processes.

+ER 474 03(3-0-0). Snow Hydrology. F. Prerequisite: ER 416 or CE 322/CE 322. Special fee $20. Snowfall, accumulation, distribution, physical processes in the snowpack, energy balance, ablation and runoff, measurement methods, runoff forecasting.

+ER 492 Var. Seminar. Special variable ($60-$80) fee determined by department.

ER 494 A-H Var. Independent Study.

ER 495 Var. Independent Study in Watershed Sciences.

ER 500 03(2-3-0). Quaternary Geology. S. Prerequisite: ER 154, ER 454. Quaternary geologic processes as analogs for future and more distant past.

ER 504/ER 504 02(2-0-0). Water-Based Recreation. S. Prerequisite: Written consent of instructor. Credit not allowed for both ER 504 and RR 504. Identify issues and management strategies for recreation utilization of water resources.

ER 510 02(2-0-0). Watershed Management in Developing Countries. F. Prerequisite: CE 322/CE 322 or ER 304. Watershed management problems, approaches, and solutions in developing countries.

+ER 516 03(2-0-1). Cumulative Effects and Watershed Analysis. S. Prerequisite: ER 410, ER 417. Definition, causal processes, and modeling of cumulative watershed effects; comparison and evaluation of current watershed analysis procedures.

ER 520 02(2-0-0). Evapotranspiration. S. Prerequisite: PH/PHCC 122. Theory, estimation, measurement, simulation, and application of evapotranspiration processes in hydrology.

+ER 524/CE 524 04(3-0-1). Modeling Watershed Hydrology. S. Prerequisite: CE 322/CE 322 or ER 416; ST/STCC 304 or ST/STCC 309. Credit not allowed for both ER 524 and CE 524. Development and application of watershed models: structure, calibration, evaluation, sensitivity analysis, simulation.

+ER 544 03(2-3-0). Engineering Geology. F. Prerequisite: ER/ERCC 140. Special fee, $10. Geology and geologic methods applied to civil engineering problems.

+ER 546 04(3-3-0). Sedimentary Basin Analysis. S. Prerequisite: ER 344 or written consent of instructor. Special fee, $25. Sedimentologic data base, correlation, mapping, facies models, classification, and evolution of sedimentary basins. Applications to petroleum exploration.

+ER 547 03(3-0-0). Mineral Deposits. S. Prerequisite: ER 447 Special fee, $60. Tectonic setting and parameters in minerals exploration.

+ER 549 03(3-0-0). History of Geology. F. Prerequisite: ER/ERCC 140, ER 154. Historical development of geological ideas.

ER 552 Var. 2-3. Advanced Topics in Hydrogeology. S. Prerequisite: ER 452 or written consent of instructor. Current literature, new techniques, legislative and political developments in hydrogeology, and appropriate case histories.

ER 560 03(2-3-0). Clay Mineralogy. F. Prerequisite: ER 364 or written consent of instructor. Special fee, $35. Crystallography and chemistry of clay minerals. Applications to geology, engineering, and soil sciences; X-ray analysis of clays.

ER 562 03(3-0-0). Statistical Data Analysis in Earth Resources. F. Prerequisite: ST 302, ST 304. Statistical parameters, sequential data, map analysis, and multivariate data.

ER 564 03(2-3-0). X-Ray Mineralogy. S. Prerequisite: Written consent of instructor. Identification, analysis, interpretation of minerals and rocks using X-ray techniques.

+ER 567 03(3-0-0). Sedimentary Geochemistry. S. Prerequisite: ER 366. Geochemical processes affecting sedimentary rocks and other surficial materials.

ER 570 03(1-0-2). Tectonics. S. Prerequisite: ER 372, ER 364. Evidence, environments, and consequences of tectonic theories.

+ER 574 03(1-0-2). Advanced Topics in Snow Hydrology. S. Prerequisite: ER 474. Special fee, $60. New techniques and theoretical topics in snowpack energy balance, snow melt and runoff, electromagnetic properties and remote sensing of the snowpack.

ER 589 04(3-3-0). Watershed Planning for Developing Countries. S. Prerequisite: Hydrology course or professional experience in watershed and soil conservation. Offered only through Division of Educational Outreach. Basic training in watershed and soil conservation survey, planning, monitoring, and evaluation, emphasizing microcomputer technology.
+ER 601 03(1-0-1). Earth Resources Analysis. F. Prerequisite: ER 372 or ER 416. Special fee, $30. Analytical techniques and their applications in the geology and watershed programs.

*ER 616 03(1-0-2). Hillslope Hydrology and Runoff Processes. S. Prerequisite: CE 322/EV 322 or ER 416 or written consent of instructor. Hillslope hydrology and runoff processes in different environments; implications for management and modeling.

+ER 652 03(3-0-0). Fluvial Geomorphology. F. Prerequisite: ER/ERCC 140. Special fee, $12. Geomorphology of channels, slopes, and drainage systems.

+ER 672 03(2-3-0). Advanced Structural Geology. F. Prerequisite: ER 436. Special fee, $12. Rheology, deformation mechanisms, structural associations, and advanced methods of structural analysis.

*ER 674 03(1-4-0). Modeling in Snow Hydrology. F. Prerequisite: ER 474, written consent of instructor. Modeling spatial distribution of snow, snow-covered area, and snow melt: operational and research models.

ER 684 Var. [1-5]. Supervised College Teaching. F, S, SS. Prerequisite: Written consent of instructor.

ER 692 Var. Seminar.

ER 695 Var. Independent Study.

+ER 696 Var. Group Study. Special variable ($30-$60) fee determined by department.

ER 698 Var. Research.


*ER 712 03(2-0-1). Watershed Systems. F. Prerequisite: ER 416 or CE 322/EV 322, ST 304. Dynamic simulation of watershed behavior; application and evaluation of current hydrologic models.

*ER 714 03(3-0-0). Water Quality for Wildland Managers. F. Prerequisite: ER 418. Sampling, statistics of sampling, concepts of ionic equilibrium, water quality modeling, instream flow requirements.

ER 732 03(3-0-0). Geochemistry. F. Prerequisite: C 474, written consent of instructor. Chemical principles applied to geologic systems; emphasis on occurrence, distribution of major elements, their roles in the weathering cycle.

*ER 737 04(3-3-0). Advanced Igneous Petrology. S. Prerequisite: ER 364. Physicochemical principles of igneous systems utilizing phase rule chemistry and thermodynamics.

*ER 738 04(3-3-0). Advanced Metamorphic Petrology. S. Prerequisite: ER 364. Physicochemical principles utilizing phase rule chemistry, thermodynamics, petrofacial analysis.

ER 746 03(2-3-0). Techniques in Environmental Geology. S. Prerequisite: ER 652. Advanced techniques and legal aspects pertinent to environmental geology; field application of methods to problems.

*ER 747 04(3-3-0). Advanced Sedimentary Petrology. S. Prerequisite: ER 344. Classification, origin, depositional history, and diageneis of detrital sedimentary rocks as determined from thin sections.

ER 798 Var. Research.

ER 799 Var. Dissertation.

ENGINEERING SCIENCE COURSES

College of Engineering

ES 492 01(0-0-1). Seminar.

ES 495 Var. Independent Study.

AMERICAN ETHNICITY COURSES

Center for Applied Studies in American Ethnicity
College of Liberal Arts

ETCC 200 03(3-0-0). Ethnicity in America. F, S, SS. Key concepts and experiences which illustrate the central role ethnicity has played in American life and institutions.

ETCC 204 03(2-0-1). Ethnicity in Colorado. S, SS. Cultures, histories, and contributions of major ethnic groups in Colorado, with emphasis on interethnic relations and incorporation into the US society.

ETCC 205 03(3-0-0). Ethnicity and the Media. F. Ethnic representation across time as represented in autobiography, fiction, poetry, and popular media.

ET 234/E 234 03(3-0-0). Native American Literature. F. Credit not allowed for both ET 234 and E 234. Native American writings and their significance in American culture.

ET 239/E 239 03(3-0-0). Introduction to Chicano Literature. F, S. Credit not allowed for both ET 239 and E 239. Contemporary Chicano fiction and poetry with consideration of historical roots and influences.

ETCC 240 03(3-0-0). Native American Cultural Expressions. F. Exploration of Native lives and expressions through examination of Native architecture, art, music, film, activism, and literature.


ETCC 251/HYCC 251 03(3-0-0). African-American History Since 1865. S. Credit not allowed for both ET/ETCC 251 and HY/HYCC 251. Political, socioeconomic, and cultural history of African Americans since abolition.
ETCC 252/ HYCC 252 03(3-0-0). Asian-American History. F. Credit not allowed for both ET/ETCC 252 and HY/HYCC 252. Asian-American historical experience in the United States from 1850s to the present time.

ETCC 253) 03(3-0-1). Chicana/o History and Culture. F. Historical study of Chicana/o-Mexican/o people and culture from Spanish colonization to beginning of 20th century.

ET 254 03(3-0-0). La Chicana in Society. F. Historical contributions of Chicana women and current gender issues in Chicano communities in the U.S.

ETCC 255/HYCC 255 03(3-0-0). Native American History. S. Credit not allowed for both ET/ETCC 255 and HY/HYCC 255. History of Native American peoples in the United States from the Age of Discovery to present.

ETCC 256 O3(3-0-0). Americans in a Changing World. S. Colonial and post-colonial discourse, politics of representation and epistemology of “location” it has produced: first and third world.

ET 260 O3(3-0-0). The Asian Diaspora-Cultures and Communities. S. Resettlement, transformation, and creation of cultures among selected populations of Asian decent in Europe and Americas.

ET 261 O3(3-0-0). Latina/o Populations in the U.S. F. Historical processes and sociocultural phenomena that define Latina/o populations in the U.S.

ET 292 O3(3-0-0). Ethnic Studies Research Methods and Writing. F. Research ethics, methodology, theory, and writing in ethnic studies.


ET 312 O3(3-0-0). African-American Situation. F. Examination of historical, political, social, and economic experiences of the African-American people.

ET 316JT 316 O3(3-0-0). Multiculturalism and the Media. S. Credit not allowed for both ET 316 and JT 316. Media and multiculturalism with emphasis on race, ethnicity, and other protected groups.

*ET 318/AP 318 O3(3-0-0). Peoples and Cultures of the Southwest. F. Prerequisite: AP/APCC 100. Credit not allowed for both ET 318 and AP 318. Analyze development of cultures of the American Southwest including migration, political incorporation, socioeconomic, and cultural development.

ET 320 O3(3-0-0). Ethnicity and Film Asian-American Experience. F. Asian-American film image and film representation through both mainstream and independent movies.

ET 324 O3(3-0-0). Asian-Pacific Americans and the Law. S. Legal history of Asian-Pacific Americans examined through case studies.


ET 340 O3(3-0-0). Native-American Perspectives on Conquest. S. Native life and expression in the U.S. through response of Native Americans to conquest via revitalization movements, literature, arts.

ET 344 O3(3-0-0). Native-American Ceremony and the Sacred. F. Native ritual, ceremony, and sacred existence; clearer understanding of Native life and religious ways.

*ET 410 O3(3-0-0). African-American Periods and Personalities. S. Historical moments, movements, and men and women who have helped shape the African-American heritage.

*ET 412 O3(3-0-0). Africa and African Diaspora. S. Interdisciplinary investigation of retention, transformation, and creation of culture in plantation economies of Americas.


*ET 420 O3(3-0-0). Asian/Pacific-American Families/Communities. S. Formation and transformation of families, institutions, and communities.

*ET 424 O3(3-0-0). Asian/Pacific-American Literature and Culture. S. Asian/Pacific-American culture viewed through literature, art, and popular culture.

ET 430 O3(3-0-0). Chicana/o/Latina/o Creative Expression. S. Creative expression in literature, art, theatre, music: approach to understanding experiences of various Chicana/o/Latina/o groups in the U.S.

ET 432 O3(3-0-0). Chicana/o/Latina/o Routes to Empowerment. S. Critical examination of political and economic strategies used to incorporate Chicana/o/Latina/o groups into U.S. society.

ET 438/E 438 O3(3-0-0). Contemporary Native American Literature. F. Credit not allowed for both ET 438 and E 438. Contemporary fiction, poetry of Native Americans emphasized as distinctive tradition in American literature and cultural expression of indigenous peoples.

ET 442/AP 442 O8(8-0-0). Ethnographic Field School. SS. Prerequisite: AP/APCC 100. Credit not allowed for both ET 442 and AP 442. Directed fieldwork with American Indian communities; methodology, protocols, and social relations of ethnographic field research.

ET 444/S 444 O3(3-0-0). Federal Indian Law and Policy. S. Credit not allowed for both ET 444 and S 444. Indian policy processes and their impact on Native lives and culture, particularly Native sovereignty.

ET 492 O3(0-0-3). Seminar. ET 495 Var. Independent Study. ET 500 O3(3-0-0). Race, Ethnicity, and Nationality. S. Intersections of race, ethnicity, and nationality within a broader framework of political economy.

ENVIROMENTAL ENGINEERING COURSES

College of Engineering

EV 101 02(1-2-0), Environmental Engineering I. F.
The environmental engineering profession, engineering approach to
problem solving, computer programming.

EV 102 03(2-2-0), Environmental Engineering II. S. Prerequisite:
EV 101

EV 204/CB 204 03(2-2-0), Agricultural and Environmental
Measurements. S. Prerequisite: PH/PHCC 110 or PH/PHCC 141.
Credit not allowed for both EV 204 and CB 204.

EV 322/CE 322 03(3-0-0), Basic Hydrology. F, S. Prerequisite:
CE 300 or ER 416 or CB 331 or ST/STCC 301 or ST/STCC 309 or
CE 308, or written consent of instructor. Credit not allowed for both
EV 322 and CE 322.

Hydrologic cycle, soil moisture, groundwater, runoff processes,
water contamination, applications in water resources and environmental
engineering.

EV 401 01(1-0-0), Environmental Engineering Design I. S.
Prerequisite: EV 322/CE 322.

Introduction to design of environmental engineering systems;
preparation of formal proposal.

EV 402 03(2-0-1), Environmental Engineering Design II. F.
Prerequisite: EV 401.

Detailed design of environmental engineering systems; preparation
and presentation of (oral and written) reports.

EV 428/CE 438 04(4-0-0), Pollution Control Engineering. F, S.
Prerequisite: C 113, CE 300 or CB 331 or ST/STCC 301 or ST/STCC 309 or
CE 308, or written consent of instructor. Credit not allowed for both
EV 438 and CE 438.

Environmental engineering approaches to designing water supply,
wastewater removal, and pollution control systems.

EV 442/CE 442 03(3-0-0), Rate-Controlled Separations. F.
Prerequisite: CB 331 or CE 300 or CB 331 or ME 342. Credit not allowed
for both EV 442 and CE 442.

Diffusion; convective mass transfer; packed tower operations;
electrophoretic and membrane separations; selection and sequencing of
separations.

EV 443/CE 443 02(0-6-0), Mass Transfer and Separation
Laboratories. F. Prerequisite: CB 341 or EV 442/CE 442 or concurrent
registration. Credit not allowed for both EV 443 and CE 443.

Mass transfer experimentation: evaporation, distillation, solvent
extraction, ion exchange, gas absorption, humidification.

EV 448/ME 448 03(3-0-0), Pollution Prevention. F. Prerequisite:
CB 331 or CE 300 or ME 342. Credit not allowed for both EV 448 and
ME 448.

Prevention of environmental problems by modification of industrial
processes.

EV 693 01(1-0-0), Environmental Engineering Seminar.
Prerequisite: CE 438/EV 438.

Current topics in practice and research.

EV 695 Var. Independent Study.

EX 240 02(1-2-0). First Aid and Emergency Care. F, S. Special fee, $10.50. Principles, applied techniques emphasizing emergency rescue and care. Meets requirements for Red Cross Advanced First Aid and Emergency Care Credential.

EX 260 02(3-0-0). History and Principles of Physical Education. F, S. Emerging philosophies and principles.

EX 303 03(2-2-0). Anatomical Kinesiology. F, S, SS. Prerequisite: AY 300/PS 300. Human movement emphasizing influence of intrinsic dynamics, task demands, and environmental conditions.

EX 307 03(3-0-0). Biomechanical Principles of Human Movement. F, S. Prerequisite: PH/PHCC 121 or PH/PHCC 141. Identify with and utilize biomechanical principles pertinent to human movement.

EX 309 02(2-0-0). Methods of Coaching. F, S. Preparation to coach in an interscholastic athletic situation.

EX 311 A-D 01(0-2-0). Techniques of Teaching Team Sports. F, S. Prerequisite: Corresponding laboratory or competency in area. Practical and theoretical aspects of teaching team sports with special emphasis on materials, teaching techniques, and analyzing skills. A) Soccer. B) Baserball. C) Field sports. D) Volleyball.

EX 332A-H. Techniques of Teaching Individual Sports. F, S. Prerequisite: Corresponding laboratory or competency in area. Practical and theoretical aspects of teaching individual sports with special emphasis on materials, teaching techniques, and analyzing skills: A) Badminton 01(0-2-0). B) Golf 01(0-2-0). Special fee, $57. C) Tennis 01(0-2-0). D) Track and field 01(0-2-0). F) Weight training 01(0-2-0). H) Aerobics 01(0-2-0).

EX 340 01(1-0-0). Exercise Prescription. F, S, SS. Corequisite: EX 386A. Theory and practice of exercise prescription for healthy individuals, cardiac patients, and other special populations.

EX 344 03(3-0-0). Methods of Health Education. F, S. Prerequisite: EX/EXCC 145. Prepare teaching units and methods for health education in the public schools, K-12.

EX 345 03(3-0-0). Population Health and Disease Prevention. F, S, SS. Prerequisite: EX/EXCC 145. Causes of disease throughout the lifespan and interventions designed to prevent disease.

EX 346 03(2-2-0). Training Room Methods. F, S. Prerequisite: EX 303. Preventive measures, taping, bandaging, massage and manipulation, diet and conditioning of athletes.

EX 356 03(3-0-0). Wellness Programming. F, S, SS. Prerequisite: EX/EXCC 145, EX 386A. Assessment of wellness concerns and organizational problems; selection and implementation of program design.

EX 365 02(2-0-0). Program Administration. F, S. Problems and nature of organization and administration in health and physical education.

EX 386A-B. Practicum. Prerequisite: A) EX/EXCC 145, EX 240, EX 332F, EX 332H, FN/FNCC 150; concurrent registration in EX 340. B) EX 386A.

A) Adult fitness. 02(1-3-0). B) Wellness program management. 03(1-6-0).

EX 403 04(3-2-0). Physiology of Exercise. F, S. Prerequisite: EX 403. Special fee, $7. Theory and operation of devices commonly employed in quantifying factors related to exercise.

EX 420 03(2-2-0). Electrocardiography and Exercise Management. F, S. Prerequisite: EX 403. Special fee, $8. Interpretation of 12-lead ECG tracings, administering exercise tests, and prescribing exercise program for healthy individuals and special populations.


EX 444 02(2-0-0). Exercise and Aging. F, S, SS. Prerequisite: EX 403. Understanding the aging process and what impact exercise has on this process.

EX 453 03(3-0-0). Measurement and Evaluation. F, S, SS. Prerequisite: PY/PYCC 100. Physical and academic testing; methods of establishing and evaluating a testing program.

EX 456 03(3-0-0). Advanced Wellness Programming. F, S, SS. Prerequisite: EX 356. Investigation of established wellness programs with special emphasis on design, implementation, and evaluation of programming models.

EX 476 03(3-2-0). Rehabilitation Exercise. F, S. Prerequisite: EX 240, EX 303. Evaluation, design, and selection of exercises for individuals with permanent or temporary disabilities.

EX 479 03(3-0-0). Psychology and Sport. F, S. Prerequisite: PY/PYCC 100. Psychological and social implications involved in teaching of physical education and coaching of athletics.

EX 484 Var 01-5. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course.


EX 487 Var. Internship. Prerequisite: EX 486B and all course work. Practical application of knowledge and skills in a professional situation.


EX 492 02(0-0-2). Seminar.

EX 496A-D Var. Group Study.

EX 540 03(3-0-0). Human Performance in Environmental Extremes. F. Prerequisite: One course in exercise physiology or written consent of instructor. Ability of humans to exercise or work in extremes of temperature, barometric pressure, air pollution, and sleep deprivation.

EX 556 03(3-0-0). Health Promotion. F.
Discussion of theory and application of health promotion in various settings.

EX 560/FN 560 03(3-0-0). Exercise and Nutrition. S. Prerequisite: EX 403, FN 350, undergraduate biochemistry course. Credit not allowed for both EX 560 and FN 560. Interaction of nutrition and physical fitness in exercise performance and promotion of health.

EX 600 03(3-0-0). Research Design. S. Prerequisite: EX 453.
Methods of research applied to health and exercise science including quantitative techniques of analysis and research design.

EX 603 03(3-0-0). Advanced Topics in Exercise Physiology. F. Prerequisite: EX 403. Advanced principles of theoretical and applied exercise physiology at molecular, cellular, and systemic levels.

EX 610 03(3-0-0). Exercise Bioenergetics. F. Prerequisite: Undergraduate course in biochemistry and undergraduate course in exercise physiology. Biology of energy transfer reactions related to human locomotion and exercise performance in both healthy individuals and disease states.

EX 656 03(3-0-0). Comprehensive Stress Management. F. S. SS.
Relationship between stress and illness emphasizing methods to impact in detrimental effects.

EX 684 Var. Supervised College Teaching. F. S. SS.

EX 686A-E Var. Practicum. Prerequisite: Current CPR certification.

EX 687 Var. Internship. Prerequisite: EX 686A or B or C or D or E.
Practical application of knowledge and skills in a professional situation.

EX 692 01(0-0-1). Seminar.
Consideration of graduate education in health and exercise science.

EX 693 01(0-0-1). Seminar.
Maximum of 2 credits allowed in course. Current topics and issues in health and exercise science.

EX 695A-F Var. Independent Study.

EX 696A-F Var. Group Study.

EX 698 Var. Research.
Non-thesis research in health and exercise science.


ECOLOGY COURSES

Colleges of Natural Resources and Natural Sciences

EY 504A-B. Organic and Population Ecology. F. Prerequisite: One college-level course in each: biology, calculus, statistics, biology ecology. Current theories in population ecology, including evolutionary concepts, sociobiology, regulation and adaptation, and population models. A) 03(3-0-0) B) 04(3-0-1).

EY 501A-B. Community and Ecosystem Ecology. S. Prerequisite: One college-level course in each: biology, calculus, statistics, biology ecology. Current theories in community ecology, including competition, predation, community organization, and ecosystem function. A) 03(3-0-0) B) 04(3-0-1).

EY 571 Var [1-3]. Advanced Topics in Ecology. S. Prerequisite: One course in ecological principles. Current research topics presented and analyzed by visiting scientists.

EY 576 03(3-0-0). Ecological Risk Assessment Modeling. F. Prerequisite: M/M CC 155. Theoretical and practical aspects of simulation modeling in support of ecological risk assessment.

EY 577 02(2-0-0). Analysis of Risk Assessment Simulation Models. S. Prerequisite: EY 576 or NR 575. Theoretical and practical aspects of validation, verification, uncertainty analysis, and sensitivity analysis of risk assessment models.

EY 578 03(3-0-0). Distribution and Transport of Contaminants. F. Prerequisite: C 113, M/M CC 155. Fundamental concepts of transport processes and linkages with environmental contaminants.

EY 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.

EY 693 01(0-0-1). Research Seminar. Prerequisite: Written consent of instructor. Critique of research programs, plans, and ecological theory.

EY 695 Var. Independent Study.

EY 698 Var. Research.
Non-thesis research in ecology.


FOREST SCIENCES COURSES

Department of Forest Sciences
College of Natural Resources

F 333 03(3-0-0). Forest Products in Society. S. Prerequisite: F 321, F 322.
Structure, properties, identification, and characteristics of wood.

F 334 04(3-2-0). Wood Protection. S. Prerequisite: F 331.
Degradative effects of water and biological organisms on wood; methods of protecting wood from these factors.

F 387 Var [3-12]. Internship. Prerequisite: Written consent of department head.

FOREST SCIENCES COURSES

Department of Forest Sciences
College of Natural Resources

F 311 03(3-0-0). Forest Ecology. F. Prerequisite: BY 220.
Relationships of ecological concepts to the dynamics of forest ecosystems.

F 312 03(2-2-0). Forest Bionomy. F. Prerequisite: ST/STCC 201 or ST/STCC 301; NR 220. Special fee. $15.
Measurement and estimation of timber in logs, trees, and stands.

F 320 02(0-4-0). Forest Field Measurements. SS.
Develop field skills using maps, compasses and aerial photos; photo interpretation; tree and stand measurements; stand volume and value estimates.

F 321 03(3-0-0). Silviculture. S. Prerequisite: F 210, F 311, NR 220.
Principles of silviculture and their application to major forest types of the United States.

Principles of timber harvesting and effects of logging on the environment.

F 331 03(2-2-0). Wood Anatomy and Properties. F.
Structure, properties, identification, and characteristics of wood.

F 332 03(3-0-0). Economics of the Forest Environment. S. Prerequisite: EUC/ ECC 202 or EA/EEACC 202 or EC/EECC 240 or EA/EECC 240.
Economic principles and techniques applied to forested environments.

F 322 03(2-2-0). Wildland Fire Measurements. F. Prerequisite: F CC 192. Special fees. $33.
Wildland fire control and use; measurement of fuels, weather, topography, fire behavior, and fire ecology.

F 325 03(3-0-0). Silviculture. S. Prerequisite: F 210, F 311, NR 220.
Principles of silviculture and their application to major forest types of the United States.

F 333 03(3-0-0). Forest Products in Society. S.
Society's dependence on wood and fiber derived from forests.

F 341 04(3-2-0). Wood Protection. S. Prerequisite: F 331.
Degradative effects of water and biological organisms on wood; methods of protecting wood from these factors.

F 387 Var [3-12]. Internship. Prerequisite: Written consent of department head.

Growth and yield of trees and forest stands; financial aspects of stand management; harvest scheduling and regulation of forests.

F 422 03(2-2-0). Quantitative Methods in Forest Management. F.
Prerequisite: F 321, F 322.
Design and analysis of optimization and nonoptimization models in forest managerial operations.

F 424 03(2-2-0). Forest Fire Management. F. Prerequisite: F 224 or written consent of instructor.
Policies and systems for fire prevention, fuel treatment, prescribed fire, and wildfire operations in forestry.

F 425 02(2-0-0). Forest Fire Behavior. S. Prerequisite: Fire experience.
Programmed instruction in fuel, weather, and topography-effects on wildland fire behavior.

F 431 A-B. Mechanics of Wood and Wood Composites. F.
Elastic, strength, and rheological behavior of wood and wood composites; laboratory involves testing procedures, data analysis, and interpretation. A) 03(1-0-0). B) 04(3-2-0).

F 432 03(2-2-0). Design of Wood Structures. S. Prerequisite: CE 360.
Anatomy and fundamental properties of wood, design of connections and structural elements of wood composites.

F 435 04(3-2-0). Mechanical Processing of Wood Products. S. Prerequisite: F 331.
Machining and manufacturing of lumber, plywood, and particleboard.

F 466/H 466 03(2-2-0). Community Forestry. S. Prerequisite: F 210 or H 221, H 464. Credit not allowed for both F 466 and H 466.
Policies and management of public and privately owned community forests in urbanized areas.

F 487 Var [3-12]. Professional Forestry Internship. Prerequisite: Written consent of department head.
Professional-level field experience with forestry organization.

F 489 A-F 03(3-0-0). Technical Fire Management. F, S, SS.
Prerequisite: A) ST/STCC 201. A-F) Five years professional, full-time forestry management. Offered only through Division of Educational Outreach.

F 493 01(0-0-1). Seminar in Forestry. S. Prerequisite: Senior standing.
Current issues in forestry and natural resources; discussion of professional leadership roles and ethics; inquiry and debate of contemporary issues.

F 495 Var. Independent Study.

F 510 03(2-3-0). Ecophysiology of Trees. S. Prerequisite: F 311.
Environmental factors affecting physiology of woody plants; emphasis on water relations in trees and importance of water in physiological processes.

F 511 03(3-0-0). Pollution Effects on Forest Ecosystems. F.
Prerequisite: F 325, SC 240.
Major pollutants and their direct and indirect effects on forest ecosystems.

F 520 03(3-0-0). Advanced Quantitative Methods in Forestry I. F.
Prerequisite: F 322, M/M CC 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: EC 306. Analysis of forest inventory information; dynamic and stochastic models oriented to decision making and research in forestry.

F 524 03(2-2-0). Forest Fire Meteorology and Behavior. S. Prerequisite: AT 350. 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 or written consent of instructor. Comprehensive coverage of silvicultural practices as applied in U.S. forestry.

F 569/CE 569 03(3-0-0). Intermediate Design of Wood Structures. F. Prerequisite: CE 367, F 432. Credit not allowed for both F 569 and CE 569. Characteristics of structural products and their consideration in design; behavior of glulam members, wood trusses, and other wood structural systems.

F 593 01(0-0-1). Seminar-Fire Science. F.

F 624 03(2-2-0). Fire Ecology. S. Prerequisite: F 424, completion of 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 03(2-2-0). Ecology of Forest Production. S. Prerequisite: One 300-level course in ecology. Development, structure, and production in forest communities; manipulation of forest production.

F 633 03(3-0-0). Fundamentals of Wood Adhesion. F. Prerequisite: Written consent of instructor. Adhesion and its applications in the bonding of the wood.

F 693 01(0-0-1). Seminar. F 695 Var. Independent Study.

F 698 Var. Research.


F 721 03(2-2-0). Forest Policy. F. Prerequisite: NR/NRCC 320. Significance and evolution of policies and institutions affecting management of forest lands; analysis of current forest policy problems.

F 798 Var. Research.

F 799 Var. Dissertation.

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FOOD SCIENCE AND HUMAN NUTRITION COURSES

Department of Food Science and Human Nutrition
College of Applied Human Sciences


FNCC 150 03(3-0-0). Survey of Human Nutrition. F, S, SS. Basic nutrition principles and concepts; their application in personal health and interactions with societal and environmental issues.

FN 160 03. Nutrition and the Preschool Child. F, S, SS. Offered as correspondence course only. Basic nutrition and application of nutrition principles to needs of preschool child.

FN 300 03(3-0-0). Food Principles and Applications. F, S. Prerequisite: CC CC 107, FN/FNCC 150. Application of food preparation theories to modification and evaluation of food products.

FN 301 02(0-6-0). Food Principles and Applications Laboratory. F, S. Prerequisite: FN 300 or concurrent registration. Special fee, S30. Techniques and manipulative skills for preparation and evaluation of standard and modified food products.

FN 310 03(3-0-0). Food Service Systems-Operations. F, S. Technical operations: menu planning, evaluation, recipe standardization, forecasting, food cost, sanitation, normal food distribution systems.

FN 311 03(3-0-0). Food Service Systems-Production and Purchasing. F, SS. Prerequisite: FN 310. Quantity food production principles, purchasing specifications, market channels.

FN 350 03(3-0-0). Human Nutrition. F, S, SS. Prerequisite: AY 300/PS 300 or PS 310/BZ 310, C 245. Metabolism of macro and micro-nutrients; physiologic basis underlying dietary recommendations for human health. Nutrients, dietary requirements for physical well-being; evaluation of various diets.

FN 360 03(3-2-1). Nutrition Assessment. S. Prerequisite: C 246 or C 344, FN 350. Special fee, S25. Techniques for anthropometric, dietary, and biochemical assessment of nutritional status.

FN 386 02(0-4-0). Practicum in Food Service Management.


FN 428 03(3-0-0). Nutrition Teaching and Counseling Techniques. S. Prerequisite: FN 350, nine credits in food science and nutrition. Objectives, principles, and organization of subject matter for nutrition education and counseling.

FN 450 04(3-0-1). Diet and Disease. F. Prerequisite: FN 350, BC 301 or BC 351. Dietary modifications to meet nutritional needs under normal and pathological conditions.
FN 451 03(3-0-0). Community Nutrition. F. Prerequisite: FN 330. Influence on nutritional status, assessment of nutrition problems and needs, planning, and evaluation of nutrition intervention programs.


FN 470 03(3-0-0). Integrative Nutrition and Metabolism. S. Prerequisite: FN 350; BC 301 or BC 351. Influence of nutrition on roles and action of hormones and gene expression on metabolism.

FN 484 Var [1-3]. Supervised College Teaching. F, S.


FN 492 03(0-0-3). Seminar in Dietetics and Nutrition. S. Prerequisite: FN 350 and nine or more upper division credits in major. Skill development in professional competencies including interpersonal communication, team decision making, problem solving, and critical thinking.

FN 495 A-B Var. Independent Study.
   A) Nutrition. B) Food service management.


FN 520 03(3-0-0). Medical Nutrition Therapy. SS. Prerequisite: FN 350 or FN 551. Role of nutrition in etiology and treatment of selected disorders.

FN 522 02(2-0-0). Nutrition Education Theories and Practice. F. Prerequisite: FN 350. Examination of current theories, skills, and models used in nutrition education programs as preparation for research and practice.

FN 550 03(3-0-0). Advanced Nutritional Science I. S. Prerequisite: BC 351 or BC 403, FN 350. Protein, vitamin, mineral metabolism; human studies, animal models.

FN 551 03(3-0-0). Advanced Nutritional Science II. F. Prerequisite: BC 351 or BC 403, FN 350. Carbohydrate, lipid, energy metabolism; human studies, animal models.

FN 560 EX 560 03(3-0-0). Exercise and Nutrition. S. Prerequisite: EX 403, FN 350; undergraduate biochemistry class. Credit not allowed for both FN 560 and EX 560. Interaction of nutrition and physical fitness in exercise performance and promotion of health.

FN 575 01(1-0-0). Nutrition Education for a Healthy Heart. F, S, SS. Offered only as a correspondence course. Nutrition-related issues of atherosclerotic cardiovascular disease risk reduction and background in the art/science of facilitating behavior change.

FN 586A-B Var. Practicum. A) F, S, SS. B) SS. Also offered as correspondence course.
   A) Nutrition for a healthy heart 01(0-2-0). B) Advanced clinical nutrition Var [1-3].

FN 587A-C 06(0-18-0). Internship.

FN 590 Var. Workshop.

FN 620 02(2-0-0). Advanced Community Nutrition. S. Prerequisite: FN 350; concurrent registration in FN 686. Community nutrition assessment, nutrition program planning and evaluation, nutrition policy analysis.

FN 650A-B 02(2-0-0). Recent Developments in Human Nutrition.
   *A) F. *B) S. Prerequisite: A) FN 550. B) FN 551. Appraisal of literature on human nutritional status. A) Protein, vitamins, and minerals. B) Carbohydrates, lipids, and energy. SS.

FN 660 02(2-0-0). Lifecycle Nutrition. F. Prerequisite: FN 459 or written consent of instructor. Current nutritional issues related to selected stages of lifecycle compared to normal adult nutritional needs.

*FN 661 02(2-0-0). International Nutrition. F. Prerequisite: FN 350. Roles of technological programs and international agencies in meeting nutritional needs.

FN 670 02(0-4-0). Laboratory Methods. F. Prerequisite: C 245, C 246. Laboratory techniques and instrumentation in nutrition and food science.

FN 684 Var. Supervised College Teaching. F, S.

FN 686 Var. Practicum.

FN 692 01(0-0-1). Seminar.

FN 695A-C Var. Independent Study.

FN 696A-D Var. Group Study.

FN 698B C Var. Research.
   B) Nutrition. C) Food service management.

   B) Nutrition. C) Food service management.

*FN 700 02(2-0-0). Cellular Nutrition. F. Prerequisite: FN 550, FN 551, or BC 403; PS 501. Essential nutrient requirements of cells and organs.

FN 795 Var. Independent Study.

FN 796 01(0-0-1). Group Study.

FOOD TECHNOLOGY COURSES

Department of Food Science and Human Nutrition
College of Applied Human Sciences

FT 110 03(3-0-0). Introduction to Food Science and Technology. S. Prerequisite: High school chemistry. Commercial food processing related to preservation and enhancing of food quality, safety, and value.

FT 230 02(2-0-0). Alcoholic Beverage Technology and Control. F. Prerequisite: CIC CC 103 or CIC CC 107. Classification, production, service, and control of wines, beers, and distilled spirits.

FT 314/MB 334 64(2-4-0). Food Microbiology. F. Prerequisite: MB 301 or MB 302. Credit not allowed for both FT 334 and MB 334. Microorganisms in production of foods, in preservation and spoilage, and in food-borne diseases. Control of microorganisms in foods.

FT 360/AN 360 03(3-0-0). Principles of Meat Science. F, S. Prerequisite: CIC CC 107 or C/C CC 111. Credit not allowed for both FT 360 and AN 360. Structure, composition, and biology of muscle and associated tissues; wholesomeness, nutritive value, and palatability of beef, pork, and lamb.

*FT 369 03(2-2-0). Food Processing. F. Prerequisite: C 245, MB 300, P/E/PHCC 121. Food processing principles used to preserve and enhance nutritive value and quality of food. Food processing and preservation principles.

FT 400 03(3-0-0). Food Safety. F. Prerequisite: Six credits in biology and/or chemistry. Safety of humanfood emphasizing safe production, processing, marketing, preparation, consumption, and regulations.

*FT 420 03(2-2-0). Quality Assessment of Food Products. F. Prerequisite: FT 110, MB 300. Quality control of raw ingredients to manufactured products; assessment and sensory evaluation of foods.

FT 447 02(2-0-0). Food Chemistry. F. Prerequisite: C 245, BC 301 or BC 351. Credit not allowed for both FT 447 or BC 351 or concurrent registration. Chemistry of food constituents as related to food quality and stability.

FT 487 Var 11-15J. Internship.

FT 495 Var. Independent Study.

*FT 570 02(2-0-0). Food Product Development. F. Prerequisite: FT 447. Food product concepts, feasibility, and evaluation.

*FT 572 02(2-0-0). Food Biotechnology. S. Prerequisite: MB 334. Interrelationships among microorganisms, food processing methods, advances in biotechnology and food quality, spoilage, shelf-life and safety.

*FT 574 02(2-0-0). Flavor Chemistry. F. Prerequisite: C 245. Formation pathways of desirable and undesirable food flavor compounds and their analysis.

*FT 576 02(2-0-0). Cereal Science. S. Prerequisite: FT 447. Chemistry and functionality of cereal grain components and their importance in human nutrition.

FT 660/AN 660 03(3-0-2). Advanced Meat Science. S. Prerequisite: AN 360/FT 360 or AN 422 or BC 301 or FN 350. Credit not allowed for both FT 660 and AN 660. Anatomical, biochemical, histological, and physical factors associated with transformation of muscle into meat.

FT 698 Var. Research.


FISHERY AND WILDLIFE BIOLOGY COURSES

Department of Fishery and Wildlife Biology
College of Natural Resources


+FWCC 192 02(2-0-1). Wildlife Inquiries. F. Prerequisite: FW 100 or concurrent registration. Special fee, $17. Field and laboratory exercises and discussions in fishery and wildlife ecology and conservation.

FW 264 03(3-0-0). Introduction to Fishery Biology. F. Prerequisite: FW 100. Exposure to sampling techniques, agencies, and topics in fishery biology careers.

FW 300 02(2-0-0). Ichthyology. S. Prerequisite: BY 103 or BZ/BZCC 111. Biology of fishes: anatomy, taxonomy, physiology, behavior, ecology, evolution, and zoogeography.

+FW 301A-B 01(0-3-0). Ichthyology Laboratory. S. Prerequisite: FW 300 or concurrent registration. Credit not allowed for both FW 301A and B. Special fee, $16 per subtopic. A) Fish biology. Anatomy, taxonomy, ecology of North American freshwater fishes. B) Fishery Biology. Applications of biology and ecology to management of fishes.

FT 447 Var. Independent Study.
FW 312 03(3-0-0). Diseases of Wildlife. F. Prerequisite: BY 103 or BZ/BZCC 111.
Etiological agents, reservoir hosts, transmission, susceptible hosts, environmental influence, diagnostic procedures, and preventive and/or control measures.

FW 350 04(3-2-1). Teaching Shooting Responsibility. S.
Education and instructor certification course to develop knowledge, skills, behavior for teaching about firearms, shooting sports, and associated ethics.

FW 355 02. Hunter Education for Instructors. F, S, SS. Offered as correspondence course only.
Principles of learning and teaching for instructors of state hunter education courses.

FW 360 03(3-0-0). Principles of Vertebrate Management. F, S.
Prerequisite: BY 220; M/M CC 141 or M/M CC 155 or M/M CC 160.
Principles of ecology applied to management of fish and wildlife resources. Quantitative methods, socioeconomic factors, population dynamics.

FW 370 02(1-0-1). Design of Wildlife Projects. F, S.
Prerequisite: BY 220; M/M CC 141 or M/M CC 155 or M/M CC 160.
Principles of ecology applied to management of fish and wildlife resources. Quantitative methods, socioeconomic factors, population dynamics.

FW 371 04(2-4-0). Wildlife Data Collection and Analysis. F, S.
Prerequisite: NR 220, NR 260, ST/STCC 301 or ST/STCC 307 or EH/EHCC 307.
Design, analysis, and evaluation of wildlife projects; preparation and presentation of project proposals.

FW 375 02(1-0-1). Field Wildlife Studies. S, SS.
Prerequisite: BY 220. Special fee, $72.
Field trip to see wildlife management and habitats and to discuss problems and practices with professional ecologists and resource managers.

FW 377 03(1-2-1). Habitat for Wildlife. F. Prerequisite: FW 360.
Credit not allowed for both FW 377 and FW 677. Special fee, $25.
Wildlife habitat evaluation, classification, and improvement; management of natural and altered environments for wildlife; wildlife indicator species.

FW 384 Var [1-5]. Supervised College Teaching. F, S, SS.
Prerequisite: Written consent of instructor.
Instruction and practice in laboratory instruction in lower-division departmental courses.

FW 400 03(3-0-0). Fish Ecology. F. Prerequisite: BY 220, FW 300, FW 370.
Interactions between fishes and their environments; applications of ecological principles to fishery management, research.

FW 401 03(2-2-0). Fishery Science. F. Prerequisite: FW 300; ST/STCC 301 or ST/STCC 307 or EH/EHCC 307; NR 260 or CS 110; M/M CC 141 or M/M CC 155.
Theory, philosophy, and applications for study and management of fishery resources.

FW 402 04(3-2-0). Fish Culture. S. Prerequisite: FW 204, FW 300; FW 301A or B. Special fee, $21.
Principles and practices to produce food, bait, and sport fishes.

FW 420 03(2-0-1). Water Quality for Fish and Wildlife. S.
Prerequisite: BY 220, C/C CC 108 or C/C CC 112.
Relationships among ecological distributions of fish and wildlife and water quality.

FW 467 03(3-0-0). Wildlife Nutrition. S. Prerequisite: C 245.
Basic nutritional concepts applicable to wild vertebrates emphasizing methods of improving nutritional status of wildlife.

FW 468 03(2-3-0). Wild Bird Management. S. Prerequisite: FW 360. Special fee, $32.
Ecology and management of game, pest, and rare bird populations and nongame bird communities.

FW 469 04(4-2-1). Conservation in Management of Large Mammals. F. Prerequisite: FW 360, ST/STCC 301 or ST/STCC 307 or EH/EHCC 307, BZ 330. Special fee, $47.
Ecology and management of large wild mammals with emphasis on North American species both hunted and nonhunted.

FW 474 03(2-0-1). Wildlife Ecology. S. Prerequisite: BY 220, ST/STCC 301 or ST/STCC 307 or EH/EHCC 307.
Analysis of wildlife communities; distribution, abundance, adaptations; wildlife ethnology; human impacts on wildlife.

FW 487 Var [1-6]. Internship. S.
Prerequisite: Written consent of instructor.
Field experience in fish and wildlife management.

FW 492 01(0-0-1). Seminar-Wildlife Biology. S.

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 501 03(2-0-1). Advanced Ichthyology. S. Prerequisite: BZ 214 or FW 300.
Advanced phylogeny, classification, anatomy, physiology, distribution, and ecology of fishes.

FW 502 03(2-2-0). Fish Reproduction and Early Life History. S.
Prerequisite: FW 300.
Fish reproduction, embryology, larval biology, habitat, management.

FW 521 03(3-0-0). Fish Habitat Management. S. Prerequisite: BZ 470 or FW 400.
Critical fish habitat problems in lotic, lentic, marine, artificial environments; survey techniques; legal constraints; technologies for mitigation.

FW 540 04(2-0-2). Fisheries Ecology. F. 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). Ecotology. S. Prerequisite: BY 220, EH 440, ST/STCC 301; or written consent of instructor.
Ecological effects of contaminants on populations, communities, and ecosystems.
FW 551 Var [2-3]. Design of Fish and Wildlife Studies. F. Prerequisite: ST/STCC 301; or ST 512 for three-credit option.

Statistical designs applicable to wildlife investigations, their planning and analysis.

FW 555 03(2-0-1). Conservation Biology. F. Prerequisite: BY 220.

Ecological factors in conservation of biological diversity, distribution of wild vertebrates.

*FW 560 03(2-3-0). Management of Fish in Ponds and Reservoirs. F. Prerequisite: FW 300.

Life histories, special requirements, management of fishes adaptable to artificial impoundments.

FW 561A-E Var [1-3]. Advanced Topics. F, S. Prerequisite: Written consent of instructor.


*FW 565 03(2-0). Managing Human-Wildlife Conflicts. F. Prerequisite: FW 360. Special fee, $32.

Conflict resolution strategies for anthropogenic, ecological, and human-land conflicts.

FW 567 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. Wildlife Habitat Evaluation for Educators. F, S. SS. Prerequisite: Written consent of instructor.

Teachers or leaders implement wildlife habitat evaluation procedures in classroom or community programs and evaluate performance of students.

FW 576 03. Wildlife Policy, Administration, and Law. F, S. SS. Prerequisite: Political science, introductory course to natural resources management fields. Offered as correspondence course only.

Evolution of policy affecting wildlife and humans using historical, current, philosophical, legal, and administrative constructs.

FW 581 Var [1-5]. Supervised College Teaching. F, S. SS. Prerequisite: Written consent of instructor.


**GEOGRAPHY COURSES**

Department of Earth Resources
College of Natural Resources

GR 100 03(3-0-0). Introduction to Geography. F, S.

Major geographic themes applied to selected regions, physical environment, human-land relationships, regional analysis.

GR 210 03(3-0-0). Physical Geography. S.

Energy, mass budget, and human impacts on atmosphere, hydrosphere, and continental land surfaces.

*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.

+GR 342 03(3-0-0). Geography of Water Resources. Special fee, $10.

Overview of spatial and temporal issues.

+GR 345 03(3-0-0), Geography of Hazards. S. Prerequisite: GR 210. Special fee, $10.

Causes, effects, distributional patterns, and human adjustments to environmental hazards.

GR 495 Var. Independent Study.

GR 595 Var. Independent Study.

**GRADUATE SCHOOL COURSES**

Graduate School


UNIX, networks, scalar, vector, and parallel architectures; performance programming.

GS 511 03(2-0). High Performance Computing and Visualization. S. Prerequisite: GS 310 or written consent of instructor.

Iterative methods for linear systems; Monte Carlo methods; visualization and image processing.

GS 592 01(0-0-1). Water Resources Seminar. F.

Interdisciplinary seminar emphasizing issues important to water resources community. Content relates to a preselected theme each semester.
GS 670 03(2-2-0). Interdisciplinary Agricultural Development. S. Prerequisite: Written consent of instructor. Theory and process for technology transfer to improve on-farm water management. Interdisciplinary teamwork using a systems approach will be emphasized.

GS 770 01(0-2-0). Teaching Analysis Using Videotape. F, S. Prerequisite: GS 792 and/or currently assigned teaching duties as a teaching assistant in lecture or laboratory. Video recordings of actual teaching are critiqued and analyzed by instructor and peers.

GS 792 02(0-0-2). Seminar on College Teaching. Role of college teacher emphasizing applied principles and practices derived from empirical research and collective experience of teaching professors.

GS 793 01(0-0-1). Genetics Seminar. Joint seminar in the Genetics Institute offered on a rotational basis in the Departments of Animal Sciences, Biochemistry and Molecular Biology, Forest Sciences, Horticulture, Physiology, Radiological Health Sciences, Soil and Crop Sciences, and Statistics.

HORTICULTURE COURSES

Department of Horticulture and Landscape Architecture College of Agricultural Sciences

H CC 100 04(2-2-0). Horticultural Science. F, S. Prerequisite: High school biology. Special fee, $20. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 132 04(1-2-0). Mechanical and Freehand Graphical Techniques for Landscape Design. F. Functional and aesthetic values of plant materials; their creative use in landscape design.}

H 140 02(4-2-0). Basic Concepts in the Art and Process of Landscape Design. S. Prerequisite: H 140. Special fee, $20. Theories, principles, and techniques of sexual and asexual propagation.

H 199 02(3-2-0). Survey of History and Principles of Landscape Design and Development of the Profession. S. Prerequisite: H 221. Offered only off campus. Survey of history and principles of landscape design and development of the profession.

H 221 04(2-4-2). Introduction to Horticultural Therapy. F. Prerequisite: H 140, one course in botany, biology, or horticulture. Special fee, $20. Theory and practice of horticultural therapy in health care and human services; applications, settings, and professional career topics.

H 225 04(2-4-0). Landscape Grading and Drainage Studio. F. Prerequisite: H 140. M/M CC 118 or M/M CC 121. Special fee, $10. Basic design principles for grading, drainage, and earth forms for small-scale projects.

H 230 02(0-0-2). Seminar on College Teaching. Role of college teacher emphasizing applied principles and practices derived from empirical research and collective experience of teaching professors.

H 231 03(2-2-0). Principles of Landscape Design. S. Prerequisite: H 140, one course in botany, biology, or horticulture. Special fee, $20. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 235 04(2-4-0). Landscape Structures. S. Prerequisite: H 140, one course in botany, biology, or horticulture. Special fee, $20. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 300 02(1-2-0). Principles of Landscape Design. S. Prerequisite: H 140. Special fee, $20. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 311 03(2-2-0). Plants for Interiors. F. Prerequisite: One course in botany, biology, or horticulture. Special fee, $52. Theory and practice of horticultural therapy in health care and human services; applications, settings, and professional career topics.

H 315 02(2-0-0). Landscape Irrigation. E. Prerequisite: One course in botany, biology, or horticulture. Special fee, $20. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 316 03(2-2-0). Turfgrass Management. F. Prerequisite: H 140, one course in botany, biology, or horticulture. Special fee, $52. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 317 03(2-2-0). Landscape Structures. S. Prerequisite: H 140, one course in botany, biology, or horticulture. Special fee, $52. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 318 03(2-2-0). Landscape Irrigation. E. Prerequisite: One course in botany, biology, or horticulture. Special fee, $20. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 319 02(1-2-0). Survey of History and Principles of Landscape Design and Development of the Profession. S. Prerequisite: H 221. Offered only off campus. Survey of history and principles of landscape design and development of the profession.

H 320 02(0-0-2). Seminar on College Teaching. Role of college teacher emphasizing applied principles and practices derived from empirical research and collective experience of teaching professors.

H 321 03(2-2-0). Plants for Interiors. F. Prerequisite: One course in botany, biology, or horticulture. Special fee, $52. Principles of plant science and related disciplines as the base and context for the introduction of horticulture practices.

H 325 04(2-4-0). Landscape Grading and Drainage Studio. F. Prerequisite: H 140, M/M CC 118 or M/M CC 121. Special fee, $10. Basic design principles for grading, drainage, and earth forms for small-scale projects.
+H 412 04(3-0-1). Floriculture Crops. F. Prerequisite: H 310. Special fee, $15. 
Commercial production and marketing of bedding plants, potted container crops, and cut flowers.

+H 432 05(2-0-0). Intensive Landscape Design Studio. S. Prerequisite: H 332. Special fee, $20. 
Site planning and design for landscape projects of a limited scale. Problems of increasing complexity. Emphasis on real sites and clients.

+H 441 03(3-0-0). Turfgrass Science. F. Prerequisite: BZ/BZCC 120, C 341, SC 240. Special fee, $75. 
Examination of turfgrass management practices from a scientific perspective, discussion of advanced turfgrass management technologies.

+H 450 A-D 01(0-0-0). Horticulture Food Crops. F. Prerequisite: One plant science course. Special fee, $10 per subtopic.

+H 454 02(2-2-0). Horticulture Crop Production and Management. F. Prerequisite: H 450 A-B or H 310. Special fee, $10. 
Production and management of horticulture crops.

H 460/SC 460 03(3-0-0). Plant Breeding. S. Prerequisite: SC 330. Credit not allowed for both H 460 and SC 460. 
Theory and practice of plant breeding using principles of genetics and related sciences.

H 461/SC 461 01(0-2-0). Plant Breeding Laboratory. S. Prerequisite: H 460/SC 460 or concurrent registration. Credit not allowed for both H 461 and SC 461. 
Techniques and procedures used in public and commercial plant breeding programs.

H 471 02(2-0-0). Development and Management of HT Programs. S. Prerequisite: H 371, H 373, H 375. Offered only off campus. 
Horticultural therapy program development, site planning and management, program proposals.

H 475 03(3-0-0). Environmental Requirements of Horticultural Plants. S. Prerequisite: BZ 440. 
Impact of environmental factors and global climatic change on production of horticultural crops, plant distribution, and species biodiversity.

H 486 Var [1-6]. Practicum. 
Directed experiences in applications of horticulture techniques and procedures.

H 487 Var. Internship.

H 495 Var. Independent Study.

H 496 Var. Group Study.

H 560 03(2-2-0). Plant Environmental Measurements. S. Prerequisite: One course in physics. 
Principles and use of equipment for measuring environmental parameters in and above plant covers; outdoors and in environmental chambers.

H 575 02(2-0-0). Plant Germplasm Conservation. S. Prerequisite: H 460/SC 460 or written consent of instructor. 
Principles, concepts, and methodology for collection, conservation, and utilization of plant genetic resources.

H 588 Var. Supervised Extension Practices. F, S, SS. 
Field experiences in extension practices in horticulture.

H 642 03(2-2-0). Plant Growth Analysis and Modeling. S. Prerequisite: BZ 440, M/M CC 155, ST 304; or written consent of instructor. 
Functional approach, fitted surfaces, and simulation modeling approach - deterministic and mechanistic.

H 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.

H 695 Var. Research.


H 784 Var. Supervised College Teaching. F, S, SS.

H 792 01(0-0-1). Seminar.

H 795 Var. Independent Study.


HOUSING AND CONSUMER SCIENCES COURSES

Department of Design and Merchandising 
College of Applied Human Sciences


H 496 Var. Group Study.

H 590 Var. Workshop.
HUMAN DEVELOPMENT AND FAMILY STUDIES COURSES

Human Development and Family Studies
Department
College of Applied Human Sciences

HDCC 101 03(3-0-0). Individual and Family Development. F, S, SS.
Also offered as correspondence course.
Principles of life-span human development in the contexts of the family. Theory and research on the influence of family systems on individuals.

HD 175/PY 175 03. Developmental Psychology Across the Life Span.
F, S, SS. Credit not allowed for both HD 175 and PY 175. Offered as telecourse only.
Theory and research on physical, cognitive, and psychosocial human development across the life span.

HD 217 03(3-0-0). Creative Experiences for Children. F, S, SS.
Prerequisite: HD/HDCC 101 or concurrent registration in HD 286.
Theories of play; art, music, literature as related to child development.

HD 218 03. Creative Experiences for Preschool Children. F, S, SS.
Credit not allowed for both HD 218 and HD 217. Offered as correspondence course only.
Role of art, music, and literature in development; emphasis on planning and conducting creative experiences for preschool children.

HD 254/AY 254 03(3-0-0). Biological Aspects of Human Development.
F, S. Prerequisite: BZ/BZCC 102 or BZ/BZCC 101 or BZ/BZCC 110. Credit not allowed for both HD 254 and AY 254.
Human embryology, genetics, developmental processes resulting in birth defects, human physical development through the lifespan.

HD 276 03. Studying Young Children. F, S, SS. Offered as correspondence course only.
Increasing understanding of young children through development of observation skills while participating in an early childhood center.

HD 277 02(2-0-0). Professional Skills Development I. F, S.
Prerequisite: HD/HDCC 101 and CO/COC 150.
Exploration of the relation of human development and family studies to professional opportunities in family and community services and research.

HD 286 03(1-0-0). Practicum. Prerequisite: HD/HDCC 101.
Observational experience with children, adolescents, and families.

HD 301 03(3-0-0). Perspectives in Gerontology. F.
Prerequisite: HD/HDCC 101 or PY/PYCC 100 or SIS CC 100 or written consent of instructor. Also offered as telecourse.
Using multidisciplinary perspectives to explore a variety of issues in human aging; emphasis on applied gerontology.

HD 302 03(3-0-0). Marriage and Family Relationships. F, S.
Prerequisite: PY/PYCC 100, SIS CC 100. Also offered as telecourse.
Preparation for and adjustment to marital and family relationships throughout the life cycle.

HD 310 03(3-0-0). Infant and Child Development in Context. F, S.
Prerequisite: HD/HDCC 101 and PY/PYCC 100. Also offered as telecourse.
Physical, cognitive, and socioemotional development from conception through middle childhood in context of family, relationships, and culture.

HD 311 03(3-0-0). Adolescent/Early Adult Development in Context.
F, S, SS. Prerequisite: HD/HDCC 101.
Physical, cognitive, and socioemotional development of adolescents and young adults in context of family, relationships, and culture.

HD 312 03(3-0-0). Adult Development-Middle Age and Aging. F, S.
SS. Prerequisite: HD/HDCC 101 or PY/PYCC 100 or SIS CC 100. Also offered as correspondence course.
Developmental issues and processes pertaining to middle and later adulthood. Contexts in which adult development and aging occur are emphasized.

HD 317 03. Children with Special Needs in Child Care. F, S, SS.
Prerequisite: HD 276 or written consent of instructor. Offered as correspondence course only.
Exploration of characteristics, services, and issues affecting exceptional individuals.

HD 332 03(2-0-1). Death, Dying, and Grief. F, S, SS.
Prerequisite: HD/HDCC 101.
Developmental processes of death and dying related to the dying individual and family; applied to dealing with grief, death in human service agencies.

HD 334 03(3-0-0). Parenting Across the Lifespan. F, S, SS.
Prerequisite: HD 310.
Parenthood as a developmental process; child rearing as a function of variations in risk status, family systems, and ecological contexts.

HD 354 03(3-0-0). Biological Aspects of Aging. S.
Prerequisite: BY/LSCC 102 or BY/LSCC 101 or BY/LSCC 110. Credit not allowed for both HD 354 and SIS CC 100.
Biological human and comparative aging, including cellular and genetic mechanisms, alterations to organ systems due to aging, and disease conditions.

HD 374 03. Children's Programming/Curriculum Development. F, S, SS.
Offered as correspondence course only.
Principles of designing and evaluating developmentally appropriate programs for children.

HD 375 03(3-0-0). Programmed for Children and Families. F, SS.
Prerequisite: HD 310, HD 286.
Prevention and intervention programs for children and families.

HD 400 03(3-0-0). Speech, Language, and Communication Development.
F, S. SS. Prerequisite: HD 310 or PY 260.
Speech, language, and communication development from birth to adulthood; review of physical, cognitive, social, cultural influences.

HD 401 03(3-0-0). Childhood Socialization. F, S, SS.
Prerequisite: HD 310, HD 334.
Socialization processes that influence human development within diverse family styles and cultures.

HD 402 03(3-0-0). Family Studies. F, S, SS.
Prerequisite: HD/HDCC 101.
Theory and research concerning relationships within families; interaction between family and other social institutions.

HD 403 02(2-0-0). Families and the Legal Environment. F, SS.
Legal aspects of consumer and family roles.

HD 430 03. Play Behavior. F, S, SS.
Prerequisite: HD/HDCC 101 or HD 310 or written consent of instructor. Offered as correspondence course only.
Theories and research of play behavior and play environments.
Six credits of upper-division behavioral sciences.

Applications and integration of human development and family background within professional settings.

HD 448 Var 1-3. Supervised College Teaching. F, S, SS.


Application of human development skills in a professional setting.

- A) Human development. B) Family studies.

HD 492 03(0-0-3). Seminar-Program Proposal Development.

Research, development, and presentation of program proposals from a family development perspective.

HD 493 03(0-0-3). Specialized Seminar. Prerequisite: Written consent of instructor.
Advanced study of theory, research, and application in a specialized area.

HD 495A-C Var. Independent Study.

HD 497 Var. Group Study.

- A) Human development. B) Family studies.

HD 499 Var 1-4. Thesis. Prerequisite: Written consent of department head.
Independent research project presented to a faculty committee.

HD 500 03(0-0-3). Issues in Human Development and Family Studies. F. Prerequisite: Six credits in human development or family studies.

A selected, broad issue in human development and family studies emphasizing principles of research.

HD 510 03(3-0-0). Theories of Human Development. S. Prerequisite: One child development course, three additional credits in human development.

Comparative analysis of major theories in human development.

HD 524 03(3-0-0). Family Theory. F. Prerequisite: One family studies course.

Major theories and conceptual frameworks for family analysis.

HD 528 04(3-2-0). Child and Family Assessment. F. Prerequisite: Nine credits in human development and family studies or behavioral science at 300-400 level.

Assessment procedures for children and families related to test selection and effective intervention.

HD 530 03(3-0-0). Socioemotional Development. F, S. Prerequisite: Six credits of upper-division behavioral sciences.

Examination of theory and research on issues in social, emotional, and personality development of youth.

HD 534 03(3-0-0). Marriage and Family Therapy. F. Prerequisite: HD 524.

Theories and techniques.

HD 550 03(3-0-0). Research Methods I. S. Prerequisite: Three credits of statistics, three credits of upper-division behavioral sciences.

Research strategies and ethical considerations.

- A) Human development. B) Family studies.


HD 612 03(3-0-0). Adolescent Development. F. Prerequisite: One course in adolescence, three credits of upper-division behavioral science.

Classical and contemporary theory; review of research related to major developmental processes.

HD 613 03(3-0-0). Adult Development and Aging. F, S. Prerequisite: One course in adult development or three credits of upper-division behavioral science.

Advanced study of developmental change and adaptation during adult years.

HD 624 03(3-0-0). Skills and Techniques in Family Therapy. F. Prerequisite: HD 514.

Elaboration of techniques and therapy skills based on theory and research.

HD 631 03(3-0-0). Cognitive Development. F. Prerequisite: Six credits of upper-division behavioral sciences.

Examination of child and adolescent cognitive development, including perceptual, linguistic, memory, and social cognitive skills.

HD 644 03(3-0-0). Foundations in Family Therapy. F, SS. Prerequisite: HD 524.
Contemporary research and treatment strategies for parenting problems, family violence, and substance abuse.

HD 650 03(2-0-3). Research Methods II. F. Prerequisite: HD 550.

Statistical concepts and analysis.

HD 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.

HD 677 03(3-0-0). Ethical and Legal Issues. S.
Ethical and legal issues in the field of human development and family studies.

HD 678 02(2-0-0). Applications of Marital and Family Therapy. F, S, SS. Prerequisite: HD 677 or concurrent registration; admission to MFT Program.

Applications of family therapy theory to clinical cases.

HD 684 Var. Supervised College Teaching. F, S.


HD 687A-C Var. Internship. Prerequisite: A-B) Nine graduate credits in human development. C) HD 677, HD 678, HD 688 or concurrent registration.
HD 688 Var [1-5]. Field Placement. Prerequisite: Admission to MFT Program; concurrent registration in HD 678. Application of knowledge, skills, and methods to therapy and intervention.

HD 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.


HD 697 Var [1-6]. Group Study.


**HIGHER EDUCATION COURSES**

**School of Education**

**College of Applied Human Sciences**

HE 590A-J Var [1-3]. Workshop-Student Personnel.


HE 670 03(0-0-3). College Student Personnel Administration. F. Prerequisite: Written consent of instructor. Historical, philosophical, and professional development in student affairs functions; analysis of role of student affairs in higher education.

HE 671 02(2-0-0). Higher Education Administration. F. Prerequisite: HE 670. Purpose, structure, and role of administration of higher education. Emphasis on financial management for student affairs administrators.

HE 672 02(0-0-2). Campus Ecology. F. Prerequisite: HE 670. Relationships between college students and their environments; impact on student development.

HE 673 03(0-0-3). Student Development Theory. F. Prerequisite: HE 670. Strategies for application of student development theories in practice of student affairs.

HE 675 03(3-0-0). The Community College. F. Prerequisite: VE 601 or appropriate experience. Role and scope of community college: history, philosophy, organization, administration.

HE 676 03(3-0-0). Organizational Behavior in Student Affairs. S. Prerequisite: HE 670. Understanding and application of basic organizational behavior principles within administration of student affairs in higher education.

HE 677 02(2-0-0). Law in Student Affairs. F. Prerequisite: HE 670. Legal issues focusing on sources and application of educational law and responsibilities of higher education administrators.


HE 692A-B Var. Seminar. Prerequisite: A) HE 670 or written consent of instructor. A) Student personnel. B) Community college administration.


HE 701 03(0-0-3). Higher Education Law. S. Prerequisite: Written consent of instructor. Legal theory, analysis, and review of cases relevant to higher education.

HE 710 03(0-0-3). Community College Finance. S. Prerequisite: VE 611 or HE 675. Federal, state, and local revenue distribution, budget preparation and controls, accounting options, audit preparation.

HE 750 03(0-0-3). Simulated Presidential Cabinet I. SS. Prerequisite: Completion of community college leadership course work or consent of program chair. Issues and challenges relating to students, faculty, instructional programs, noninstructional programs, and instructional delivery.

HE 751 03(0-0-3). Simulated Presidential Cabinet II. SS. Prerequisite: Completion of community college leadership course work or consent of program chair. Issues and challenges relating to internal/external governances, legal authority, institutional revenues, expenditures and insurances, human resources.

HE 792 Var [1-6]. Seminar-Community College Leadership. Prerequisite: HE 710 or consent of program chair.


**HONORS COURSES**

**Honors Program Office**

HP 100 01(0-0-1). Honors Western Civilization I. F. Corequisite: HY/HYCC 100; participation in Honors Program. Selected readings complementing Western Civilization material.

HP 101 01(0-0-1). Honors Western Civilization II. S. Corequisite: HY/HYCC 101; participation in Honors Program. Selected readings complementing Western Civilization material.

HP 102 01(0-0-1). Honors Attributes of Living Systems. F. Corequisite: BY/LSCC 102; participation in Honors Program. Selected readings complementing "Attributes of Living Systems" material.

HP 103 02(1-0-1). Honors Biology of Organisms. S. Corequisite: BY 103; participation in Honors Program. Selected readings complementing "Biology of Organisms" material.

HP 170 01(0-0-1). Honors World Civilizations, Ancient-1500. F. Corequisite: HY/HYCC 170; participation in Honors Program. Selected readings complementing "World Civilizations, Ancient-1500" material.
HP 171 01(0-0-1). Honors World Civilizations, 1500-Present. S.
Corequisite: HY/HYCC 171; participation in Honors Program.
Selected readings complementing “World Civilizations, 1500-
Present” material.

HPCC 192A 04(0-0-4). 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.

HPCC 192B 03(0-0-3). Seminar. F, S. Prerequisite: HPCC 192A,
participation in University Honors Program.
Humanistic and scientific studies with emphasis on rigorous literate
activities, especially written communication.

HP 197 Var [1-4]. General Honors Colloquium. Limited to qualified
freshmen and sophomores.
Students from all major fields meet in small groups to focus on a
problem of concern to all.

HP 375 03(0-0-0). The Brain: A User's Guide. S. Prerequisite:
Participation in Honors Program or approval of the Honors Program
and written consent of instructor.
How the brain functions and how to think about the mechanisms
underlying thoughts and behaviors.

HP 384 Var. Supervised College Teaching. F, S.

HPCC 392 03(0-0-3). Seminar. F, S. Prerequisite: HPCC 192B,
participation in University Honors Program.
Various topics in humanistic and scientific studies.

HP 397 Var [1-4]. General Honors Colloquium. 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.

HP 399 02(0-0-2). Pre-thesis. F, S. Prerequisite: HPCC 192B,
preparation for Honors senior thesis.

HP 492 03(0-0-3). Seminar. Prerequisite: Participation in Honors
Program.

HP 495 Var [1-5]. Independent Study.

HP 499 Var [1-5]. Senior Honors Thesis. Prerequisite: Enrolled in the
Honors Program and approval of the Honors Director. Maximum of 6
credits allowed in course.

HUMAN SERVICES COURSES

College of Applied Human Sciences

HSCC 192 02(0-0-2). Applied Human Sciences First-Year Seminar.
F, S, SS.

Concepts and topics integral to applied human sciences; development of
community; enhancement of reading, critical thinking, and
communication skills.

HS 100 03(3-0-0). Research in Applied Professions. F, S, SS.

Application of social science research methodology to applied
professions including problem formulation, research design, and data
collection.

HS 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 services settings.

HS 490 Var [1-5]. Workshop.

HS 492 Var [1-5]. Seminar.

HS 495 Var [1-5]. Independent Study.

HS 590 Var [1-5]. Workshop.

HS 692 Var [1-5]. Seminar.

HS 695 Var [1-5]. Independent Study.

HISTORY COURSES

Department of History
College of Liberal Arts

HYCC 100 03(3-0-0). Western Civilization, Pre-Modern. F, S, SS.
Historical development of Western civilization from antiquity to the
early modern era (c. 1600 C.E.).

HYCC 101 03(3-0-0). Western Civilization, Modern. F, S, SS.
Historical development of Western civilization from c. 1600 C.E.
to the contemporary era.

HYCC 150 03(3-0-0). U.S. History to 1876. F, S, SS.
Major issues and themes in the development of the United States
from the colonial period through reconstruction.

HYCC 151 03(3-0-0). U.S. History Since 1876. F, S, SS.
Major issues and themes in the historical development of the United
States since reconstruction.

HYCC 170 03(3-0-0). World Civilizations, Ancient-1500. F, S, SS.
Historical developments and interactions of major world
civilizations from the ancient to modern periods.

HYCC 171 03(3-0-0). World Civilizations, 1500-Present. F, S, SS.
Historical developments and interactions of major world
civilizations from 1500 to the present.

HYCC 216 03(3-0-0). The Islamic World. S.
Religion, society, and culture in the Islamic world since the time of
Muhammad.

HYCC 219 03(3-0-0). Africa-Precolonial States and Empires. F,
Origins of societal and political development in Africa before 1800;
technology, the environment, human migrations, and trade.

HYCC 220 03(3-0-0). Medieval Europe. S.
Political, legal, socioeconomic development of Europe from 300-
1500 emphasizing emergence of major states.

HY 235 03(3-0-0). Slavic and East Central European Civilizations.
F, S.
Evolution of cultural characteristics of Slavic and East Central
Europe emphasizing similarity and diversity of the peoples of the
region.

HY 240 03(3-0-0). History of England. F, S.
From Roman period to present emphasizing constitutional, legal,
political developments.
HY 242 03(3-0-0). History of Ireland. S.

HY 245 03(3-0-0). World War II. F, S, SS.

HY 250/ETCC 250 03(3-0-0). African-American History. 1619-1865. F. Credit not allowed for both HY/HYCC 250 and ET/ETCC 250.

HY 251/ETCC 251 03(3-0-0). African-American History Since 1865. S. Credit not allowed for both HY/HYCC 251 and ET/ETCC 251.

HY 252/ETCC 252 03(3-0-0). Asian-American History. F. Credit not allowed for both HY/HYCC 252 and ET/ETCC 252.

HY 255/ETCC 255 03(3-0-0). Native American History. S.

HY 260 03(3-0-0). Colorado. F, S, SS.

HY 263 02(2-0-0). War for Independence. S.

HY 264 03(3-0-0). The War in Vietnam. S.

HY 270 03(3-0-0). Colonial Latin America. F.

HY 271 03(3-0-0). Latin America Since Independence. S.

HY 272 03(3-0-0). Asian Civilizations I. F.

HY 274 03(3-0-0). Asian Civilizations II. S.

HY 277 Var [J-3]. Group Study.

HY 301 03(3-0-0). Historical Methods. F, S.

HY 302 03(3-0-0). Ancestor Civilization-Near East. S.

HY 303 03(3-0-0). Ancestor Civilization-Greece. S.

HY 304 03(3-0-0). Ancient Civilization-Rome. S.

HY 310 03(3-0-0). Renaissance and Reformation Europe. F.

HY 311 03(3-0-0). The Middle East. F.

HY 312 03(3-0-0). The Age of Enlightenment. S.

HY 313 03(3-0-0). Modern Europe, 1815-1914. F, S.

HY 314 03(3-0-0). European Biography. F, S.

HY 315 03(3-0-0). European History, 1914-Present. F, S.

HY 316 03(3-0-0). The Age of the Enlightenment. S.

HY 317 03(3-0-0). Renaissance and Reformation Europe. F.

HY 318 03(3-0-0). European History, 1914-Present. F, S.

HY 320 03(3-0-0). European Biography. F, S.

HY 321 03(3-0-0). European History, 1914-Present. F, S.

HY 322 03(3-0-0). European History, 1914-Present. F, S.

HY 323 03(3-0-0). European History, 1914-Present. F, S.

HY 324 03(3-0-0). European History, 1914-Present. F, S.

HY 325 03(3-0-0). European History, 1914-Present. F, S.

HY 326 03(3-0-0). European History, 1914-Present. F, S.

HY 327 03(3-0-0). European History, 1914-Present. F, S.

HY 328 03(3-0-0). European History, 1914-Present. F, S.

HY 329 03(3-0-0). European History, 1914-Present. F, S.

HY 330 03(3-0-0). African Civilization. S.

HY 331 03(3-0-0). African Civilization. S.

HY 332 03(3-0-0). African Civilization. S.

HY 333 03(3-0-0). African Civilization. S.

HY 334 03(3-0-0). African Civilization. S.

HY 335 03(3-0-0). African Civilization. S.

HY 336 03(3-0-0). African Civilization. S.

HY 337 03(3-0-0). African Civilization. S.

HY 338 03(3-0-0). African Civilization. S.

HY 339 03(3-0-0). African Civilization. S.

HY 340 03(3-0-0). African Civilization. S.

HY 341 03(3-0-0). African Civilization. S.

HY 342 03(3-0-0). African Civilization. S.

HY 343 03(3-0-0). African Civilization. S.

HY 344 03(3-0-0). African Civilization. S.

HY 345 03(3-0-0). African Civilization. S.

HY 346 03(3-0-0). African Civilization. S.

HY 347 03(3-0-0). African Civilization. S.

HY 348 03(3-0-0). African Civilization. S.

HY 349 03(3-0-0). African Civilization. S.

HY 350 03(3-0-0). African Civilization. S.

HY 351 03(3-0-0). African Civilization. S.

HY 352 03(3-0-0). African Civilization. S.

HY 353 03(3-0-0). African Civilization. S.

HY 354 03(3-0-0). African Civilization. S.

HY 355 03(3-0-0). African Civilization. S.

HY 356 03(3-0-0). African Civilization. S.

HY 357 03(3-0-0). African Civilization. S.

HY 358 03(3-0-0). African Civilization. S.

HY 359 03(3-0-0). African Civilization. S.

HY 360 03(3-0-0). African Civilization. S.

HY 361 03(3-0-0). African Civilization. S.

HY 362 03(3-0-0). African Civilization. S.
HY 364 03(3-0-0). Age of Jefferson. F, SS. Prerequisite: HY/HYCC 150. 
Society, culture, and political life in times of Thomas Jefferson.

HY 368 03(3-0-0). Age of Jackson. S, SS. Prerequisite: HY/HYCC 150. 
National growth, 1815 to 1850, emphasizing political, social, and 
economic developments.

HY 370 03(3-0-0). Civil War Era. S. Prerequisite: HY/HYCC 150. 
U.S. history between 1848 and 1865 emphasizing causes and results 
of the Civil War.

HY 372 03(3-0-0). Reconstruction and the New South. F. 
Prerequisite: HY/HYCC 150. 
Reconstruction Era, 1865-1877, and the South to present with 
emphasis on purposes and results of Reconstruction.

*HY 375 03(3-0-0). United States, 1876-1917. S. 
Victorian way of life, rise of industry; reform movements; 
imperialism; World War I.

HY 376 03(3-0-0). United States, 1917-1945. F, SS. 
World War I, the 1920s, the Great Depression, and World War II.

HY 377 03(3-0-0). United States Since 1945. S, SS. 
The Cold War, foreign and domestic affairs from Truman to present.

HY 379/EC 379 03(3-0-0). Economic History of the United 
States. F. Prerequisite: EC/ECCC 101 or EC/ECCC 202 or 
EA/EACC 202; or any two courses in American history. Credit not 
allowed for both HY 379 and EC 379.

Economic analysis of growth and welfare from beginning of 
industrial society, and development of world's largest empire.

HY 401/MS 401 03(3-0-0). The American Military Experience. F, SS. 
Credit not allowed for both HY 401 and MS 401.

Role of the armed forces in American society; development of 
military institutions, traditions, and practices.

HY 404 03(3-0-0). Ancient Israel. S. 
Ancient Israel to 70 A.D. emphasizing the Near Eastern background, 
using archaeological data and the Old Testament.

*HY 410 03(3-0-0). Medieval England. S. 
Political, social, and intellectual development of England from 
Romans to end of Middle Ages.

HY 414 03(3-0-0). Tudor Stuart England, 1485-1689. F, SS. 
Political, economic, and social history of England from 1485-1689 
emphasizing religious movements, revolution, and constitutional 
development.

HY 415 03(3-0-0). Early Modern France, 1500-1789. S. 
Political, social, economic, religious, and cultural developments in 
France (16th-18th centuries) emphasizing formation of the absolutist 
state.

*HY 416 03(3-0-0). Great Britain and the Empire, 1714-1901. S. 
Transition of aristocratic Britain to world's first middle-class, urban, 
industrial society, and development of world's largest empire.

*HY 418 03(3-0-0). Britain in the 20th Century. F. 
Political, economic, and social developments emphasizing role of 
Britain in world affairs and internal changes that led to welfare state.

HY 420 03(3-0-0). History of Spain. F. 
Iberian Peninsula from Roman era emphasizing modern Spain.

HY 421 03(3-0-0). Modern France Since 1789. F. 
France from the Revolution to present.
HY 463 03(3-0-0). European Culture in the 20th Century. S. Cultural developments since World War II emphasizing science, art, and clash of ideologies, existentialism, youth culture, and environmental issues.

HY 464 03(3-0-0). American Environmental History. S. Interaction of humans and nature in American history with emphasis on relationships between environmental, social, and cultural change.

HY 466 03(3-0-0). American Intellectual History. S, SS. Ideas and institutions that have molded American character from earliest times to present.

HY 468 03(3-0-0). Women in America. F. Roles and contributions of women from colonial times to present.

HY 469 03(3-0-0). United States Immigration History. S. Examines central themes of U.S. immigration from perspective of major immigrant groups and within context of U.S. immigration policy.

HY 470 03(3-0-0). American West to 1900. F. Social, political, economic, environmental developments and intercultural relations in trans-Mississippi West to 1900.

HY 471 03(3-0-0). American West Since 1900. S. Social, political, economic, environmental developments and intercultural relations in trans-Mississippi West since 1900.

HY 472 03(3-0-0). American Southwest. F, S, SS. Borderlands, northern Mexico, southwestern U.S. from 16th century to 1912; intercultural relationships among Indian, Spanish, Mexican, and Anglo cultures.

HY 484 Var. Supervised College Teaching. F, S, SS. Assisting the instructor in teaching introductory history courses; relevant readings and discussions.

HY 487 Var [1-3]. Internship. Application of historical methods in museums, libraries, and at historic sites.

HY 492 03(0-0-3). Capstone Seminar. Prerequisite: HY 301; senior status or written consent of instructor. History majors only. Seminar involving critical reading, writing, research, and discussion.

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

HY 497 Var [1-3]. Group Study.

HY 500A-C 03(0-0-3). Historical Method. F. Prerequisite: Written consent of instructor.


HY 510A-C 03(0-0-3). Reading Seminar. F, S, SS. Prerequisite: HY 500A or written consent of instructor.


HY 515 03(3-0-0). Archival Records Management. S. Prerequisite: HY 500A.

Historical context of records management and instruction in techniques for controlling, creation, use, and disposition of records.

HY 586 Var. Practicum. Prerequisite: HY 500A.

HY 587 Var [1-6]. Internship. Prerequisite: HY 500A or written consent of adviser.

Work-oriented instruction involving implementation of classroom or laboratory experiences coordinated by faculty member.

HY 610A-C 03(0-0-3). Research Seminar. F, S, SS. Prerequisite: HY 500A or written consent of instructor.


HY 684 Var. Supervised College Teaching. F, S, SS. Discussions and readings to enhance teaching proficiency.

HY 695 Var. Independent Study. Prerequisite: HY 500A.

HY 697 Var [1-3]. Group Study.

HY 699 Var. Thesis. Prerequisite: HY 500A.

INTERIOR DESIGN COURSES

Department of Design and Merchandising
College of Applied Human Sciences

ID 166 03(0-6-0). Design Sketching. F. Conceptual sketching techniques focusing on the built environment.

ID 175 03(1-4-0). Small-Scale Interiors. S. Prerequisite: DM 130 or concurrent registration. Application of elements and principles of design and human factors to small-scale interiors.

ID 250 03(3-0-0). Interior Facility Design. F. Designing facilities to coordinate physical workplace with people and work of an organization.

ID 266 03(0-6-0). Design Communications I. F, S. Prerequisite: MC 131. Introduction to drawing and presentation techniques for interior design.

ID 275 03(1-4-0). Interior Design I. F, S. Overview of interior design discipline; application of elements and principles of design, awareness of human factors, and understanding programming.

ID 320 03(2-2-0). Computer-Aided Design. F. Prerequisite: Formal admission to junior-level courses. Computer-aided drafting and design using a microcomputer and various software including AutoCAD.

ID 330 03(3-0-0). Color and Light. F. Prerequisite: ID 275. Special fee, $15. Theories and systems of color and light.

ID 340 03(3-0-0). Interior Materials and Market Study. S. Prerequisite: Formal admission to junior-level courses. Analysis of materials and understanding of resources for interior design professionals.

*ID 357 03(3-0-0). History of International Interiors. S. Prerequisite: AR/ARC 100. Major international interior periods/styles from Middle Ages through 19th century.

ID 366 03(0-6-0). Design Communications II. S. Prerequisite: ID 375. Advanced communication and presentation techniques for interior designers.

ID 375 03(1-4-0). Interior Design II. F. Prerequisite: Formal admission to junior-level courses. Application of design elements and principles to small-scale interiors, emphasizing human factors in interior design.
**INTERNATIONAL EDUCATION COURSES**

**Office of International Programs**

**IECC 116/A CC 116** 03(3-0-0). Plants and Civilizations. F. Credit not allowed for both IECC 116 and A/AC 116.
Worldwide origin of plants and products as basis for food, spices, perfumes, medicine, art, mythology, religion, wars, exploration, slavery.

**IECC 270/A CC 270** 03(3-0-0). World Interdependence—Population and Food. S. Credit not allowed for both IECC 270A and A/AC 270.
Survey of world population and food; emphasis on understanding the problems and opportunities in a world context.

**IE 270B-C. World Interdependence.**
* (B) The revolutionary century. 03(3-0-0). F; C) Current global issues. 03(1-0-0). F.

**IE 271** 03(3-0-0). India. S.
Interdisciplinary interpretation of philosophical, historical, cultural, physical, social, and technological influences shaping modern India.

**IE 470** 03(3-0-0). Women and Development. S.
Research and policy issues related to women in developing countries.

**IE 492** 03(0-0-3). International Development Seminar. S.
Key aspects of international development and current and emerging issues.

**IE 550/PL 550** 03(3-0-0). Ethics and International Development. F. Prerequisite: Written consent of instructor. Credit not allowed for both IE 550 and PL 550.
Ethical reflection applied to development goals, strategies of Third World countries, relations between developed and developing countries.

**IE 692** 03(0-0-3). International Development Seminar. S.
Exploration of contemporary issues in international development from interdisciplinary perspectives.

**INTERNATIONAL STUDIES COURSES**

**College of Liberal Arts**

**IN 300** 03(3-0-3). Approaches to International Studies. F. Prerequisite: Nine credits from AUCC categories 3C, 3D, 3E and/or 3F; one year of a foreign language.
Interdisciplinary and comparative analytical approaches to the field of international studies.

**IN 492A-C** 03(0-0-3). Seminar. Prerequisite: A) HY/HYCC 273, HY/HYCC 274, IN 300. B) HY/HYCC 276, HY/HYCC 271, IN 300. C) Two courses in European history, IN 300.
INTRA-UNIVERSITY COURSES

HELP/Success Center

IUCC 192 03(1-0-2). The Individual, University, and Society. F, S.
Develop communication, research, and critical thinking skills; analyze various societal issues; explore academic choices and university resources.

TECHNICAL JOURNALISM COURSES

Department of Journalism and Technical Communication
College of Liberal Arts

JTCC 100 03(3-0-0). Introduction to Mass Media. F, S.
Role of media in American democracy, impact of media on individuals and social institutions, comparative communication.

JTCC 192 03(1-4-0). Journalistic Writing. F, S, SS. Prerequisite: admission to major.
Basic journalism skills; news gathering and newswriting.

JT 200 03(1-0-2). Professional Writing. F, S. Prerequisite: CO/CCOC 150.
Basic elements of writing for professional and specialized audiences.

JT 210 03(1-4-0). Newswriting. F, S, SS. Prerequisite: Satisfactory performance on typing and diagnostic tests.
Theory and practice in newswriting.

Theory, techniques for using computer-related techniques for visual presentation of news, specialized, and technical information.

Basic black and white photography, processing and printing, emphasizing word-picture relationships for publication. Access to 35mm camera required.

JT 250 03(3-0-0). Advertising. F, S.
Advertising principles and techniques used to develop effective advertising campaigns.

JTCC 300 03(3-0-0). Professional and Technical Communication. F, S, SS. Prerequisite: CO/CCOC 150.
Professional writing and presentation skills applied to students’ major fields.

JT 301 03(2-0-1). Business Communication. F, S. Prerequisite: CO/CCOC 150.
Principles and practice of effective business communication with emphasis on written professional reports.

JT 310 04(2-4-0). Copy Editing and Production. F, S. Prerequisite: JT 210.
Theory and practice of copy preparation and editing; publication design and layout. Introduction to commercial printing processes.

JT 311 03(3-0-0). History of Media. F, S.
Media development, growth, trends within context of political, social, and economic change.

JT 316/ET 316 03(3-0-0). Multiculturalism and the Media. S. Credit not allowed for both JT 316 and ET 316.
Media and multiculturalism with emphasis on race, ethnicity, and other protected groups.

JT 320 03(1-4-0). Reporting. F, S. Prerequisite: JT 210.
Theory, methods, and practice of gathering and reporting news.

JT 326 03(3-0-0). Online Journalism. F, S. Prerequisite: JT 310 with grade of C or better or JT 340 with grade of C or better.
Website and message design and creation for media practitioners based on understanding of online attributes and technological context of journalism.

JT 340 03(2-2-0). Videotape Editing. F. Special fee, $85.
Theory, techniques of picture and sound editing on videotape.

Practical application of principles, techniques used in broadcast newswriting and radio and television reporting.

Audience and subject research, script structure and development; narrative techniques, visual story and role of visual media as change agents.

Theory, techniques of videotape field production emphasizing news, current affairs, and special interest programs.

JT 350 03(3-0-0). Public Relations. F, S.
Public relations principles and practices of business, industry, education, and public agencies.

Case studies, problems in public relations. Planning, preparation, and application of public relations techniques.

Writing articles for agricultural, business, hobby, technical, trade, and other specialized periodicals whose readers use information to make decisions.

JT 372 03(2-2-0). Web Design and Management. F, S. Prerequisite: JT 211.
Design, development, and management of World Wide Web content.

JT 410 02(2-0-4). Newspaper Editing. F. Prerequisite: JT 310.
Editorial techniques, responsibilities, news evaluation.

JT 411 03(3-0-0). Media and Society. F, S.
Relation of media systems to the social system; ethics and journalism.

JT 412 03(3-0-0). International Mass Communication. F.
Media communication systems, their roles throughout the world; news flow, propaganda in national development; role of foreign correspondents.

JT 413 03(3-0-0). New Communication Technologies and Society. F, S.
Political, economic, social, philosophical, legal, and educational impacts of new technologies.
JT 414 03(3-0-0). Media Effects. F, S. Perspectives on audience processes and media effects on individuals and society.

JT 415 03(3-0-0). Communications Law. F, S. Constitutional, statutory law of political speech, obscenity, advertising, libel; privacy, copyright, information ownership and access.

JT 420 03(3-0-0). Advanced Reporting. F, S. Prerequisite: JT 320. Advanced techniques for gathering and evaluating information; interpretive reporting of public affairs issues.

JT 435 03(2-3-0). Documentary Video Production. F. Prerequisite: JT 345. Special fee, $85. Writing, directing, and editing of long-form television documentaries.

JT 440 03(1-4-0). Advanced Electronic Reporting. F, S, SS. Prerequisite: JT 341; JT 345. Special fee, $60. Gathering, writing, field producing, videotaping, editing, and presenting local television news and public affairs programming.

JT 450 03(2-2-0). Public Relations Campaigns. F. Prerequisite: JT 310, JT 351. Preparation of materials, use of media to achieve objectives with target audiences; work with nonprofit organizations in actual campaigns.


JT 461 03(2-2-0). Writing about Science, Health, and Environment. F. Prerequisite: JT 310, one upper-division writing course; or written consent of instructor. Writing about science, health, and the environment for lay audiences from a journalistic perspective.

JT 464 03(2-2-0). Technical Writing. F, S. Prerequisite: JT 310, JT 361. Writing technical information for a variety of media.

JT 465 03(2-2-0). Technical/Specialized Editing. S. Prerequisite: JT 310, JT 361, and JT 451 or JT 454. Editorial purpose, techniques, and evaluation of technical and specialized print and online information.

JT 471 03(3-0-0). Communication Research Methods. F. Prerequisite: One statistics course. Credit not allowed for both JT 471 and JT 500. Quantitative, qualitative methods of analyzing process and effects of mass and interpersonal communication.

JT 484 Var [1-3]. Supervised College Teaching. F, S.

JT 487 Var [1-3]. Internship.

JT 490 Var [1-3]. Workshop.


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

JT 500 03(3-0-0). Communication Research and Evaluation Methods. Prerequisite: Three credits of statistics. Credit not allowed for both JT 500 and JT 471. Theory and applied communication research and evaluation methodologies for assessing and improving communication in technological environment.

JT 501 03(3-0-0). Process and Effects of Technical Communication. F. Corequisite: JT 500. Examination of technical communication including communicator credibility, messages, channels, audiences, and information, behavior, and attitude change.


JT 544 03(2-2-0). Corporate Video. S. Special fee, $30. Advanced techniques for managing messages and communication tasks with video in corporate, governmental, and organizational settings.

JT 550 03(3-0-0). Public Relations. F, S. Offered only off campus. Contemporary public relations principles and practices.

JT 560 03(3-0-0). Managing Communications Systems. S. Prerequisite: JT 501. Examination of role, responsibilities of communication managers in translating theory into effective, applied communication programs.


JT 614 03(3-0-0). Public Communication Campaigns. F. Prerequisite: JT 501 or written consent of instructor. Conceptual, methodological issues and decisions underpinning determination of communication campaign effects, planning, implementation, and evaluation.

JT 640 03(3-0-0). Telecommunication. S. Prerequisite: JT 501. Theory and application of telecommunication in information age.

JT 650 03(3-0-0). Public Relations Management. F. Prerequisite: JT 501 or concurrent registration. Theoretical and practical management techniques for public relations campaigns including societal, ethical, and legal issues involved.

JT 660 03(3-0-0). Communication in Technology Transfer. F. Prerequisite: JT 501 or concurrent registration. Communication's role in technology transfer as related to nature, process, and effects of technology transfer, knowledge dissemination, and utilization.

JT 661 03(3-0-0). Information Design. S. Prerequisite: JT 501. Theoretical and empirical review of creation, presentation, storage, and distribution of information.

JT 662 03(3-0-0). Communicating Science and Technology. S. Prerequisite: JT 501. Examination of theoretical and empirical studies concerning communication of science and technology subject matter.

JT 684 Var. Supervised College Teaching. F, S, SS. Prerequisite: Written consent of instructor. Philosophy, techniques, and approaches to teaching journalism skills courses, as supervised by faculty.

JT 687 Var [1-3]. Internship. Prerequisite: Written consent of instructor.
KEY ACADEMIC COMMUNITY COURSES

Office of Provost/Academic Vice President

KACC 192 03(0-0-3). Key Academic Community Seminar. F.
Concurrent registration in companion courses in the Key Course Cluster.
Examination of an intellectual problem or theme through the lenses of
two disciplines linked in a Course Cluster.

FOREIGN LANGUAGES AND LITERATURES COURSES

Department of Foreign Languages and Literatures
College of Liberal Arts

L CC 105 05(5-2-0). First-Year Language I. F, S, SS. Prerequisite:
Registration allowed only for students with no previous study in the
language. Credit not allowed for both L/L CC 105 and L 106.
Essentials of the language for the beginner: aural comprehension,

L 106 03(3-2-0). First-Year Language Review. F, S, SS. Prerequisite:
Placement exam or instructor placement. For students with minimal
proficiency. Credit not allowed for both L 106 and L/L CC 105.
Basic review of essential skills: aural comprehension, speaking,

L CC 107 05(5-2-0). First-Year Language II. F, S, SS. Prerequisite:
L/L CC 105 or L 106.
Essentials of the language for the continuing student: aural comprehension,

L 108 05(5-2-0). Intensive Language I. F, S, SS. Prerequisite: Grade of A in
L/L CC 105 or L 106 and written consent of instructor; or placement
exam.
Accelerated practice in speaking, reading, writing, and aural

L 120 03(3-0-0). Reading for Proficiency. F, S, SS. Credit for L 120
not allowed if L/L CC 107 or L 108 has been completed.
Essentials of language for developing reading proficiency.

L CC 130 03(3-0-0). Modern Languages/Cultures: Italian and
Japanese. S. Language, cultural issues, and historical heritage of modern Italian
and Japanese societies.

L 152 03(3-0-0). Classical Greek I. S.
Essentials of the language, reading, and translation.

L 153 03(3-0-0). Classical Greek II. S. Prerequisite: L 152.
Essentials of the language, reading, and translation.

L 154 05(5-0-0). Intensive Latin. F.
Essentials of Latin grammar, vocabulary, and phonology.

L CC 200. Second-Year Language I. F, S. Prerequisite: L/L CC 107
or L 108 or placement exam.
Grammar review and extensive practice in conversation, reading,
and writing. C) Chinese 05(5-2-0). F) French 03(3-2-0). G) German
03(3-2-0). I) Italian 03(3-2-0). J) Japanese 05(5-2-0). R) Russian
03(3-2-0). S) Spanish 03(3-2-0).

L CC 201. Second-Year Language II. F, S. Prerequisite: L/L CC 200
or placement exam.
Grammar review and extensive practice in conversation, reading,
and writing. C) Chinese 05(5-2-0). F) French 03(3-2-0). G) German
03(3-2-0). I) Italian 03(3-2-0). J) Japanese 05(5-2-0). R) Russian
03(3-2-0). S) Spanish 03(3-2-0).

L 202 03(3-2-0). Intermediate Language and Culture I. F. S, SS.

L 203 03(3-2-0). Intermediate Language and Culture II. F, S, SS.
Prerequisite: L 202.

L 205 03(3-0-0). Intermediate Written Chinese. S. Prerequisite:
L/L CC 200C or placement exam.
Development of fundamental language skills emphasizing writing
and reading.

L 208 05(5-0-0). Intensive Language II. S. Prerequisite: L 108.
Accelerated practice in speaking, reading, writing, and aural

L CC 215 03(3-0-0). Translation Between Cultures and Languages.
F, S, SS.
Selected works in translation from different periods and genres
which represent the interrelationship of language, literature, and

L CC 250 03(3-0-0). Language, Literature, Culture in Translation.
F, S.
Study of immigration literature; experiences of people who have
crossed or are constantly crossing cultures.

L 296 Var [1-5]. Group Study. Prerequisite: L/L CC 107 or L 108.

L CC 300 03(3-0-0). Reading and Writing for Communication. F,
S, SS. Prerequisite: L/L CC 201 or L 208.
Development of reading and writing proficiency through an in-depth
S) Spanish.
L 301 03(3-0-0). Oral Communication. Prerequisite: L/L CC 300.

L 302 03(3-0-0). Advanced Communication Skills. Prerequisite: L/L CC 300 or placement exam.

L 310 03(3-0-0). Approaches to Literature. F, S. Prerequisite: L/L CC 201 or L 208.

L 310G 03(3-0-0). Approaches to Literature. F, S. Prerequisite: L/L CC 201 or L 208.

L 326 03(3-0-0). Phonetics. F, S. Prerequisite: L/L CC 300 or concurrent registration.

L 335 03(3-0-0). Issues in Culture. Prerequisite: L/L CC 300S or concurrent registration.

L 345 03(3-0-0). Business Language. F, S, SS, Prerequisite: L/L CC 201 or L 208.

L 355 03(3-0-0). Twentieth-Century Literature. F, S. Prerequisite: L 310.

L 379 01(0-2-0). Service Learning. F, S. SS. Prerequisite: Concurrent registration with 300-level language course with written consent of instructor.

L 400 03(3-0-0). Advanced Communication Skills. F. Prerequisite: L/L CC 300.

L 412 03(3-0-0). Advanced Spanish Translation/Interpreting. F, S. Prerequisite: L 310S or written consent of instructor.

L 433A-B 03(3-0-0). Advanced French/ Francophone Culture. F. Prerequisite: L 310S.

L 442 03(3-0-0). Social Manifestations of Hispanic Poetry. F, S. Prerequisite: L/L CC 300S, L 310S.

L 443 03(3-0-0). Spanish Theatre. F, S. Prerequisite: L/L CC 300S, L 310S.

L 445 03(3-0-0). Women Writers in the Hispanic Worlds. F. Prerequisite: L/L CC 300S, L 310S.

L 450 03(3-0-0). Selected Literary Movements and Periods. F. Prerequisite: L/L CC 300, L 310.

L 450A-B 03(3-0-0). Genre Studies. F. Prerequisite: L/L CC 300, L 310.

L 453 03(3-0-0). Author Studies. S. Prerequisite: L/L CC 300, L 310.

L 454 03(3-0-0). Topic Studies. S. Prerequisite: L/L CC 300, L 310.
L 460 03(3-0-0). French/ Francophone Women Writers. S. Prerequisite: L/L CC 300F, L 310F.
Selected French and Francophone women writers in a variety of genres emphasizing relationships among gender, culture, and writing.

L 465A-C 01-(3-0-0). Studies in Foreign Film. F, S.

L 470 03(3-0-0). Spanish Syntax and Semantics-Teaching Methods. S. Prerequisite: L 312.
Theory and teaching methods of Spanish grammatical constructions (word order, word formation, and sentence structure) and their relationship to meaning.

L 479 01(0-2-0). Service Learning. F, S. SS. Prerequisite: Concurrent registration with 400-level language course.

L 492 03(0-0-3). Language, Literature, and Society. F. S.
Prerequisite: L 310 and two 400-level courses; senior status.
Integrative study of language, literature, and society emphasizing relationships between texts and the society of their origin. F) French. G) German. S) Spanish.

L 495 Var [1-6]. Independent Study. Prerequisite: Three years of the same language at college level.

L 496 Var [1-5]. Group Study. Prerequisite: F, G, S) L/L CC 300F. J, R) L 305.

L 500 02(3-0-0). Advanced Syntax/ Stylistics. F. Prerequisite: L 400 or written consent of instructor.

L 505 02(2-1-0). Methods/Technologies in Language Instruction. S.
Prerequisite: Admission to Summer Institute for Foreign Language Teaching.
Theory and methodology of teaching foreign languages and cultures, including video and computer-assisted technology.

L 508 04(3-0-0). Intensive Language-Graduate Review. SS.
Prerequisite: Admission to Summer Institute for Foreign Language Teaching.

L 510 01(1-0-0). Research Methods. F. Prerequisite: Written consent of instructor.
Resources and reference tools appropriate to research in foreign languages and literatures.

L 514 01(1-0-0). Issues in Teaching Language. F. S. Prerequisite: Concurrent graduate teaching assistantship.

L 516 03(3-0-0). Theory/Methods-Foreign Language Instruction. F. Prerequisite: Admission to graduate studies in foreign languages or written consent of instructor.
Foreign language teaching methodology.

L 525 03(3-0-0). History of the Language. S. Prerequisite: L 400.
Investigation of both internal (strictly linguistic) and external (sociolinguistic) factors in development of the language. F) French. G) German. S) Spanish.

L 535 02(2-0-0). Graduate Studies in Civilization. F. SS.
Prerequisite: L 433A-B or L 434 or L 436 or L 437.
Critical and analytical approaches to a foreign civilization and culture. Research related to language of specialization.

L 545 Var [1-3]. Literary Translation Theory and Practice. S. Prerequisite: Reading knowledge of foreign language.
Theory and practice of translating literary texts from foreign language to comparable English.

L 549 03(3-0-0). Literary Periods of Spanish America. F.
Prerequisite: Undergraduate degree in the language or written consent of instructor.
Advanced studies in critical approaches to selected literary movements or periods of Spanish America.

L 551 03(3-0-0). Selected Literary Movements/Periods. F.
Prerequisite: Undergraduate degree in the language or written consent of instructor.
Advanced studies in and critical approaches to selected literary movements or periods. F) French. G) German. S) Spanish.

L 552 03(3-0-0). Advanced Studies in Literary Genres. F.
Prerequisite: Undergraduate degree in the language or written consent of instructor.
Advanced studies in and critical approaches to literary genres through study of major works in foreign literatures. F) French. G) German. S) Spanish.

L 553 03(3-0-0). Advanced Author Studies. S. Prerequisite: Undergraduate degree in the language or written consent of instructor.
Critical approaches to the study of selected authors through appreciation and analysis of their major works. F) French. G) German. S) Spanish.

L 554 03(3-0-0). Advanced Topic Studies. S. Prerequisite: Undergraduate degree in the language or written consent of instructor.
Selected topics (theme, topics, and interdisciplinary subjects) in foreign literatures. F) French. G) German. S) Spanish.

L 596 Var [1-5]. Group Study.

L 610 03(3-0-0). Literary Theory and Criticism. S. Prerequisite: Written consent of instructor.
Theoretical and critical approaches to foreign literatures.

L 684 Var. Supervised College Teaching. F, S.

L 692 03(0-0-3). Seminar. Prerequisite: Undergraduate degree in the language or written consent of instructor.

L 695 Var [1-6]. Independent Study.

LANDSCAPE ARCHITECTURE COURSES

Department of Horticulture and Landscape Architecture
College of Agricultural Sciences

+LA 110 03(1-2-1). Introduction to Landscape Architecture. F. Special fee. S15. Introductory theories, methods, and applications of landscape studies.

LA 120 03(3-0-0). History of the Designed Landscape. S. Major monuments and spaces from ancient Middle East through classical antiquity, the Renaissance, and Western tradition.

+LA 230 04(2-4-0). Drawing the Landscape. F. Special variable ($40-$90) fee determined by department. Visual communication techniques, exploration of symbology, model building, design development drawing, and construction documentation drafting.

+LA 240 04(1-4-1). Fundamentals of Landscape Design Process. S. Prerequisite: LA 230. Special variable ($40-$90) fee determined by department. Initiation of formal exploration of design elements, materials, and principles, and introduction of design process as a defensible methodology.

LA 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.

+LA 360 03(0-6-0). Basic Landscape Design and Construction. F. Prerequisite: LA 240. Special variable ($40-$90) fee determined by department. Site programming, analysis, design, and construction, including skill development in specifying earthwork, drainage, and vegetative composition.

+LA 361 02(1-2-0). Computer-aided Landscape Architecture. F. Prerequisite: LA 360 or concurrent registration. Special variable ($40-$90) fee determined by department. Landscape architectural computer applications including Internet communications, photo simulation, CAD, GIS, and office information management systems.

+LA 362 03(0-6-0). Form and Expression in Garden Design. S. Prerequisite: LA 361. Special variable ($40-$90) fee determined by department. Formal decision making for site scale environments, including creative processes for form-giving, and generation of experimental solutions.

+LA 363 04(2-4-0). Advanced Landscape Site Engineering. F. Prerequisite: LA 360 or concurrent registration. Special variable ($40-$90) fee determined by department. Understanding and documenting the built environment with emphasis on construction and surveying as integral parts of design process.

+LA 364 04(1-6-0). Design and Nature. F. Prerequisite: LA 361. Special variable ($40-$90) fee determined by department. Computer-aided processes for siting, organizing, and evaluating cultural activities within ecologically fragile, landscape-scale environments.

+LA 365 03(2-2-0). Landscape Contract Drawing and Specifications. F. Prerequisite: LA 363. Special variable ($40-$90) fee determined by department. Construction details, design development, and construction documentation emphasizing implementation of design projects.

+LA 366 04(0-8-0). Landscape Design Expression. S. Prerequisite: LA 365. Special variable ($40-$90) fee determined by department. Ideas, values, and process landscape form applied to interactions of natural, cultural systems at the site and community scale; design competitions.

LA 384 Var [1-5]. Supervised College Teaching. F, S, SS. Maximum of ten credits allowed in course.

LA 392 02(0-2-2). Seminar-Designed Landscapes-Theory and Criticism. S. Prerequisite: LA 365. Readings, discussions, and writing in landscape architectural design theory; critical analysis of the designed and constructed landscape.

LA 445 03(1-4-0). Environmental Analysis. S. Prerequisite: LA 366. Exploration and understanding of natural and cultural landscapes through analytical simulation techniques and geographic information system technology.

+LA 446 04(0-8-0). Urban Design. F. Prerequisite: LA 366. Special variable ($40-$90) fee determined by department. Designing the urban landscape, including precedent exploration about overall image, materials, and structure of the city and its components.

LA 447 04(0-8-0). Comprehensive Landscape Design. S. Prerequisite: LA 446. Terminal studio, research, analysis, and synthesis for comprehensive project identified by student and approved in advance by faculty committee.

+LA 449 01(1-0-0). Professional Practice. S. Prerequisite: LA 447 or concurrent registration. Special variable ($40-$90) fee determined by department. Theory and skills of landscape architectural professional practice including functional, human, business, legal, and political aspects.

LA 454 05(1-6-1). Landscape Field Studies. SS. Prerequisite: BZ 355, LA 366. Field observation of spatial and temporal landscape patterns resulting from natural and cultural processes and interactions.

LA 455 05(1-6-1). Travel Abroad-European Landscape Architecture. SS. Prerequisite: LA 362 or written consent of instructor. Exploration of major theoretical platforms in design through drawing, photographing, and measuring landscape architecture precedents in Europe.


LA 496 Var [1-8]. Group Study.

-+LA 510 03(2-2-0). Virtual Design Methods. S. Special variable ($30-$50) fee determined by department. Exploration and application of advanced computing technology and methods for analyzing and organizing natural and cultural landscapes.
LA 520 03(1-4-0). Geographic Information Systems. S. Prerequisite: LA 445 or written consent of instructor. Special variable ($30-$50) fee determined by department. Theories and applications of geographic information systems in spatial analysis and land planning.

LA 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.

LIBERAL ARTS COURSES

College of Liberal Arts

LBC 170 03(3-0-0). World Literatures to 1500. F, S. Culturally significant literary texts from the beginnings of writing to 1500 from Europe, Asia, and Africa.

LBC 171 03(3-0-0). World Literatures-The Modern Period. F, S. Culturally significant literary texts from 1500 to the present from Europe, Asia, Africa, the Americas.

LBC 192 03(0-0-3). College of Liberal Arts First-Year Seminar. F. Traditions, concepts, and topics integral to the liberal arts; cultivates reading, communication, and critical thinking.

LB 487 Var 11-3). Internship.


LIBRARY INFORMATION COURSE

Office of University Libraries Dean

LI 301 01(0-0-0). Library Research Methods. F, S. Developing strategies for library research; locating appropriate resources; and selecting, evaluating, and recording relevant information.

LIFE SCIENCE COURSES

Life Sciences Center

LSCC 102 04(3-2-0). Attributes of Living Systems. F, S, SS. Prerequisites: Intended for students requiring additional courses in biology or areas related to biological science. High school chemistry. Levels of organization, stability, and change in living systems.

MCC 117 01(1-0-0). College Algebra in Context I. F, S, SS. Prerequisite: Satisfactory performance on the Colorado State Mathematics Placement Examination. Credit allowed for only one of the following: M/M CC 117, M/M CC 120A-B.

MCC 118 01(1-0-0). College Algebra in Context II. F, S, SS. Prerequisite: M/M CC 117. Credit not allowed for both M/M CC 118 and M/M CC 121.

MCC 120A-B 01. College Algebra I. Prerequisite: A) F, S, SS. Satisfactory performance on Colorado State Mathematics Placement Examination. B) F, S. Credit allowed for only one of the following: M/M CC 117, M/M CC 120A-B.

MCC 121 01(1-0-0). College Algebra II. F, S, SS. Prerequisite: M/M MCC 120A-B. Credit not allowed for both M/M CC 121 and M/M CC 118.

MCC 124 01(1-0-0). Logarithmic and Exponential Function. F, S, SS. Prerequisite: M/M CC 118 or M/M CC 121 or placement. Integer and fractional exponents, radical expressions, quadratic functions, quadratic formula, combinations and permutations, binomial theorem.

MCC 125 01(1-0-0). Numerical Trigonometry. F, S, SS. Prerequisite: M/M CC 118 or M/M CC 121 or placement. Inverse trigonometric functions, trigonometric identities, solving trigonometric equations.

MCC 126 01(1-0-0). Analytic Trigonometry. F, S, SS. Prerequisite: M/M CC 125 or placement. Inverse trigonometric functions, trigonometric identities, solving trigonometric equations.

MCC 130 03(2-2-0). Math in the Social Sciences. F, S, SS. Prerequisite: Satisfactory performance on Colorado State Mathematics Placement Examination. Voting theory, power indices, fair division, apportionment, circuits and trees, list processing, descriptive statistics, probability.

M CC 135 03(2-0-1). Patterns of Phenomena I. F.  
Prerequisite: Satisfactory performance on the Colorado State Mathematics Placement Examination.  
Applications of mathematical ideas and mode of thought in the arts and humanities, focusing on classification, recognition.

M CC 141 03(3-0-0). Calculus in Management Sciences, F, S, SS.  
Prerequisite: M/M CC 118 or M/M CC 121. Credit allowed for only one of the following sequences: M/M CC 141; M/M CC 155; M/M CC 255; M/M CC 160, M/M CC 161, M 261.  
Analytic geometry, limits, equilibrium of supply and demand, differentiation, integration, applications of the derivative, integral.

M CC 155 04(4-0-0). Calculus for Biological Scientists I. F, S, SS.  
Prerequisite: M/M CC 124, M/M CC 125. Credit allowed for only one of the following sequences: M/M CC 141, M/M CC 155, M/M CC 255; M/M CC 160, M/M CC 161, M 261.  
Limits, continuity, differentiation, and integration of elementary functions with applications in the biosciences. Programmable graphing calculator required.

M CC 160 04(3-0-0). Calculus for Physical Scientists I. F, S, SS.  
Prerequisite: M/M CC 126, concurrent registration in M/M CC 124.  
Credit allowed for only one of the following sequences: M/M CC 141; M/M CC 155, M/M CC 255; M/M CC 160, M/M CC 161, M 261.  
Limits, continuity, differentiation, and integration of elementary functions with applications; conic sections.

M CC 161 04(3-0-0). Calculus for Physical Scientists II, F, S, SS.  
Prerequisite: M/M CC 124, M/M CC 160. Credit allowed for only one of the following sequences: M/M CC 141; M/M CC 155, M/M CC 255; M/M CC 160, M/M CC 161, M 261.  
Transcendental functions, integration techniques, polar coordinates, sequences and series, with mathematical software.

M 166/CS 166 04(4-0-0). Discrete Structures. F, S.  
Prerequisite: CS/CC 151 or CS/CC 153 or CS 154, M/M CC 124. Credit not allowed for both M 166 and CS 166.  
Algorithms, mathematical induction, graphs and trees, counting methods, difference equations, recursion, probability, introduction to mathematical logic.

M CC 192 01(0-0-1). First-Year Seminar in Mathematical Sciences. F.  
Prerequisite: Satisfactory performance on the Mathematics Placement Examination.  
Introduction to the richness and variety of problems addressed by mathematical language and techniques, resources and available careers.

M 229 02(2-0-0). Matrices and Linear Equations. F, S, SS.  
Prerequisite: M/M CC 141 or M/M CC 155 or M/M CC 160.  
Linear systems, matrix arithmetic, homogeneous coordinates, complex numbers, eigenvalues, eigenvectors, applications to discrete dynamical systems.

M CC 255 04(4-0-0). Calculus for Biological Scientists II, F, S.  
Prerequisite: M/M CC 155; concurrent registration in M/M CC 126.  
Credit allowed for only one of the following sequences: M/M CC 141; M/M CC 155, M/M CC 255; M/M CC 160, M/M CC 161, M 261.  
Derivatives and integrals of functions of several variables, differentiation and difference equations, matrices, applications in the biosciences. Programmable graphing calculator required.

M 261 04(4-0-0). Calculus for Physical Scientists III, F, S, SS.  
Prerequisite: M/M CC 161. Credit allowed for only one of the following sequences: M/M CC 141; M/M CC 155, M/M CC 255; M/M CC 160, M/M CC 161, M 261.  
Vector functions, partial differentiation, cylindrical and spherical coordinates, multiple integrals, line integrals, Green's theorem.

M 301 03(3-0-0). Introduction to Combinatorial Theory. F.  
Prerequisite: M/M CC 160.  
Matrices, orthogonal Latin squares, designs, difference sets, sets, binomial coefficients, inclusion and exclusion, recurrence, Ramsey's theorem, SDRs.

M CC 315 04(4-0-0). Mathematics for Economists. F.  
Prerequisite: M/M CC 141.  
Functions of several variables, matrix algebra, optimization, and applications to economics.

M 317 04(4-0-0). Advanced Calculus of One Variable. F, S, SS.  
Prerequisite: M/M CC 161.  
Convergence of sequences, series; limits, continuity, differentiation, integration of one-variable functions, development of skills for proving theorems.

M 331 03(3-0-0). Methods of Applied Mathematics I. F.  
Prerequisite: M 340 or M 345.  
Mathematical modeling, applied linear algebra, systems of linear and nonlinear ordinary differential equations, stability theory.

M 332 03(3-0-0). Methods of Applied Mathematics II. S.  
Prerequisite: M 340 or M 345; knowledge of a programming language.  
Open-ended projects with emphasis on problem identification and formulation, team approach, and reporting results.

M 340 04(4-0-0). Introduction to Ordinary Differential Equations. F, S, SS.  
Prerequisite: M/M CC 255 or M 261. Credit not allowed for both M 340 and M 345.  
First and second order equations, series, Laplace transforms, linear algebra, eigenvalues, first order systems of equations, numerical techniques.

M 345 04(3-2-0). Differential Equations. F, S, SS.  
Prerequisite: M/M CC 160 or M/M CC 255. Credit not allowed for both M 345 and M 340.  
First and second order equations, Laplace transforms, first order systems of equations, numerical methods, applied linear algebra, linearization.

M 350 04(3-2-0). Introduction to Numerical Analysis I. F.  
Prerequisite: M 340 or M 345; knowledge of a programming language.  
Systems of linear and nonlinear equations, matrix eigenvalue problems, interpolation, approximation, computing.

M 351 04(3-2-0). Introduction to Numerical Analysis II. S.  
Prerequisite: M 350.  
Numerical integration and differentiation, numerical solution of ordinary and partial differential equations, optimization problems, computing.

M 366 03(3-0-0). Introduction to Abstract Algebra. F, S, SS.  
Prerequisite: M/M CC 161.  
Sets, integers, polynomials, real and complex numbers, groups, integral domains, and fields; development of skills for proving theorems.

M 369 03(3-0-0). Linear Algebra. F, S, SS.  
Prerequisite: M/M CC 161, M 229.  
Vector spaces, linear transformations, matrices, similarity, eigenvalues and eigenvectors, canonical forms.
M 384 01(1-0-0). Supervised College Teaching. F, S. Prerequisite: M/M CC 161 or M/M CC 255 or M/M CC 315; written consent of instructor. Maximum of 1 credit allowed in course; may not be used to satisfy degree requirements in mathematics.

Skills for effective tutoring of precalculus mathematics, design and implementation of the Individualized Mathematics Program.

M 400-A-D 03(3-0-0). Topics in Mathematics. F, S. Prerequisite: Written consent of instructor. 

M 417 03(3-0-0). Advanced Multivariable Calculus. S. Prerequisite: M 261, M 317, M 369. Rigorous presentation of limits, continuity, differentiation and integration of functions of several variables.

M 419 03(3-0-0). Introduction to Complex Variables. F. Prerequisite: M 261. Analyticity, Cauchy integral theorem and formula, Taylor and Laurent series, residue calculus, conformal mapping and harmonic functions.

M 425 03(3-0-0). History of Mathematics. S. Prerequisite: M/M CC 161. Historical development of geometry, arithmetic, algebra, and calculus from ancient times to 20th century.

M 460 03(3-0-0). Information Integrity and Security. F. Prerequisite: M 369, M 301 or M 366. Modern algebra applied to information theory; finite fields; error correcting codes; computational complexity; one-way functions, cryptosystems.

M 466 03(3-0-0). Groups, Rings, and Fields. F. Prerequisite: M 366, M 369. Groups, rings, fields, isomorphism theorems, finite fields, Galois theory.

M 470 03(3-0-0). Euclidean and Non-Euclidean Geometry. S. Prerequisite: M/M CC 161. Topics from real Euclidean, affine metric and non-Euclidean geometries emphasizing methods and connections with other areas of mathematics.

M 484 Var [1-3]. Supervised College Teaching. F, S. Maximum of 6 credits allowed in course; may not be used to satisfy degree requirements requiring mathematics courses.

M 487 Var [1-16]. Internship.
A work-learning experience integrating classroom theory with practical experience.


M 501 03(3-0-0). Combinatorics I. F. Prerequisite: M 301 or M 366 or M 460. Permutations and combinations, generating functions, recurrence relations, inclusion-exclusion, Polya counting, connectedness and traversability.

M 502 03(3-0-0). Combinatorics II. S. Prerequisite: M 501. Trees, circuits, cutsets, planarity, domination and coloring, networks, matchings, designs, geometries, schemes.

M 505 03. Teaching Problem Solving in Mathematics K-12. F, S. Prerequisite: Teaching licensure or written consent of instructor. Offered as telecourse only. 
Problem-solving strategies, cooperative learning, and manipulatives for K-12 classroom.

M 510/EG 510(3-0-0). Linear Programming and Network Flows. F, S. Prerequisite: M 261 or M/M CC 315. Credit not allowed for both M 510 and EG 510.
Optimization methods, linear programming, simplex algorithm, duality, sensitivity analysis, minimal cost network flows, transportation problem.


M 518 03(3-0-0). Introduction to Mathematical Analysis II. S. Prerequisite: M 369, M 517. Sequences and series of functions. Differential and integral calculus of functions of several variables.

M 519 03(3-0-0). Complex Variables I. F. Prerequisite: M 317. Analytic functions, complex integration theory, singularities, elementary functions, and mappings.

M 520/EG 520 03(3-0-0). Nonlinear Programming. S. Prerequisite: EG 510/M 510. Credit not allowed for both M 520 and EG 520.
Theoretical, computational, practical aspects of nonlinear programming (NLP); unconstrained, constrained NLP; quadratic programming; large-scale NLP.

M 531 03(3-0-0). Discrete Models of Physical Systems. F. Prerequisite: M 340 or M 345. Discrete models for physical systems; systems of ordinary differential equations, applied linear algebra; introduction to finite elements.

M 532 03(3-0-0). Continuous Models of Physical Systems. S, SS. Prerequisite: M 340 or M 345. Credit not allowed for both M 532 and M 332.
Continuous models for physical systems, integral transforms, and eigenfunction expansions for solving partial differential equations.

M 540 03(3-0-0). Dynamical Systems. F. Prerequisite: M 369, M 417. Linear and nonlinear systems, orbits, phase space, flows of vector fields, stability, bifurcation theory, chaos, strange attractors and applications.

M 545 03(3-0-0). Partial Differential Equations I. F. Prerequisite: M 340 or M 345. Second order linear PDEs, elliptic and parabolic equations, equations of math physics, separation of variables, Fourier series.

M 546 03(3-0-0). Partial Differential Equations II. S. Prerequisite: M 545. Laplace's equation, Green's functions, complex variable methods, eigenfunction expansions.

M 550 03(3-0-0). Difference Methods-Partial Differential Equations. S. Prerequisite: M 532 or M 545; knowledge of a programming language.
Explicit, implicit methods for second order equations, higher-dimensional problems, stability analysis, method of characteristics.

M 560 03(3-0-0). Linear Algebra. F. Prerequisite: Written consent of instructor.
Finite dimensional vector spaces, inner products, dual spaces, transformations, projections, adjoints, norms, eigenvalues, eigenvectors.
M 561 04(4-0-0). Numerical Analysis I. S. Prerequisite: M 369 and preparedness to do programming in a standard language.

M 566 03(3-0-0). Introduction to Abstract Algebra I. F. Prerequisite: M 366.
Analysis of algebraic structures including groups, rings, fields, and vector spaces.

M 567 03(3-0-0). Introduction to Abstract Algebra II. S. Prerequisite: M 566.
Field theory, Galois theory, and advanced linear algebra.

M 570 03(3-0-0). Topology I. F. Prerequisite: Twelve credits of mathematics at 300 level or above.
Point-set topology including basic set theory, continuity, product and quotient spaces, metrization, compactness, and connectedness.

M 571 03(3-0-0). Topology II. S. Prerequisite: M 566, M 570.
Fundamental group, free groups and presentations, and manifolds.

M 584 01(1-0-0). Supervised College Teaching. F, S.

M 601 03(3-0-0). Advanced Combinatorics I. F. Prerequisite: M 502, M 566.
Special numbers, mobius inversions, transversals, partial orders, different sets, codes, t-designs.

M 602 03(3-0-0). Advanced Combinatorics II. S. Prerequisite: M 601.
Hypergeometric functions, graph algorithms, hadamard matrices, strongly regular graphs, association schemes.

M 617 04(4-0-0). Real Analysis I. S. Prerequisite: M 517.
Measure and integration, Fubini's theorem, Lp spaces, differentiation theory.

M 618 03(3-0-0). Real Analysis II. F. Prerequisite: M 560, M 617.
Normed linear spaces, Banach and Hilbert spaces, elements of functional analysis.

M 619 03(3-0-0). Complex Variables. S. Prerequisite: M 519.
Infinite products, entire functions, analytic continuation, Riemann surfaces, other topics.

M 620 03(3-0-0). Variational Methods and Optimization I. F. Prerequisite: M 518, M 566; or written consent of instructor.
Unconstrained and constrained infinite dimensional optimization, calculus of variations, applications.

M 621 03(3-0-0). Variational Methods and Optimization II. S. Prerequisite: M 620 or written consent of instructor.
Unconstrained and constrained infinite dimensional optimization, variational inequalities, Lagrange multipliers, control, applications.

M 640 03(3-0-0). Ordinary Differential Equations I. F. Prerequisite: M 340 or M 345, M 369, M 517.
Existence and uniqueness, continuation, continuous dependence, linear systems, and stability.

M 641 03(3-0-0). Ordinary Differential Equations II. S. Prerequisite: M 640.
Topics selected from nonlinear boundary value problems, periodic phenomena, differential operators, and others.

Abstract methods for linear partial differential equations.

*M 646 03(3-0-0). Advanced Partial Differential Equations II. S. Prerequisite: M 645.
Problems in nonlinear partial differential equations.

M 651 04(4-0-0). Numerical Analysis II. F. Prerequisite: M 369 and preparedness to do programming in a standard language.
Interpolation, approximation, quadrature, initial and boundary value problems.

*M 652 04(4-0-0). Finite Element Methods. S. Prerequisite: M 560.
Rayleigh-Ritz, Galerkin, and collocation methods, variational inequalities approximations over rectangles and triangles, applications and computing.

M 666 03(3-0-0). Advanced Algebra I. F. Prerequisite: M 567.
Theory of rings and algebras with applications.

M 667 03(3-0-0). Advanced Algebra II. S. Prerequisite: M 666.
Advanced topics from algebra: representation theory, Wedderburn theory, bilinear forms, multilinear and homological algebra.

*M 670 03(3-0-0). Introduction to Differential Manifolds. S. Prerequisite: M 518, M 560.
Finite-dimensional differential manifolds, submanifolds, vector fields and flows, Lie groups and algebras.

M 672 03(3-0-0). Projective Geometry I. F. Prerequisite: M 567 or written consent of instructor.
Algebraic sets in projective space, the Nullstellensatz, rational maps and functions, coordinate rings, Hilbert functions, dimension, degree.

M 673 03(3-0-0). Projective Geometry II. S. Prerequisite: M 672.
Topics selected from curves and surfaces, sheaf theory, algebraic geometry, singularity theory, vector bundles.

M 675A-J 03(3-0-0). Topics in Mathematics. S.

M 687 Var [1-9]. Internship.
A work-learn experience integrating classroom theory with practical experience.


M 775A-J 03(3-0-0). Topics in Mathematics. F.


M 667 03(3-0-0). Topics in Mathematics. S.


M 775A-J 03(3-0-0). Topics in Mathematics. F.


MICROBIOLOGY COURSES

Department of Microbiology
College of Veterinary Medicine and Biomedical Sciences

MB 149 03(3-0-0). The Microbial World. F.
Role of microorganisms in nature with emphasis on environmental, medical, food, and agricultural microbiology.

MBCC 192 02(0-0-1). Microbiology First-Year Seminar. F
Introduction to microbiology major and faculty; academic and career planning; information sources in biomedical sciences.

MB 275 02(1-0-1). Microcomputing Applications in Microbiology. S
Network software on MS-DOS microcomputers will be used to acquire and analyze data and information that are commonly encountered in microbiology.

MB 300 03(3-0-0). General Microbiology, F, S, SS.
Prerequisite: C 245 or C 341 or concurrent registration; BY/LSCC 102 or BC/BZCC 110 or BZ/BZCC 120. Structure, function, development, physiology, and molecular biology of microorganisms emphasizing bacteria.

MB 301 01(0-3-0). Fundamental Microbiology Laboratory Techniques. F.
Prerequisite: MB 300 or concurrent registration. Microbiological techniques for students in the physical sciences and engineering.

MB 302 02(0-4-0). General Microbiology Laboratory. F, S, SS.
Prerequisite: MB 300 or concurrent registration. Laboratory skills and techniques for isolating, characterizing, and identifying bacteria.

MB 334/FT 334 04(2-4-0). Food Microbiology. F.
Prerequisite: MB 301 or MB 302. Credit not allowed for both MB 334 and FT 334. Microorganisms in production of foods, in preservation and spoilage, and in food-borne diseases. Control of microorganisms in foods.

MB 342 04(0-4-1). Immunology. S, SS.
Prerequisite: MB 300. Principles of immunology, components of the immune system, interactions of humoral and cellular elements, and clinical applications of basic concepts.

MB 343 02(0-4-0). Immunology Laboratory. S.
Prerequisite: MB 301 or MB 302. MB 342 or concurrent registration. Techniques used in research and clinical immunology, including diagnostic problems solving and data analysis.

MB 350 03(3-0-0). Microbial Diversity. F.
Prerequisite: MB 300. Physiological, taxonomic, and phylogenetic aspects of microbial diversity. Yeasts and filamentous fungi as microbial entities.

MB 351 03(3-0-0). Medical Microbiology. S.
Prerequisite: MB 342. Bacteria and fungi - their role in human and veterinary diseases; host-parasite relationships; disease mechanisms, prevention, and therapy.

MB 352 03(0-6-0). Medical Microbiology Laboratory. S.
Prerequisite: MB 301 or MB 302; MB 351 or concurrent registration. Laboratory skills and techniques necessary for identifying medically important bacteria and fungi.

MB 384 Var 01-5. Supervised College Teaching. F, S, SS.
Maximum of 10 credits allowed in course.

MB 400 02(2-0-0).
Capstone in Microbiology. F.
Prerequisite: MB 420 or concurrent registration. Current topics in medical microbiology such as: medical microbiology, virology, environmental microbiology, biotechnology in microbiology.

MB 420 04(4-4-0). Medical and Molecular Virology. F.
Prerequisite: MB 342, BC 351 or BC 401 or concurrent registration. Principles of animal virology: structure, classification, assay, diagnosis, control, replication, genetics, host-parasite relationships.

MB 425 02(0-4-0). Virology and Cell Culture Laboratory. F.
Prerequisite: MB 301 or MB 302, MB 420 or concurrent registration. Isolation and characterization of viruses. Viral diagnostic and culture techniques.

MB 432 04(3-3-0). Aquatic Microbiology. S.
Prerequisite: MB 301 or MB 302.
Microorganisms and their functions in aquatic environments; effects of pollution on aquatic microbial communities; sanitary microbiology.

MB 436 04(2-4-0). Industrial Microbiology. F.
Prerequisite: MB 301 or MB 302. Use of microorganisms for producing commercially valuable products.

MB 443 04(3-0-1). Microbial Physiology. S.
Prerequisite: MB 300, BC 351 or BC 401.
Structure, function of bacterial constituents; comparison with other organisms. Bacterial growth, energy production, biosynthesis.

MB 450 03(3-0-0). Microbial Genetics. F.
Prerequisite: MB 300, BC 351 or BC 401 or concurrent registration. Principles of genetics at molecular level: mutation, recombination, complementation, suppression, control of gene expression, and recombinant DNA.

MB 462/BC 462/EN 462 05(3-4-0). Parasitology and Vector Biology. F.
Prerequisite: BY 103 or BC/BZCC 110; MB 301 or MB 302 or BC 212. Credit allowed for only one of the following: MB 462, BC 462, EN 462. Protozoa, helminths, and insects and related arthropods of medical importance, systematics, epidemiology, host damage and control.

MB 495 Var. Independent Study. Prerequisite: MB 300.

MB 498 Var. Research. Prerequisite: MB 301 or MB 302.

MB 500 01(0-0-1). Topics in Medical Microbiology. S.
Prerequisite: MB 420; MB 351 or concurrent registration. Current topics in medical microbiology and infectious disease.

*MB 530 03(3-0-0). Advanced Molecular Virology. S.
Prerequisite: BC 351 or BC 401; MB 450. Animal virus structure, replication; viral latency, oncogenicity, and genetics. Comparative virology.
MB 533/EH 533 03(2-0-1). Epidemiology of Infectious Diseases/Zoonoses. S. Prerequisite: MB 300. Credit not allowed for both MB 533 and EH 533. Epidemiologic features of infectious and parasitic diseases that have a major impact on community medicine.

MB 550 04(2-6-0). Microbial and Molecular Genetics Laboratory. S. Prerequisite: MB 301 or MB 302; MB 450, written consent of instructor. Use of both in vivo genetics and in vitro molecular techniques to study gene structure, function, and regulation in bacteria.

MB 562/BZ 562/EN 562 05(1-8-0). Field Ecology of Disease Vectors. S. Prerequisite: MB 462/BZ 462/EN 462 or MB 300, EN 302. Credit allowed for only one of the following: MB 562, BZ 562, EN 562. Evolution, morphology, life cycles, and field biology of disease vectors; field techniques and experience in surveillance of arthropods and pathogens.

MB 575/EN 575 03(3-0-0). Molecular Entomology. F. Prerequisite: Twelve credits in biology, cell biology, genetics, or microbiology. Credit not allowed for both MB 575 and EN 575. Application of molecular and biotechnologies to entomological topics.

MB 576/EN 576 03(1-0-1). Bioinformatics. F. S. Prerequisite: BC 463 or BY 310 or CM 501 or EN 575/MB 575 or MB 450. Concurrent registration in EN 575 with instructor consent. Access to campus network. Credit not allowed for both MB 576 and EN 576. Technical computing across platforms using bioinformatics tools in molecular analyses.

MB 578/BZ 578 04(3-0-1). Genetics of Natural Populations. F. Prerequisite: One course in genetics, one course in statistics. Credit not allowed for both MB 578 and BZ 578. Theoretical and empirical aspects of the genetics of natural populations; current molecular techniques and statistical analysis.

MB 579/BZ 579 04(0-8-0). Laboratory in Population Genetics. F. Prerequisite: MB 578/BZ 578 or written consent of instructor. Credit not allowed for both MB 579 and BZ 579. Special fee, $50. Molecular and statistical techniques in discrete and quantitative genetics. Students design and complete practical exercises.

MB 624 02(1-0-1). Microbial Ecology. F. Prerequisite: MB 300 or relevant ecology course. Concepts in ecology as applied to microbial systems including analysis of communities, interactions, and biogeochemical cycling.

MB 630 03(1-0-0). Advances in Microbial Physiology. F. Prerequisite: MB 443. Contemporary developments in bacterial structure, function, metabolism, and genetics.

MB 636 04(3-0-1). Mechanisms of Viral Infection and Disease. S. Prerequisite: MB 420 or MB 530. Cytopathic mechanisms, pathogenic events in viral diseases; host response and antiviral immunity; cancer induction by DNA and RNA viruses.

MB 651 03(3-0-0). Immunobiology. F. Prerequisite: MB 342. Structure, function, regulation of immunoglobulins and the immune system. Cellular immunity including transplantation and cancer.


MB 700 01(1-0-0). Topics in Microbiology. F. S. Prerequisite: MB 350. Current literature in bacteriology, virology, genetics, and immunology.

MB 720 02(1-3-0). Methods in Carbohydrate Analysis. S. Prerequisite: C 343. Structural analysis of complex carbohydrates using gas chromatography, mass spectrometry, and nuclear magnetic resonance.

MB 740 03(2-0-1). Microbial and Molecular Genetics. S. Prerequisite: MB 450. Molecular biology and genetics of prokaryotic and eukaryotic cells and their viruses; strategies for genetic manipulation.


MB 784 Var. Supervised College Teaching. F, S. SS.

MB 792 01(0-0-1). Seminar.

MB 795 Var. Independent Study.


MANUFACTURING TECHNOLOGY AND CONSTRUCTION MANAGEMENT COURSES

Department of Manufacturing Technology and Construction Management
College of Applied Human Sciences

MC 110 02(1-0-1). Team Problem Solving and Leadership. F, S, SS. Special fee, $5-10. Current and emerging tools, skills, and techniques of leadership and systems improvement utilized by modern organizations emphasizing team approach.

MC 131 03(1-4-0). Graphic Communications/CAD. F. S. SS. Special fee, $3. Reading technical drawings, manual drafting techniques, reprographic technologies. CAD applications are introduced.

MC 136 03(1-4-0). Computer-Aided Design. F, S, SS. Prerequisite: BD 150 or written consent of instructor. Also offered as correspondence course and online course. Introduction to and application of computer-aided design and drafting software. Applications using the latest release of AutoCAD.

MC 141 02(1-0-1). Application of Energy/Transportation. F. S. Explores how natural resources are converted into energy used for transportation and environmental control.


MC 210 03(2-2-0). Quality Improvement Techniques. F. S. Decision-making tools utilized in quality assessment and improvement efforts in modern organizations.

MC 231 02(1-2-0). Architectural Plan Reading. F, S, SS. Prerequisite: MC 131, MC 151. Architectural plan reading, representation, scale, coordination, and accuracy.

MC 234 03. Advanced Computer-Aided Design (CAD). F, S. SS. Prerequisite: Knowledge of CAD fundamentals. Offered as correspondence course only. Advanced computer-aided drafting and design software utilization.

MC 235 02(1-2-0). Construction Graphics. F. S. Prerequisite: MC 131, MC 231 or concurrent registration. Interior Design students must be approved for advancement to 2nd year level. Special fee, $3. Technical drawing principles; techniques for producing building site plans, floor plans, elevations, sections, and interior details.


MC 242 03(2-2-0). Analog and Digital Electronics. F. S. SS. Prerequisite: MC 241. Special fee, $10. Theories and applications of analog and digital electronics.


MC 261 03(2-3-0). Construction Surveying. F, S, SS. Prerequisite: M/M CC 125. Special fee, $10. Surveying fundamentals to field of construction, building layout, measurement procedures, vertical controls, line and grade, surveying, instrument operation.

MC 310 03(2-2-0). Process Planning and Costing. S. Prerequisite: MC 210. Application of project management software to manufacturing process planning and costing in areas such as new product introduction or plant layout.

MC 317 02(2-0-0). Safety Management. F, S. Safety management in a) industrial, b) construction, or c) school environments.

MC 318 03(2-2-0). Manufacturing Facilities Planning. F, S. Prerequisite: JT/JTCC 300 or JT 301, BI 300, SP/SPCC 200. Designing, planning, equipping, and organizing manufacturing facilities.

MC 331 03(3-0-0). Structure Influence on Tactics and Strategy, F. S. Prerequisite: Admission to fire service emphasis of technology education and training. Offered only through the Division of Educational Outreach. How construction type, alterations, design and materials influence a building's reaction to fire. Fireground influence on tactics and strategy.

MC 332 03(3-0-0). Fire Suppression Leadership. F. S. Prerequisite: Admission to fire service emphasis of technology education and training. Offered only through the Division of Educational Outreach. Management of large-scale emergency incidents, including mitigation strategies and organizational management of resources and personnel.

MC 333 03(2-0-1). Proposals/Reports in Fire Service Management. F, S, SS. Prerequisite: Admission to fire service emphasis of technology education and training. Offered only through the Division of Educational Outreach. Process of preparing reports and developing a proposal supported by research. Introduction to research techniques, Internet and library use, conventions of documentation.

MC 334 01(1-0-0). Career Development Portfolio. F, S, SS. Prerequisite: Admission to fire service emphasis of technology education and training. Offered only through the Division of Educational Outreach. Demonstration of knowledge, skill, and professional experience for the purpose of enhancing documentation and career development skills.

MC 342 03(2-2-0). Industrial Controls. F. S. Prerequisite: MC 242. Special fee, $15. Industrial electronic control devices emphasizing programmable controllers and devices for control applications.


MC 353 03(2-2-0). Industrial Plastics. F, S, SS. Prerequisite: C/CCC 104; MC 251. Special fee, $20. Sources, structures, applications, and processing of industrial plastics.

MC 354 03(1-4-0). Advanced Manufacturing Processes-Woods. F. S. Prerequisite: MC 251. Special variable ($50-$100) fee determined by department. Material properties and advanced manufacturing processes as they impact the methodologies and costs of manufacturing wood-based products.

MC 361 03(3-0-0). Mechanical and Electrical Systems. F. S. Prerequisite: MC 241. Systems approach to the functions and components of electrical, plumbing, heating, ventilating, and cooling systems.

MC 362 02(2-0-1). Construction Contracts. F. S. Prerequisite: MC 231. Commercial construction planning, bidding, and contract administration.

MC 363 02(1-2-0). Quantity Surveying. F, S. Prerequisite: MC 231 or concurrent registration. Fundamentals of quantity surveying based on small examples for different Construction Specification Institute (CSI) divisions.


MC 366 03(2-2-0). Construction Equipment and Methods. F. S. Prerequisite: MC 261, MC 365 or concurrent registration. Equipment/methods in heavy and highway construction: equipment selection, productivity, and costs. Infrastructure, tunneling, and trenchless technology.
MC 384 Var [1-5]. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course.

MC 386D-F Var [1-3]. Practicum. Prerequisite: Admission to Teacher Licensure Program.


Evaluation and application of modern manufacturing management strategies for continuous organizational improvement in a competitive global economy.

MC 438 03(2-0-1). Industrial Processes and Fire Protection. F, S, SS. Prerequisite: Admission to fire service emphasis of the technology education and training program. Offered only through the Division of Educational Outreach.

Industrial processes and fire protection managed by fire and safety personnel.

MC 431 03(3-0-0). Fire Department Response-Community Violence. F, S. Prerequisite: CE 359, MC 233, Me 352. Special fee, $20.

Use of electronic devices and systems in controlling and monitoring manufacturing operations.


Computer-aided design (CAD) and computer-aided programming (CAP) for manufacturing process applications.

MC 461 03(2-2-0). Construction Project Scheduling and Cost Control. F, S. Prerequisite: MC 342. Special fee, $15.

Strategies and techniques for efficient scheduling of project activities and control of project costs; emphasis on Critical Path Method.

MC 462 03(3-0-0). Financial Management for Construction. F, S. Prerequisite: BA 205, BN 305.

Financial statements, financial ratios, applications of engineering economy, cash flow analysis, construction financing, and cost information systems.

MC 464 02(1-2-0). Construction Project Administration. F, S. Prerequisite: MC 362, MC 461 or concurrent registration.

Administrative procedures, planning processes, and coordination required to successfully complete construction projects on time and budget.

MC 463 02(1-4-0). Construction Management Professional Practice. F, S. Prerequisite: MC 461, MC 464, MC 487A, MC 462 or concurrent registration. Construction management majors only.

Professional practice using an understanding of the contractual and working relationships among all participants in the design/construction process.

MC 473 03(1-4-0). Technology Applications. F. Prerequisite: MC 241, MC 251. Special fee, $5.

Integration of concepts of mathematics and science with technology, industrial processes, and career demands.

MC 474 03(1-4-0). Product Development and Manufacturing. S. Prerequisite: MC 352 or MC 354 for technology education and training majors; MC 452 for industrial technology management majors. Special variable ($15-$45) fee determined by department.

Industrial organization, materials, processes, and products; product development and manufacturing.


MC 501A-C Var [1-3]. Special Problems in Technology Education. F, S, SS. Prerequisite: A) MC 354. Special variable ($40-$57) fee per subtopic determined by department.


MC 530 03(1-2-0). Computer-Aided Design Applications. F, SS. Prerequisite: Written consent of instructor. Advanced CAD techniques: 3-D modeling, I/O devices, design, and analysis.

MC 540 03(1-2-0). Manufacturing Planning and Administration. F, SS. Prerequisite: MC 352.

New techniques of machining and fabricating processes.

MC 555 03(3-0-0). Manufacturing Planning and Administration. F. Prerequisite: Written consent of department head.

Manufacturing processes and procedures involving equipment, facilities, and personnel.

MC 560 03(3-0-0). Advanced Construction Management. F. Prerequisite: MC 461 or written consent of instructor.

Construction project management at corporate level; survival/failure of construction organizations.

MC 561 03(3-0-0). Cost, Productivity, and Financial Control. S. Prerequisite: BA 205, MC 461.

Optimizing time-cost restraints; controlling expenditures; account code designations; reporting systems.

MC 562 03(3-0-0). Trends in Project Development. F. Prerequisite: MC 461.

Analysis of construction markets; strategic planning for growth; project development and financing; public relations for construction.

MC 564 03(2-2-0). Microcomputer Applications in Industry. F, S, SS. Prerequisite: CS 110 or written consent of instructor.

Use of microcomputers and software applications currently used in construction, manufacturing, and educational environments.

MC 565 03(3-0-0). Legal Aspects of Construction Process. F. Prerequisite: MC 560.

Common points of dispute; methods of avoiding disputes among owner, architect, engineer, and contractor.

MC 570 03. Grantsmanship and Proposal Writing. F, S, SS. Offered as correspondence course only. Mechanics of proposal writing, including intangibles of the grant-seeker's art.

MC 590B-J Var. Workshop. Special variable (330-560) fee per subtopic determined by department.

MC 592 Var. Seminar.

MC 600 03(3-0-0). Research Methods. F.
Identification, analysis of research problems in applications of technology.

MC 610 03(3-0-0). Industry Management Planning and Communication. S. Prerequisite: Admission to industrial sciences graduate program or written consent of instructor. Principles and applications of industrial management.

MC 671 02(2-0-0). Facility Planning. S, SS. Prerequisite: Admission to MC master's program or written consent of instructor. Planning and organizing technology laboratories for elementary, secondary, and community college facilities.

MC 672 02(2-0-0). Technology Curriculum Development. S, SS. Curriculum development and organization, task analysis, accountability, and evaluation utilizing interdisciplinary and clustering approach.

MC 674 03(3-0-0). Trends in Technology Education. F, SS. Philosophy, principles, objectives of technology education; significant historical movements and their impact on contemporary programs.

MC 677 02(2-0-0). Administration in Industrial Sciences. F, SS. Administration, supervision, management, and planning techniques necessary for successful operation of industrial sciences.

MC 684 Var. Supervised College Teaching. F, S, SS.

ME 120 01(2-2-0). Introduction to Computer-Aided Design. S. Prerequisite: ME 121 or concurrent registration. 3-D visualization, solid modeling of parts and assemblies, drawing production and drafting practice.

ME 121 01(0-0-1). Mechanical Engineering Shop Practicum. F, S, SS. Basic hand tools, cutting, grinding, the lathe mill; introduction to numerical control, shop safety.

MECC 192 02(1-2-0). Introduction to Mechanical Engineering. F. Restricted to first-year students in mechanical engineering. History and development of engineering disciplines with specific emphasis on mechanical engineering, the mechanical engineer in the information age.

ME 237 03(3-0-0). Introduction to Thermal Sciences. F, S. Prerequisite: PH/PHCC 142. First and second laws of thermodynamics, properties of materials, energy conversion, statistical aspects, heat transfer.

ME 259 02(2-0-0). Computer Applications in Mechanical Engineering. S. Prerequisite: M/M CC 161. Use of digital computers in instrumentation, control, and analysis.

ME 304 03(3-0-0). Engineering Design. S. Prerequisite: ME 250. Design fundamentals, including design processes, project planning, creativity, manufacturing, and human factors.

ME 307 04(3-3-0). Mechatronics and Measurement Systems. F. Prerequisite: CE 261, EE 204, M 340, ME 250. Instrumentation and measurement systems analysis and design; sensors and actuators; computer data acquisition and control.

ME 324 04(3-2-0). Dynamics of Machines. F. Prerequisite: CE 261, concurrent registration in M 340. Analysis and synthesis of moving machinery.

ME 325 03(3-0-0). Machine Design. F, S. Prerequisite: CE 360. Design of mechanical components to avoid failure during operation. Stress analysis, failure theories, and specific mechanical components in design context.

ME 331 04(3-2-0). Introduction to Engineering Materials. F, S. Prerequisite: C/C CC 112, C 113, PH/PHCC 142. Characteristics of metallic, plastic, and ceramic material; basic principles which relate properties of materials to their atomic and microstructure.

ME 337 03(3-0-0). Thermodynamics. F, S. Prerequisite: M 261, ME 237. First and second laws, characteristic functions, power and refrigeration cycles, introduction to statistical thermodynamics, applications.

ME 338 01(0-3-0). Thermosciences Laboratory. F, S. Prerequisite: ME 344 or concurrent registration. Experimental methods in heat transfer, fluid flow, and thermodynamics.

MECHANICAL ENGINEERING COURSES
Department of Mechanical Engineering
College of Engineering

ME 120 01(2-2-0). Introduction to Computer-Aided Design. S. Prerequisite: ME 121 or concurrent registration. 3-D visualization, solid modeling of parts and assemblies, drawing production and drafting practice.

ME 121 01(0-0-1). Mechanical Engineering Shop Practicum. F, S, SS. Basic hand tools, cutting, grinding, the lathe mill; introduction to numerical control, shop safety.

MECC 192 02(1-2-0). Introduction to Mechanical Engineering. F. Restricted to first-year students in mechanical engineering. History and development of engineering disciplines with specific emphasis on mechanical engineering, the mechanical engineer in the information age.

ME 237 03(3-0-0). Introduction to Thermal Sciences. F, S. Prerequisite: PH/PHCC 142. First and second laws of thermodynamics, properties of materials, energy conversion, statistical aspects, heat transfer.

ME 259 02(2-0-0). Computer Applications in Mechanical Engineering. S. Prerequisite: M/M CC 161. Use of digital computers in instrumentation, control, and analysis.

ME 304 03(3-0-0). Engineering Design. S. Prerequisite: ME 250. Design fundamentals, including design processes, project planning, creativity, manufacturing, and human factors.

ME 307 04(3-3-0). Mechatronics and Measurement Systems. F. Prerequisite: CE 261, EE 204, M 340, ME 250. Instrumentation and measurement systems analysis and design; sensors and actuators; computer data acquisition and control.

ME 324 04(3-2-0). Dynamics of Machines. F. Prerequisite: CE 261, concurrent registration in M 340. Analysis and synthesis of moving machinery.

ME 325 03(3-0-0). Machine Design. F, S. Prerequisite: CE 360. Design of mechanical components to avoid failure during operation. Stress analysis, failure theories, and specific mechanical components in design context.

ME 331 04(3-2-0). Introduction to Engineering Materials. F, S. Prerequisite: C/C CC 112, C 113, PH/PHCC 142. Characteristics of metallic, plastic, and ceramic material; basic principles which relate properties of materials to their atomic and microstructure.

ME 337 03(3-0-0). Thermodynamics. F, S. Prerequisite: M 261, ME 237. First and second laws, characteristic functions, power and refrigeration cycles, introduction to statistical thermodynamics, applications.

ME 338 01(0-3-0). Thermosciences Laboratory. F, S. Prerequisite: ME 344 or concurrent registration. Experimental methods in heat transfer, fluid flow, and thermodynamics.
ME 342 03(3-0-0). Mechanics and Thermodynamics of Flow Processes. F. S. Prerequisite: M 340; ME 337 or concurrent registration.
   Engineering details of viscous flow with losses, measurements, compressibility, turbomachinery, convective heat transfer.

ME 344 03(3-0-0). Heat and Mass Transfer. F. S. Prerequisite: ME 342.
   Transport and rate processes, laws of heat and momentum transfer, conduction in solids, radiation, convection principles, change of phase, application.

ME 408 03(2-0-1). Manufacturing Simulation. F. Prerequisite: M 340, ME 250.
   Design of simulation models for manufacturing and other engineering systems.

ME 409 03(2-0-1). Manufacturing Quality Design and Control. S. Prerequisite: M 340, ME 250.
   Design of decision-making models for industrial engineering.

ME 410 02(2-0-0). Engineering Economy for Engineers. F. Prerequisite: M 261.
   Economic evaluation of engineering projects.

ME 411 03(3-0-0). Manufacturing Engineering. S. Prerequisite: CE 360, ME 331.
   Casting, forming, machining, and welding processes used in manufacturing operations.

ME 417 03(2-2-0). Control Systems. F. Prerequisite: M 340, ME 304.
   Feedback and forward loop control design and simulation; discrete time and frequency domain methods with implementation considerations.

ME 424 03(3-0-0). Advanced Dynamics. S. Prerequisite: ME 324.
   Kinematics and dynamics of rigid bodies, Hamilton's principle and Lagrange's equations for lumped parameter extended bodies and distributed systems.

ME 431 03(0-0-0). Metals and Alloys. F. Prerequisite: ME 331.
   Engineering metals and alloys, modification of properties by alloying, plastic deformation, and heat treatment. Fundamentals of physical metallurgy.

ME 437 03(2-0-1). Internal Combustion Engines. F. Prerequisite: ME 344.
   Application of thermodynamics, heat transfer, and fluid mechanics to internal combustion engines.

ME 446/CB 466 04(3-2-0). Design of Off-Highway Vehicles. S.
   Design of off-highway vehicles, tillage, and earthmoving machinery.

ME 444 03(2-0-1). Engineering Applications of Heat and Mass Transfer. F. Prerequisite: ME 344.
   Design and analysis of thermal devices, mass transfer, natural convection, solar collectors, heat exchangers; group design project.

ME 448/EV 448 03(3-0-0). Pollution Prevention. F. Prerequisite: CB 331 or CE 300 or ME 342. Credit not allowed for both ME 448 and EV 448.
   Prevention of environmental problems by modification of industrial processes.

ME 460 03(3-0-0). Aeronautics. S. Prerequisite: ME 342.
   Thermodynamics and fluid mechanics principles applied to the mechanics, aerodynamics, performance, stability, and control of airplanes.

ME 463 03(2-0-0). Building Energy Systems. S. Prerequisite: ME 344. Credit not allowed for both ME 463 and ME 676.
   Comfort, psychrometrics, leaks, solar radiation, heating and cooling system design, transport, solar system design, economics.

ME 467 03(3-0-0). Energy Conversion Engineering. F. Prerequisite: ME 237, EE 204.
   Energy resources and consumption patterns; direct and conventional energy conversion systems and components; economic considerations.

ME 486A-B 03(12-0). Engineering Design Practicum. A) F. B) S.
   Prerequisite: AE 363, ME 304, ME 307, ME 324, ME 325, ME 331, ME 338, ME 344. ME 486A.
   A) Practicum I. B) Practicum II. Capstone engineering design project; transition experience to the mechanical engineering profession in industry and graduate education.

ME 495 Var. Independent Study.

ME 504 03(3-0-0). Advanced Engineering Design. F. Prerequisite: ME 486B.
   Systematic design process and various design methodologies, design projects.

*ME 510 03(2-0-1). Capital Budgeting. S. Prerequisite: ME 410.
   Independence among proposals, minimum attractive rate of return, continuous and discrete cash flows, complete and incomplete information.

*ME 511 02(2-0-0). Total Quality Control. F. Prerequisite: ST/STCC 301 or ST/STCC 309.
   Total Quality Management (TQM) using ISO 9001 as a guideline.

ME 512 02(2-0-0). Reliability Engineering. F. Prerequisite: ME 511 or concurrent registration.
   Models to predict time to failure of mechanical or electronic devices.

ME 513 03(4-0-0) Simulation Fundamentals. F, S, SS. Prerequisite: ST/STCC 309.
   Theoretically based and commercial simulation languages, input processes, statistics, interdependencies, manufacturing and service operations.

ME 514 03(2-2-0). Manufacturing and Robotic Systems. S. Prerequisite: ME 417.
   Examination of electromechanical systems of manufacturing applications and robotics.

ME 520 04(3-3-0). Computer-Aided Engineering. F. Prerequisite: M 340 or written consent of instructor.
   Techniques for computer modeling of engineering objects, analysis, and display.

ME 524 03(3-0-0). Principles of Mechanics. F. Prerequisite: ME 324.
   Kinematics and dynamics of rigid body motion, Lagrangian and Hamiltonian formulations of mechanics; applications to engineering problems.

ME 529 03(3-0-0). Advanced Mechanical Systems. S. Prerequisite: ME 307, ME 424.
   Modeling, analysis, and synthesis of practical mechanical devices in which dynamic response is dominant consideration.

ME 530 03(3-0-0). Advanced Composite Materials. F. Prerequisite: CE 363, ME 300, ME 331.
   Materials aspects of advanced composite constituents and how their combination yields synergistic results.

ME 531 03(0-0-0). Materials Engineering. S. Prerequisite: ME 331 or ME 431.
   Structure engineering materials and their selection on basis of property, processing, and economic considerations.
Failure mechanisms from materials viewpoint with emphasis on use in design. Fracture, creep, fatigue, and corrosion.

Statistical interpretations of first, second, and third laws; irreversible thermodynamics; quantum statistics.

First and second laws of thermodynamics applied to engineering devices and systems. Introduction to availability, exergy, and lost work analysis.

Characteristics of real gases in reacting and nonequilibrium systems; equilibrium air; statistical mechanics; chemical thermodynamics.

Combustion processes: explosions, detonations, flame propagation, ignition, generation of pollutants in moving and stationary energy conversion systems.

Analysis of space flight missions and propulsion systems.

Abatement of emissions from mobile and stationary sources; monitoring, dispersion, air quality standards, electrostatic precipitation, energy consumption.


Physical processes in broad-beam electron-bombardment ion sources for space propulsion and ion machining applications.

Biomechanics. Mathematical approach to analysis of living systems, their function, diseases, and replaceable parts.

Structure-function relationships of natural biomaterials; application to analysis of biometric materials and biomaterials used in medical devices.

Various design theories, design constraint management, and optimal solution using classical and artificial intelligence techniques.

Advanced topics in concurrent engineering, design for manufacture, and new product development.

Advanced applications in computer-aided engineering. Parametric and variational geometry, feature representation, non-manifold modeling.

Stress distribution near cracks; energy criteria for fracture; design criteria; fracture toughness testing.

Radiation fundamentals; properties, spectral, directional variations; transfer between surfaces; participating media; numerical, Monte Carlo methods.

Fundamentals; conservation, constitutive equations; second law, forced, free convection; internal, external flows; laminar, turbulent flows.

Theory and applications of internal combustion engines. Alternative fuels, engine control, and pollution prevention.

Solar radiation, flat-plate and concentrating collectors, energy storage, space heating and cooling, power generation, agricultural applications.

Credit not allowed for both ME 676 and ME 463.

Advanced applications in computer-aided engineering. Parametric and variational geometry, feature representation, non-manifold modeling.

Stress distribution near cracks; energy criteria for fracture; design criteria; fracture toughness testing.

Radiation fundamentals; properties, spectral, directional variations; transfer between surfaces; participating media; numerical, Monte Carlo methods.

Fundamentals; conservation, constitutive equations; second law, forced, free convection; internal, external flows; laminar, turbulent flows.

Theory and applications of internal combustion engines. Alternative fuels, engine control, and pollution prevention.

Solar radiation, flat-plate and concentrating collectors, energy storage, space heating and cooling, power generation, agricultural applications.

Credit not allowed for both ME 676 and ME 463.

Advanced applications in computer-aided engineering. Parametric and variational geometry, feature representation, non-manifold modeling.

Stress distribution near cracks; energy criteria for fracture; design criteria; fracture toughness testing.

Radiation fundamentals; properties, spectral, directional variations; transfer between surfaces; participating media; numerical, Monte Carlo methods.

Fundamentals; conservation, constitutive equations; second law, forced, free convection; internal, external flows; laminar, turbulent flows.

Theory and applications of internal combustion engines. Alternative fuels, engine control, and pollution prevention.

Solar radiation, flat-plate and concentrating collectors, energy storage, space heating and cooling, power generation, agricultural applications.

Credit not allowed for both ME 676 and ME 463.

Advanced applications in computer-aided engineering. Parametric and variational geometry, feature representation, non-manifold modeling.

Stress distribution near cracks; energy criteria for fracture; design criteria; fracture toughness testing.

Radiation fundamentals; properties, spectral, directional variations; transfer between surfaces; participating media; numerical, Monte Carlo methods.

Fundamentals; conservation, constitutive equations; second law, forced, free convection; internal, external flows; laminar, turbulent flows.

Theory and applications of internal combustion engines. Alternative fuels, engine control, and pollution prevention.

Solar radiation, flat-plate and concentrating collectors, energy storage, space heating and cooling, power generation, agricultural applications.

Credit not allowed for both ME 676 and ME 463.

Advanced applications in computer-aided engineering. Parametric and variational geometry, feature representation, non-manifold modeling.
ME 729 03(3-0-0). Special Topics in Mechanics and Materials. S. Prerequisite: ME 524 or ME 530. Advanced topics in discipline of engineering mechanics and materials; associated analysis and manufacturing techniques.

*ME 744 03(3-0-0). Advanced Topics in Heat Transfer. F. Prerequisite: ME 644 or ME 645 or ME 646 or written consent of instructor. Advanced numerical methods; two-phase flow; experimental, asymptotic, perturbation, and variational methods.

*ME 752 03(3-0-0). Physical Gas Dynamics II. S. Prerequisite: ME 551. Flows with chemical and vibrational rate processes, nonequilibrium kinetic theory, flow with translational nonequilibrium radiative heat transfer in gases.

ME 784 Var. Supervised College Teaching. F. S. SS.


MILITARY SCIENCE COURSES

Department of Military Science

+MS 110 02(2-0-0). Military Skills I. F. S. Special fee, $20. Leadership principles and techniques; first aid; weapons common to U.S. forces; rifle marksmanship; branches of the Army; physical fitness training.

+MS 121 02(2-0-0). Military Skills II. S. Special fee, $20. Small unit leadership; survival techniques; knots, rappelling; map reading, land navigation; plant/animal identification; physical fitness training.

+MS 210 02(2-0-0). Contemporary Management Principles. F. Special fee, $20. Leadership assessment; principles of war; small unit operations; basic management skills; oral communication; counseling/behavioral evaluation techniques.

+MS 221 02(2-0-0). Dynamics of Military Operations. S. Special fee, $20. Operation orders; theories of conflict; small unit operations; troop leading procedures; observing and classifying behavior; physical fitness training.

MS 250 03(3-0-0). Basic Camp I. SS. Organization, role of defense establishment; map reading; land navigation; basic military skills; communication; time management techniques; first aid.

MS 294 Var [1-2]. Independent Study. Prerequisite: MS 110, MS 121.

MS 295 Var [1-2]. Independent Study.

+MS 310 03(3-1-0). Leadership Assessment. F. Special fee, $50. Leadership theory review; leadership assessment program to further develop leadership and management skills; physical fitness training.

+MS 320 03(3-1-0). Applied Leadership. S. Prerequisite: MS 310 or written consent of instructor. Special fee, $50. Command and staff functions; operations orders; tactical unit operations; military skills; physical fitness training; field training exercises.

MS 386 05(2-6-0). Advanced Camp Practicum. SS. Prerequisite: MS 320. Theories and principles applied to actual field situations.

MS 395 Var [1-3]. Independent Study. Leadership theory and skills as applied to the military.

MS 401/401 03(3-0-0). The American Military Experience. F, S. Credit not allowed for both MS 401 and HY 401. Role of the armed forces in American society; development of military traditions, institutions, and practices.

+MS 420 03(3-1-0). Role and Ethics of the Officer. S. Prerequisite: MS 320, MS 401(HY 401). Special fee, $50. Role of the officer; ethics and professionalism; military justice; law of land warfare; preparation for active duty; military fitness training.

+MS 492 02(0-1-1). Seminar. Special fee, $50. Military staff functions and issues in leadership.

MS 495 Var [1-3]. Independent Study. Role of the Army officer; ethics, professionalism, military justice, and law of land warfare.

MUSIC COURSES

Department of Music, Theatre, and Dance

College of Liberal Arts

MUCC 100 03(3-0-0). Music Appreciation. F. S. SSS. Previous musical training not necessary. Survey of music from a wide range of periods and styles.

MUCC 111 03(3-0-0). Music Theory Fundamentals. F. S. SS. For nonmusic 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.

MU 117 04(3-0-0). Music Theory I. F. Prerequisite: MU, MUCC 111 or satisfactory completion of placement examination. Introduction to diatonic harmony and part-writing; basic sight-singing, ear training, and keyboard harmony skills.

MU 118 04(3-0-0). Music Theory II. S. Prerequisite: MU 117. Four-part diatonic writing; diatonic modulation; diatonic sight singing, ear training, and keyboard harmony skills.

MU 150 02(2-0-0). Piano Class I. F. S. SSS. Basic piano technique; keyboard harmony and music rudiments.

MU 151 02(2-0-0). Piano Class II. F. S. Prerequisite: MU 150. Intermediate piano technique; introduction to ensemble playing.

MU 152 02(2-0-0). Piano Class III. S. S. Prerequisite: MU 151. Advanced piano techniques; further development of technical skills.

MU 153 02(2-0-0). Piano Class IV. F. S. Prerequisite: MU 152. Practical application of piano skills as a teaching tool in the classroom.
MU 155 02(2-0-0). Guitar Class I. F. S. S.S. 
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. S. 
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.

MUCC 192 03(0-0-3). Introduction to Music History and Literature. F. S. 
Landmarks of music history and literature from 1300 to the present.

MU 200 01(0-3-0). Women's Chorus. F. S. 
Rehearsal and performance of a variety of types and styles of music for women's voices.

MU 204 01(0-3-0). Marching Band. F. S. 
Marching routines utilizing popular and jazz musical idioms with performances at all home football games and other athletic events.

MU 217 04(3-3-0). Music Theory III. F. Prerequisite: MU 118. 
Harmonic language of the 18th and early 19th centuries; diatonic and chromatic sight singing, ear training, and keyboard harmony skills.

MU 218 04(3-3-0). Music Theory IV. S. Prerequisite: MU 217. 
19th- and 20th-century systems of composition and analysis; chromatic, modal, and atonal sight singing, ear training, and keyboard harmony skills.

MU 220 03(3-0-0). Music of Black Americans. S. 
Music indigenous to or composed by Black Americans.

MUCC 231 03(3-0-0). Women in Music. F. 
Examination of the role of women in music from historical and societal perspectives.

MU 241 03(3-0-0). Introduction to Music Therapy. F. 
Overview of music therapy, related helping professions, and problems in human functioning; emphasizes basic skills for managing behavior problems.

MU 250 02(2-0-0). Music Therapy Practice. F. 
Development of fundamental interactive and professional skills used in music therapy practice.

MU 252A-G 01(0-2-0). Instrumental Techniques. F. S. 

MU 254 02(2-0-0). Beginning Conducting. S. Prerequisite: MU 117. 
Basic conducting patterns and techniques.

MU 265A-B 01(2-0-2). Singers Diction. 
 Pronunciation of each language for singing; basic vocabulary from song poetry of each language; use of the International Phonetic Alphabet. *A) German/English. S. *B) French/Italian. S. Prerequisite: MU 205A.

MU 272A-V Var [1-2]. Applied Music Instruction. F. S. Corequisite: Any music ensemble. One or two half-hour lessons per week and one hour weekly performance class.


MU 286 01(0-2-0). Practicum-Music Education. 
MU 301 01(0-3-0). University Chorus. F. S. 
Rehearsal and performance of a variety of types and styles of music for mixed voices.

MU 302 01(0-3-0). University Orchestra. F. S. 
Rehearsal and performance of standard orchestral literature.

MU 304 01(0-3-0). Symphonic Band. F. S. SS. Prerequisite: Written consent of instructor. Preparation for public performance of full symphonic instrumentation of concert band literature.

MU 305 01(0-3-0). University Singers. F. S. Prerequisite: Written consent of instructor. Rehearsal and performance of choral literature emphasizing extended works with orchestral accompaniment.

MU 309 01(0-3-0). Jazz Ensemble. F. S. Prerequisite: Written consent of instructor. Rehearsal and performance of jazz ensemble literature of standard and experimental types.

*MU 311 02(2-0-0). Counterpoint I. S. Prerequisite: MU 217. 16th-century polyphonic style; analysis of compositions by Josquin, Palestrina, Lassus.

*MU 312 02(2-0-0). Counterpoint II. S. Prerequisite: MU 217. 18th-century polyphonic style; analysis of works by Bach.

MU 332 03(2-0-0). History of Jazz. S. SS. 
Jazz since the 1880s emphasizing its various influences and developments.

MU 334 03(3-0-0). Music History I. F. Prerequisite: MU 118; MU/MUCC 100 or MUCC 192. Music of the medieval, Renaissance, and baroque periods.

MU 335 03(3-0-0). Music History II. S. Prerequisite: MU 118; MU/MUCC 100 or MUCC 192. Music of the classical, Romantic, and contemporary periods.

MU 342 03(3-0-0). Psychology of Music. F. Prerequisite: PY/PYCC 100. 
Psychological aspects of music: perception, psychosocial, aesthetics, musical function, communication, measurement, and affective responses.

MU 343 03(3-0-0). Research Methods in Music Therapy. S. Prerequisite: ST/STCC 201. 
Techniques of observing, communicating, and measuring behavior. Basic experimental methods and procedures used in music therapy research.

MU 355 02(1-2-0). Choral Conducting and Literature. F. S. 
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. 
Essentials of instrumental conducting and analysis of selected works.
MU 400 01(0-3-0). University Chamber Singers. F, S. Prerequisite: Written consent of instructor. 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: Written consent of instructor. Performance of opera and/or operatic scenes emphasizing operatic singing and acting techniques.

MU 402 01(0-3-0). Theater/Chamber Orchestra. F, S, SS. Prerequisite: Written consent of instructor. Performance of selected operas, musicals, oratorio, orchestral accompaniments, and chamber music.

MU 404 01(0-3-0). Symphonic Wind Ensemble. F, S. Prerequisite: Written consent of instructor. 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: MU 2721. Practical experience in the interpretation and execution of piano accompaniments.

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.

MU 411 03(3-0-0). Orchestration. S. Prerequisite: MU 218. Unique characteristics of each orchestral instrument; arranging for variety of types of ensembles.

MU 416 03(3-0-0). Stylistic Analysis. F. Prerequisite: MU 218. Harmonic and formal analysis of representative works from the baroque to the present.

MU 420 02(2-0-0). Marching Band Techniques. F. Prerequisite: MU 204, MU 356. Marching band conducting, design, and performance techniques.

MU 430 03(3-0-0). 20th-Century Music. S. Musical styles from 1900 to present; major 20th-century movements which reflect a changing society.

MU 431 03(3-0-0). American Music. S. Sacred, patriotic, popular, and cultivated musical developments from the Pilgrims to 1900 including music on the Western frontier.

MU 437 02(1-2-0). History and Structure of the Organ. F. Prerequisite: MU 427H. Physical structure, tonal disposition, acoustical surroundings, and historical development.

MU 440 03(3-0-0). Music Therapy Methods I. S. Prerequisite: MU 241, AY 300/PS 300. 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: Admission to professional curriculum. 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: Admission to professional curriculum. 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 465 02(1-2-0). Keyboard Literature. F. 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. Development of song as an art form from monody to German Lieder, French school, and contemporary songs of England and America.

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. 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 227A-227V; 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.


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.


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 517 02(0-0-0). 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.
MU 519 03(3-0-0). History of Music Theory. S. Prerequisite: MU 416. 
Important authors, treatises, and texts dealing with acoustics, 
composition, counterpoint, harmony, notation, orchestration, 
throughbas, and tuning.

MU 520 03(3-0-0). Elementary School Music. F. Prerequisite: 
ED 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: ED 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 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 Baroque. S. Prerequisite: MU 334. 
Music of the Baroque. Style and musical language of baroque from Gabriellis 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. SS. Prerequisite: 
MU 335. 
Musical works, philosophies, and related arts of 19th century.

*MU 535 03(3-0-0). Contemporary Music. S. Prerequisite: MU 430. 
20th-century music emphasizing stylistic and theoretical concepts.

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 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.

MU 590A-M Var 1-[3]. Workshop. 
A) Choral music B) Conducting C) Beginning guitar D) Humanities. 
J) Beginning handbells K) Computers in music education. 

MU 630 03(3-0-0). Methods of Music Research. F. Prerequisite: MU 
416. 
Research, documentation, and bibliography for music history, 
literature, performance, theory, acoustics, music education, and 
quantitative testing.

MU 669 02(0-0-0). 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 684 Var [1-3]. Supervised College Teaching. F, S, SS. 
Supervised assistance in instruction.

MU 686 03(0-6-0). Music Therapy Practicum. Prerequisite: Six 
credits of MU 486A. 
Clinical practicum for graduate music therapy students.

MU 692 Var [1-3]. Seminar.

MU 695A-H Var [1-3]. Independent Study. 
A) Composition and theory B) Conducting C) Improvisation. 
theory H) Pedagogy.

MU 696A-I Var [1-3]. Group Study. 
A) Composition and theory B) Conducting C) Improvisation. 

MU 698 Var [1-3]. Research.

NEUROBIOLOGY COURSES

Office of Provost/Academic Vice President

NB 501 02(0-0-0). Cellular and Molecular Neurophysiology. F. Prerequisite: One college-level course in each: biology, biochemistry, physics, calculus. Credit not allowed for both NB 501 and PS 500. 

NB 502 01(3-0-0). Techniques in Neuroscience I. F. Prerequisite: One college-level course in each: biology, biochemistry, physics, and written consent of instructor. Current methods in molecular and cellular neurobiology.

NB 503 03(0-0-0). Developmental Neurobiology. S. Prerequisite: One college-level course in each: biology, biochemistry, physics, and written consent of instructor. Molecular mechanisms involved in development of nervous system including differentiation, growth, pathfinding, and synaptogenesis.

NB 504 02(1-3-0). Techniques in Neuroscience II. S. Prerequisite: One college-level course in each: biology, biochemistry, physics, and written consent of instructor. Current methods in cellular and organismal neurobiology and electrophysiology.

NB 505 03(3-0-0). Functional Neurobiology. S. Prerequisite: NB 501 or PS 500; or AY 325 with written consent of instructor. Anatomical and physiological organization of the nervous system.

NB 750 02(2-0-0). Physiology of Ion Channels. S. Prerequisite: PS 500, written consent of instructor. Physiological and structural analysis of membrane ion channels.

NB 793 01(0-0-1). Neuroscience Seminar.

NB 795 Var. Independent Study.


NATURAL RESOURCES COURSES

College of Natural Resources

NR 120-A-B. Environmental Conservation. F, S. Overview of natural resources environmental concerns including population, pesticides, energy, and pollution. A) 03(3-0-0). B) 04(3-3-0). Prerequisite: Participation in Honors Program.

NRCC 192 02(0-0-0). Natural Resources Freshman Seminar. F. Introduce to the disciplines involved in natural resources through exposure to current issues.

+NR 220 05(2-6-0). Natural Resources Ecology and Measurements. SS. Prerequisite: BY 103 or BC/BZCC 120; M/M CC 121. Special fee, $40. Ecology of Rocky Mountain ecosystems. Basic measurements and integrated management of natural resources. Pingree Park Campus.

NR 224/A 224 03(2-0-0-1). Integrated Ranch Management I. F. Prerequisite: A CC 192 or first-year seminar. Credit not allowed for both NR 224 and A 224. Introduction to integrated ranch system concepts through describing complex organizations and building decisions support systems.

NR 260 02(0-0-0). Introduction to Natural Resource Analysis. F, S. SS. Communication and analysis techniques with computers for natural resource management.

NR 300 03(2-0-0). Biological Diversity. S. Prerequisite: NR 120A or B or one course in biology. Biological diversity examined in context of species; extinction. Principles, techniques of conservation biology utilized to understand and resolve issues.

NRCC 320 03(3-0-0). Natural Resources History and Policy. F, S. 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. Fundamental concepts of spatial data handling and computer-assisted map analysis.

NR 323 03(2-2-0). Remote Sensing of Natural Resources. F. Remote sensing systems and applications; characteristics of photogrophic, scanner and radar images; imagery interpretation.

NR 324/A 324 03(2-0-0). Integrated Ranch Management II. S. Prerequisite: NR 224/A 224. Credit not allowed for both NR 324 and A 324. Application of enterprise planning analysis for use in ranch resource management. Continued emphasis on interdisciplinary systems analysis.

NR 330 03(3-0-0). Human Dimensions in Natural Resources. F. Prerequisite: NR 120A or B or written consent of instructor. Social, political, cultural, and economic considerations in natural resource management. [chgd to NR 460]

NR 355 03. Contemporary Environmental Issues. F, S. SS. Prerequisite: One course in biology or written consent of instructor. Offered as telecourse only. Fundamental concepts of energy, population, and ecology applied to range of contemporary environmental issues.

NR 365 03(3-0-0). Environmental Education. S. Prerequisite: BY 220. History, philosophy, and strategies being used in K-12 and public agencies to advance environmental stewardship.

NR 387 01(1-0-0). Internship I. Preparation for field experience in natural resources management.

NR 400 03(0-0-0). Public Relations in Natural Resources. F. S. Prerequisite: NR/NRCC 320. Effective public relations and public information programs applicable to natural resource professions.

NR 401 02(0-0-0). Techniques in Public Relations. F, S. Prerequisite: SP/SPCC 200. Effective communications methods related to natural resource professions; preparation of graphics, organization of programs using slide show format.

NR 420 04(3-0-0). Integrated Ecosystem Management. F, S. Natural resource management exercises; quantitative integration techniques, group dynamics.
NR 421 03(3-0-0). Natural Resources Sampling. S. Prerequisite: ST/STCC 201 or ST/STCC 301; NR 220.
Designs, techniques, problems in sampling natural resource populations; analysis, interpretation of data.

NR 422 04(2-4-0). GIS Applications in Natural Resource Management. F, S. Prerequisite: NR 321.
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). Sustainability of Renewable Resources. S. Prerequisite: F 325 or written consent of instructor.
Aspects of the sustainability of managed renewable resources.

NR 432 01. Foundations of National Forest Lands Program. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

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.

NR 434 03. Linear Uses and FERC Licenses. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.
Written consent of instructor. Offered as correspondence course only.

NR 435 05. Valuation and Landownership Adjustment. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.
Administrators, coordination, valuation, title; land purchase, donation, exchange, interchange, transfers, sales, condemnation, and negotiation.

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.

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.

NR 440 03(2-2-0). Land Use Planning. F. Also offered as an on-line course.
Integration of natural resource, social, institutional factors in regional resource planning.

NR 445 01(1-0-0). Gender and Natural Resources. S.
Influence of gender in natural resources science management and its implications for professional development.
+NR 460 03(3-0-0). Wilderness Management, S. Prerequisite: BY 220; NR 300; RR 431; or written consent of instructor. Special fee, $21.
Management of wilderness in the U.S. National Wilderness Preservation System and equivalent international wildlands.


NR 493 01(0-0-1). Seminar on GIS and Remote Sensing Applications. S. Prerequisite: NR 322 or NR 323 or written consent of instructor.
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 500 03(2-2-0). Microcomputer Applications in Natural Resources. F, S. Prerequisite: ST/STCC 301; NR 260 or CS 110.
Use of microcomputer packages in natural resources management and analysis.

NR 501 03. 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.

NR 503 03(2-3-0). Remote Sensing for Resource Management. F.
Interpretation and analysis of photographic, multispectral scanner, and radar data; sensor systems, applications to resource management.

NR 504 04(2-4-0). Computer Analysis of Remote Sensing Data. S.
Prerequisite: NR 323 or 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: NR 260 or NR 500, ST/STCC 301 or ST 511.
Concepts of geographic information systems and spatial data analysis.

NR 516 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 515 03. 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.

NR 521 02(2-2-0). 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 ST/STCC 523 03(3-0-0). Quantitative Spatial Analysis. S.
Prerequisite: ST/STCC 301 or ST/STCC 307 or EM/EMCC 307. Credit not allowed for both NR 523 and ST 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 550 03(2-3-4). Farming Systems Research and Development. F. Prerequisite: Written consent of instructor.
Principles of farming systems research methods for agricultural development projects.
NR 555 02(0-0-0). Preparation of Grant Proposals. S. Prerequisite: ST/STCC 301, one course in ecology. Idea development, preparation, writing, and presentation of research proposals in natural resources.

NR 561 02(2-0-0). 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 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: LA 520 or NR 322; NR 260; CS 110 or CS/CSCC 151. Algorithms, procedures, and applications of spatial data handling and spatial analysis.

NR 622 03(2-2-0). Analysis of Environmental Impact. F. Prerequisite: Written consent of instructor. Preparation and evaluation of environmental impact statements.

NR 660 03(3-0-0). Biogeochemical Cycling in Ecosystems. S. Prerequisite: C 245, SC 240, and one course in advanced ecology. Biotic and abiotic processes responsible for distribution and fluxes of elements at ecosystem, landscape, and global scales.

NR 676 04(3-2-0). Ecological Models. S. Prerequisite: NR 575. Model development for ecosystems, subsystems; deterministic, stochastic models; validation, sensitivity analysis.

NR 687 Var [3-6]. Natural Resources Internship. Prerequisite: NR 525. Field experience and exercises in international natural resources management.

NR 793 01(0-0-1). Seminar on Remote Sensing and GIS. Prerequisite: NR 322 or NR 323 or NR 303 or NR 305. Techniques, use of remote sensing, GIS technologies for forest, range, wildlife, water, geology, recreation, and other resource management applications.

NATURAL SCIENCES COURSES

College of Natural Sciences

NSCC 101 04(2-2-1). Phenomena of Matter and Energy. F. Prerequisite: University admissions requirements for high school mathematics and science. Physical sciences for non-technical majors considered in historic and philosophic context and from the viewpoints of multiple disciplines.

NSCC 102 04(2-2-1). Phenomena of Life. S. Prerequisite: University admissions requirements for high school mathematics and science. Biological sciences for non-technical majors considered in historic and philosophic context and from the viewpoint of multiple disciplines.

NSCC 192. 02(0-0-3). Introductory Seminar. F. Introduction to the culture and values of science and the College of Natural Sciences.

NS 201 04(3-0-1). Molecular Biosciences-Genetic Mechanisms. S. Prerequisite: BY/LSCC 102; C/C CC 111, C/C CC 112 or concurrent registration. Basic molecular genetics and molecular aspects of development.

NS 202 04(3-0-1). Molecular Biosciences-Cellular Biochemistry. F. Prerequisite: BY/LSCC 102; C/C CC 111, C/C CC 112 or concurrent registration. Molecular aspects of cellular and subcellular biology and introductory biochemistry.

NS 203 01(0-3-0). Genetic Mechanisms Laboratory. S. Prerequisite: C/C CC 112, NS 201 or concurrent registration. Basic molecular genetics and molecular aspects of development laboratory.

NS 204 01(0-3-0). Cellular Biochemistry Laboratory. F. Prerequisite: C/C CC 112, NS 202 or concurrent registration. Molecular aspects of cellular and subcellular biology and introductory biochemistry laboratory.

NS 384 Var [1-3]. Supervised College Teaching. F, S. Prerequisite: Written consent of instructor. Supervised experience in computer lab.


NS 596 Var [1-3]. Small-Scale Science Group Study.

NS 696 Var. Group Study-Science and Mathematics Education. Prerequisite: Bachelor's degree. Activity-based research using context-based curriculum in science, mathematics, and technology.

OCCUPATIONAL THERAPY COURSES

Department of Occupational Therapy
College of Applied Human Sciences

OT 110 03(3-0-0). Introduction to Occupational Therapy. F, S, SS. Also offered as on-line course. Roles and activities in occupational therapy.

OT 215 01(0-8-1). Medical Terminology. F, S. Also offered as on-line course. Definition and use of medical terms.

OT 301 04(2-2-1). Foundations for OT Intervention. F. Prerequisite: Admission to professional curriculum. Exploration of human occupation and activity; service planning and implementation; affective components of professional behavior.
OT 383 01(0-0-1). Professional Seminar I. S. Prerequisite: OT 301, OT 302.
Small group integrating fieldwork with OT theories and practice issues.

OT 310 03(2-2-0). Psychosocial Bases and Application in OT I. S.
Prerequisite: OT 301, OT 302.
Psychosocial and cultural issues in health care and strategies for OT intervention with diverse populations.

OT 311 03(2-2-0). Psychosocial Bases and Application in OT II. F.
Prerequisite: OT 301, OT 302, PY 320.
Evaluation and treatment principles in practice of psychiatric occupational therapy.

OT 320 05(3-2-1). Biomechanical Bases for OT Practice. S.
Prerequisite: AY 301, OT 301, OT 302.
Integrated approach to human movement and purposeful activity performance with application to occupational therapy practice.

OT 321 04(2-2-0). Biomechanical Applications in OT. F.
Prerequisite: OT 320. Special fee, $8.
Theories and OT evaluation and intervention with persons who have problems that are primarily biomechanical.

OT 355 02(0-0-1). Handicapped Individual in Society. F, S.
Prerequisite: PY/PYCC 100 or S/S CC 100.
Description and exploration of handicapping conditions; review of support systems including legal and financial implications.


OT 403 02(0-2-1). Professional Seminar II. F. Prerequisite: OT 303.
Small group integration of fieldwork with OT theories and practice issues.

OT 404 02(0-2-1). Professional Seminar III. S. Prerequisite: OT 403.
Small group integration of fieldwork with OT theories and practice issues.

OT 420 04(2-4-0). Neurobehavioral Applications in OT I. F.
Prerequisite: AY 345, OT 301. Special fee, $27.
Theories and OT intervention with persons with central nervous system dysfunction.

OT 421 04(2-4-0). Neurobehavioral Applications in OT II. S.
Prerequisite: OT 420. Special fee, $6.
Theories and OT intervention with persons with central nervous system dysfunction.

OT 450 03(2-0-1). Research Evaluation in OT Practice. S.
Prerequisite: OT 301, a statistics course.
Importance and methods of research in occupational therapy.

OT 175 03(2-0-1). Management, Systems Delivery, and Leadership.
S. Prerequisite: OT 311, OT 321.
Program planning, budgeting, marketing, management styles, supervisory relationships.

OT 486-F I 01(0-2-0). Practicum-OT Treatment. F, S, SS.
Prerequisite: OT 301.
Overview of OT practice areas. F) Level IA. G) Level IB. H) Level IC. J) Level ID.

OT 4881-Z Var [1-20]. Field Placement. F, S, SS.
Prerequisite: Written consent of department head. Special fee, $10 per subtopic.

OT 494 Var. Independent Study.

OT 496 Var. Group Study.

OT 499 Var. Research. Prerequisite: OT 450, S 310 or ST 311.

OT 5881-Z Var [1-20]. Field Placement. Prerequisite: Written consent of department head. Special fee, $10 per subtopic.

OT 590 Var [1-9]. Workshop.

OT 601 03(1-2-1). Foundations of Occupational Therapy I. F.
Prerequisite: Admission to professional master's program or written consent of instructor.
Service delivery from multiple perspectives, including activity analysis, assessment, interpersonal interaction, context, and major practice issues.

OT 602 03(2-0-1). Foundations of Occupational Therapy II. F.
Prerequisite: Admission to professional master's program or written consent of instructor.
Critical analysis of occupational therapy theory base including history, philosophy, and models of practice.

OT 603 01(0-0-1). Graduate Professional Seminar I. S. Prerequisite: OT 601 or written consent of instructor.
Guidance and discussion of fieldwork and classwork with emphasis on team building and system analysis.

OT 604 02(0-0-2). Graduate Professional Seminar II. F. Prerequisite: OT 603.
Guidance and discussion of fieldwork and classwork with emphasis on professional roles, assessment, and service planning.

OT 605 02(0-0-2). Graduate Professional Seminar III. S. Prerequisite: OT 604.
Guidance and discussion of fieldwork and classwork with emphasis on professional roles, assessment, and service planning.

OT 650 03(2-0-1). Research Methods I. F. Prerequisite: O.T.R.; admission to M.S. program or written consent of instructor.
Quantitative and qualitative research methodologies as applied in occupational therapy.

OT 651 03(2-0-1). Research Methods II. S. Prerequisite: OT 650.
Data analysis and interpretations of occupational therapy research.

OT 660 03(0-0-3). Leadership and Management in OT. F.
Prerequisite: O.T.R.; admission to M.S. program, or written consent of instructor.
Leadership and management processes as applied to occupational therapy settings.
OT 684 Var. Supervised College Teaching, F, S.

OT 686 Var [1-5]. Advanced Practicum. Prerequisite: Admission to M.S. program.

OT 688A-H Var [1-16]. Field Placement. Prerequisite: Degree in occupational therapy. 

OT 692 Var. Seminar. Prerequisite: OT 692.

OT 694 Var. Independent Study.

OT 696 Var. Group Study.

OT 698 Var. Research.


PATHOLOGY COURSES

Department of Pathology
College of Veterinary Medicine and Biomedical Sciences

PA 315A-B. Human and Animal Disease. F, S. Prerequisite: AY 230/PS 230 or AY 300/PS 300. Credit not allowed for both PA 315A and PA 315B. 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).

PA 495A-D Var. Independent Study. 

PA 555 03(3-0-0). Principles and Mechanisms of Disease. F. Prerequisite: AY 300/PS 300. Principles of disease processes; emphasis on reactivity of the diseased cell, tissue, organ, or organism.

PA 670 03(3-0-0). Molecular Immunology and Immunogenetics. F. Prerequisite: MB 651. Molecular basis and genetics of immune response. Biochemistry of immunologically mediated diseases.

PA 698 Var. Research.


*PA 700 03(2-2-0). Pathology of Nutritional Diseases. S. Prerequisite: VM 640. Functional and morphological changes accompanying nutritional diseases.

*PA 765 02(1-2-0). Comparative Neuropathology. S. Spontaneous diseases of nervous system of domesticated, laboratory, and wild animals.

*PA 776 02(1-2-0). Pathology of Laboratory Animals. S. Prerequisite: VM 742. Specific disease problems of common laboratory animals emphasizing morphologic, clinical pathologic features of spontaneous, selected induced diseases.

PA 784 Var. Supervised College Teaching. F, S. SS.

PA 784A-C Var. Practicum. 

PA 792A-E Var [1-3]. Seminar. Maximum of 3 credits allowed per subtopic. 

PA 795A-D Var. Independent Study. 

PA 796 Var. Group Study.

PA 798 Var. Research.

PA 799 Var. Dissertation.

PLANT DISEASE COURSES

Department of Bioagricultural Sciences and Pest Management
College of Agricultural Sciences

PD 310/W 310/EN 310 03(2-0-0). Fundamentals of Pesticides. F, SS. Prerequisite: Introductory biological science or introductory chemistry. Credit allowed for only one of the following: EN 310, PD 310, W 310. Identification, properties, use, labeling, environmental interactions, and application of major classes of pesticides.

PD 361 03(2-2-0). Elements of Plant Pathology. S. Prerequisite: BY/LSCC 142 or BY/BZCC 104 or BY/BZCC 120 or H/MLC 110. Diseases of economic plants.

*PD 365/EN 365 04(3-3-0). Integrated Tree Health Management. F. Prerequisite: BY/LSCC 142 or BY/BZCC 120. Credit not allowed for both PD 365 and EN 365. Special fee, $6. Insects and diseases in forest and urban ecosystems Effects, diagnosis, prevention, and interactions.

PD 502A-G 01. Topics in Plant Pathology. Prerequisite: One course in biology and plant pathology or written consent of instructor. 
A) Plant viruses 01(.5-1-0). F. B) Plant bacteriology 01(.5-1-0). F. C) Fungal plant pathogens 01(.5-1-0). F. D) Plant nematology 01(.5-1-0). F. E) Molecular plant-microbe interactions 01(.5-1-0). S. F) Plant disease epidemiology 01(.1-0-0). S. G) Plant disease management 01(.1-0-0). S.

*PD 508/W 508/EN 308 03(3-0-0). Environmental Fate of Pesticides. S. Prerequisite: One course in soils, organic chemistry, or plant physiology, or written consent of instructor. Credit allowed for only one of the following: EN 508, PD 508, W 508. Processes that affect fate of pesticides and their metabolites in the environment with emphasis on soil and water.

*PD 510/EN 510 03(3-0-0). Insect-Plant Disease Relationshps. F. Prerequisite: One entomology or plant disease course. Credit not allowed for both PD 510 and EN 510. Relationships between insects and various plant pathogens as they affect survival and transmissions of pathogens.
PD 511/EN 511 01(0-2-0). Insect-Plant Disease Relationships Laboratory. F. Prerequisite: PD 510/EN 510 or concurrent registration. Credit not allowed for both PD 511 and EN 511.

Detailed studies of insect-plant interactions.

PD 520/02(0-0-2). Forest Health Issues. F. Prerequisite: Introductory biological science. Current topics related to forest and shade tree health from ecosystems to tree defense physiology.

PD 521 02(1-2-0). Tree Disease Identification. F. Prerequisite: PD 361 or PD 365/EN 365. Diagnosis of forest and shade tree diseases. Field and laboratory experiences.

PD 543/W 543/EN 543 03(3-0-0). International Crop Protection. S. Prerequisite: Crop protection course and/or written consent of instructor. Credit allowed for only one of the following: PD 543, W 543, and EN 543. Insects, disease, and weed management strategies for developing countries. Emphasizes appropriate control measures for limited resource farmers.

PD 550 03(3-0-0). Phytopathology. F. Prerequisite: MB 300, PD 361. Plant pathogenic bacterial identification, control, pathogenesis, and ecology.

PD 556/W 556/EN 556 03(3-0-0). Biological Control of Plant Pests. F. Prerequisite: Ten credits of biology. Credit allowed for only one of the following: PD 556, W 556, and EN 556. Management of insect pests of plants, plant pathogens, and weeds using biological control agents such as insects, bacteria, viruses, and fungi.

PD 562 03(0-9-0). Field and Diagnostic Plant Pathology. SS. Prerequisite: PD 361, written consent of instructor. Diseases of Colorado crops and ornamental plants. Specimens are collected and diagnosis developed through field and laboratory examination.

PD 661 03(3-0-0). Epidemiology of Plant Disease. S. Prerequisite: PD 361. Interactions of host, pathogen, and environmental factors affecting plant disease development.

PD 663 02(2-0-0). Physiology of Parasitism. S. Prerequisite: BZ 440, PD 361. Plant disease development: host-parasite interactions, host metabolic responses, defense mechanisms.

PD 710/CM 710 03(0-4-1). Techniques in Molecular Biology and Genetics. S. Prerequisite: BC 463 or BZ 350 or BZ 346 or MB 450 or SC 330. Credit not allowed for both PD 710 and CM 710. Genetic manipulation of bacteria, bacteriophage, and yeast including experiments in molecular cloning and gene expression.

PD 740/SC 740 03(3-0-0). Plant Molecular Genetics. F. Prerequisite: BC 351, SC 370. Credit not allowed for both PD 740 and SC 740. Advances in study of organization and function of nuclear and organelar genomes, gene expression in higher plants, and plant-microbe interactions.

PERFORMING ARTS COURSES

Department of Music, Theatre, and Dance

PFCC 110 03(2-0-0). Performing Arts Around the World. F. Music, theatre, and dance traditions via exploration of a broad range of representative cultures.

PF 250 02(1-3-0). Performing in Musical Theatre. Prerequisites: ML 270Q, TH 151 or D 120A or B or C or written consent of instructor. Skills and techniques used in music, theatre, and dance. Brief history and technical production overview of musical theatre.

PHYSICS COURSES

Department of Physics

College of Natural Sciences

PHCC 110 03(3-0-0). Descriptive Physics. F, S, SS. Credit not allowed for both PH/PHCC 110 and PH/PHCC 121. Conceptual aspects of physics applied to phenomena in everyday life and to problems in other fields of science.

PHCC 111 01(0-2-0). Descriptive Physics Laboratory. F, S, SS. Prerequisite: PH/PHCC 110 or concurrent registration. Experiments dealing with basic physics concepts including explorations of everyday phenomena.

PHCC 121 05(3-2-1). General Physics. F, S, SS. Corequisite: M/M CC 125. Credit not allowed for both PH/PHCC 121 and PH/PHCC 110 or for both PH/PHCC 121 and PH/PHCC 141. Concepts of force, torque, energy, momentum, work used to cover fluids, waves, sound, temperature, heat, biological, physical examples (noncalculus).

PHCC 122 05(3-2-1). General Physics II. F, S. Prerequisite: PH/PHCC 121. Credit not allowed for both PH/PHCC 122 and PH/PHCC 142. Electricity including electrostatics and simple circuits; magnetism; optics; nuclear physics; radiation; biological, physical examples (noncalculus).

PHCC 141 05(3-2-1). Physics for Scientists and Engineers I. F, S. SS. Prerequisite: M/M CC 126; M/M CC 155 or M/M CC 160. Students who have had high school physics may enroll in M/M CC 155 or M/M CC 160 concurrently. Credit not allowed for both PH/PHCC 141 and PH/PHCC 121. Forces, energy, momentum, angular momentum, oscillations, waves, heat, thermodynamics (calculus based).

PHCC 142 05(3-2-1). Physics for Scientists and Engineers II. F, S. Prerequisite: PH/PHCC 141, concurrent registration in M/M CC 161 or M/M CC 255. Credit not allowed for both PH/PHCC 142 and PH/PHCC 122. Electricity and magnetism, circuits, light, optics (calculus based).

PH 160 03. Basic Physics and Physical Worldview. F, S, SS. Prerequisite: High school algebra or M/M CC 121, M/M CC 126. Offered as telecourse only. Physics, cultural and historical background of physical thoughts, humans' relationship to physical world.
PH 192 02(0-0-2). The Flying Circus of Physics. F. 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: PHYS 142 or concurrent registration.

AC circuits, physical bases and applications of electronic devices.

PH 298 Var [1-6]. Introductory Research.

PH 314 04(4-0-0). Introduction to Modern Physics. S. Prerequisite: PHYS 142, concurrent registration in M 261.

Relativity, quantum mechanics, atomic structure, applications to solid-state, nuclear, and elementary particle physics.

PH 315 02(0-4-0). Modern Physics Laboratory. S. Corequisite: PHYS 314.

Experiments in modern physics.

PH 325 02(0-4-0). Advanced Physics Laboratory. S. Prerequisite: PHYS 315, concurrent registration in PHYS 300.

Advanced experiments in electricity and magnetism, statistical physics and quantum mechanics.

PH 341 04(4-4-0). Mechanics. F. Prerequisite: PHYS 141, M 340.

Particle dynamics, translation and rotation of rigid bodies, moving coordinate systems, Lagrangian mechanics, matrix and tensor methods.

PH 351 04(4-4-0). Electricity and Magnetism. S. Prerequisite: M 340, PHYS 142.

Electrostatics, magnetostatics, currents, time-dependent electric and magnetic fields, radiation.

PH 353 04(3-3-0). Optics and Waves. F. Prerequisite: M 261, PHYS 142.

Geometrical optics, wave optics, interference, diffraction, and polarization, quantum optics.

PH 361 03(3-0-0). Physical Thermodynamics. S. Prerequisite: PHYS 142, M 261.

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. F, S, SS. Prerequisite: PHYS 121 or PHYS 141, written consent of department head. Maximum of 12 credits allowed in course.

Participation as a physics tutor.

PH 451 03(3-0-0). Introductory Quantum Mechanics I. F. Prerequisite: PHYS 314, M 340.

Schroedinger’s theory of wave mechanics, potential wells, harmonic oscillators, wave packets, operators, angular momentum and spin, WKB theory, Heisenberg picture, 3D wells, hydrogen atom, time-independent perturbation theory, angular momentum and spin, Clebsch-Gordan coefficients.

PH 452 03(3-0-0). Introduction to Lasers. S. Prerequisite: M 340, PHYS 314 or C 476.

Stimulated emission; laser resonators; theory of laser oscillation; specific laser systems; applications.

PH 522 01(0-2-0). Introductory Laser Laboratory. S. Corequisite: PHYS 521.

Experiments providing hands-on experiences with lasers.

PH 531 03(3-0-0). Introductory Solid State Physics. S. Prerequisite: PHYS 314, PHYS 361.

Crystal structures and bonding, electronic levels and vibrations, dielectric, optical and magnetic properties, quasiparticles, superconductivity.

PH 541 03(3-0-0). Classical Physics. S. Prerequisites: PHYS 341, PHYS 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: PHYS 452, concurrent registration in PHYS 452.

Waves, energy levels, harmonic oscillator, transmission and reflection, perturbation theory, thermodynamic potentials, partition function.

PH 561 03(3-0-0). Elementary Particle Physics. S. Prerequisite: PHYS 314.

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: M 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: PHYS 571.


PH 621 03(3-0-0). Classical Mechanics. S. Prerequisite: PHYS 341, PHYS 571.

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: PHYS 451, PHYS 531.

Electronic band structure and conduction phenomena; cohesive energy; lattice dynamics and thermal properties; metals, insulators, semiconductors.

PH 641 03(3-0-0). Electromagnetism. F. Prerequisite: PHYS 351, PHYS 571.

Electrostatics in a vacuum and a medium, general solution of Laplace’s equation, Green’s functions, magnetostatics in a vacuum and a medium.

PH 651 03(3-0-0). Quantum Mechanics I. F. Prerequisite: PHYS 452, PHYS 571 or concurrent registration.

WKB theory, Heisenberg picture, 3D wells, hydrogen atom, time-independent perturbation theory, angular momentum and spin, Clebsch-Gordan coefficients.
PH 672/EE 672 03(0-0-0). Principles of Semiconductors. S. Prerequisite: PH 531 or EE 471. Credit not allowed for both PH 672 and EE 672. Electronic properties of semiconductors: band structure, statistics, transport properties, photoelectric properties, potential barriers, interfaces.

PH 692 01(0-0-1). Seminar.

PH 693 03(0-0-3). Current Topics in Physics Research.

PH 698 Var. Research.


PH 722 03(3-0-0). Quantum Electronics. S. Prerequisite: PH 451 or C 476 or PH 521. One- and two-photon spectroscopy; broadening mechanisms; nonlinear optics; coherent phenomena; experimental methods.

PH 731 03(3-0-0). Condensed Matter Theory. F. Prerequisite: PH 462, PH 531, PH 751. Second quantization; electrons; phonons; electron-phonon interaction; superconductivity; magnetism; spin waves; density-functional methods; symmetry.

PH 741 03(3-0-0). Advanced Electromagnetism. S. Prerequisite: PH 641. Maxwell's equations, electromagnetic waves, radiation by accelerated charges, special relativity, Lagrangian formulation of electrodynamics.

PH 751 03(3-0-0). Advanced Quantum Mechanics. S. Prerequisite: PH 631. Wigner-Eckhart theorem, symmetries, density matrix, identical particles, interaction picture, time-dependent perturbation theory, scattering.

PH 761 03(3-0-0). General Relativity. S. Prerequisite: PH 641. Special relativity, gravitation, cosmology, astrophysical applications.

PH 762 03(3-0-0). Elementary Particle Theory. S. Prerequisite: PH 501. Symmetries, electrodynamics, renormalization, and the running coupling constant. Hadron structure, QCD, gauge symmetry and electroweak interaction.

PH 765 03(0-0-0). Statistical Mechanics. F. Prerequisite: PH 452, PH 452, PH 471 or concurrent registration. Canonical and grand-canonical ensembles; Maxwell-Boltzmann, Bose-Einstein, and Fermi-Dirac statistics; density operator; Bose-Einstein condensation.

PH 770 03(3-0-0). Quantum Theory. F. Prerequisite: PH 751. Formal scattering theory; relativistic quantum mechanics, quantum theory of radiation, symmetries and statistics, many-body theory.

PH 784 Var [1-5]. Supervised College Teaching. Supervised teaching of general physics laboratory and recitation sections.


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


PHILOSOPHY COURSES

Department of Philosophy
College of Liberal Arts

PLCC 100 03(3-0-0). Appreciation of Philosophy. F, S, SS. Basic issues in philosophy including theories of knowledge, metaphysics, ethics, and aesthetics.

PL 101 03. Practical Thinking. S. Credit not allowed for both PL 101 and PL/PLCC 110. Offered as correspondence course only.

PL 102 03(3-0-0). Logic and Critical Thinking. F, S, SS. Credit not allowed for both PL/PLCC 110 and PL 101.

PL 105 03(3-0-0). Introduction to Philosophy. F, S.

PL 106 03(3-0-0). Wisdom of the East-Oriental Philosophy. F, S.

PLCC 110 03(3-0-0). Logic and Critical Thinking. F, S, SS. Credit not allowed for both PL/PLCC 110 and PL 101.

PL 112 03(3-0-0). Reasoning and Problem Solving. F.

PLCC 120 03(3-0-0). History and Philosophy of Scientific Thought. F, S.

PL 130 02(2-0-0). Bioethics and Society. S.

PL 204 03. Ethics in America. F, S, SS. Offered as telecourse only.

PL 205 03(3-0-0). Introduction to Ethics. F, S. Prerequisite: Sophomore standing or higher or written consent of instructor. Problems and theories concerning values and standards, right action, and the good life.

PL 171 03(3-0-0). Religions of the West. F, S.

PL 172 03(3-0-0). Religions of the East. F, S.

PL 173 03(3-0-0). Religions of India. F, S.
PL 206 03(3-0-0). Knowledge and Existence-An Introduction. F, S. Prerequisite: Sophomore standing or higher or written consent of instructor. Problems and theories concerning knowledge, being, nature of the world.

PL 210 03(3-0-0). Introduction to Formal Logic. F, S. Prerequisite: Sophomore standing or higher or written consent of instructor. Elementary principles in propositional and predicate logic.

PL 251 03(3-0-0). Feminist Philosophies. F. Conceptual, moral, and social analysis of women's issues from a variety of philosophical feminist perspectives.

PL 270 03(3-0-0). Issues in the Study of Religion. F. S. Prerequisite: Sophomore standing or higher or written consent of instructor. Contemporary religion, its nature, types, forms of expression.

PL 295 Var [1-3]. Independent Study.

PL 297 Var [1-3]. Group Study.

PL 300 03(3-0-0). Ancient Greek Philosophy. F, S. SS. Prerequisite: PL 205 or PL 206 or PL 210. Philosophy of ancient Greece emphasizing Plato and Aristotle.

PL 301 03(3-0-0). 17th and 18th Century European Philosophy. S. Prerequisite: PL 206 or PL 210 or PL 300. Philosophy from the scientific revolution through Kant.

PL 302 03(3-0-0). 19th Century Philosophy. F. Prerequisite: PL 301. Major figures, movements, concepts in Europe and America from about 1800 to early 20th century.


PL 309 03(3-0-0). Ideas in Oriental Art and Literature. F. Prevalent philosophical ideas in the Chinese-Indian and Japanese-Korean art, literature selected from representative classics from about 1800 to early 20th century.

PL 315 03(3-0-0). Philosophy of Language. S. Prerequisite: PL 105 or PL 205 or PL 206 or PL 210 or any upper-division course in philosophy. Basic concepts and principles in the theory of language.

PL 318 03(3-0-0). Aesthetics-Visual Arts. F, S. Central, traditional, and contemporary theories of the nature of visual arts.

PL 325 03(3-0-0). Philosophy of Natural Science. F. Prerequisite: PL 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.

PL 327 03(3-0-0). Philosophy of Behavioral Sciences. S. Prerequisite: PL 105 or PL/PCC 120 or PL 205 or PL 206 or PL 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.

PL 330/A 330 03(3-0-0). Agricultural Ethics. S, SS. Credit not allowed for both PL 330 and A 330. Basic concepts in ethics and their application to agriculture.

PL 345 03(3-0-0). Environmental Ethics. F. S. Prerequisite: Sophomore standing or higher or written consent of instructor. Scientific, philosophical, and religious concepts of nature as they bear on human conduct; an ecological perspective.

PL 348 03(3-0-0). Philosophy of Literature and the Arts. S. Aesthetic and philosophical issues in literature and the arts.

PL 349 03(3-0-0). Philosophy of Tao and Zen. S. Philosophical view of China and Japan.

PL 350 03(3-0-0). Social and Political Philosophy. F. S. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Moral relationships between persons and institutions.


PL 352 03(3-0-0). Philosophy of History. S. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Conceptions of human existence in its historical, social, cultural dimensions.

PL 355 03(3-0-0). Philosophy of Religion. F. Prerequisite: PL 106 or PL 171 or PL 172 or PL 270. Philosophical analysis of nature of religion and structure of treating in religious discourse.

PL 359 03(3-0-0). Philosophy of Humans. F. Prerequisite: PL 105 or PL 205 or PL 206 or any upper-division course in philosophy. Contrasting views of role of humans in the universe as drawn from science, literature, philosophy of modern period.

PL 360 03(3-0-0). Topics in Oriental Philosophy. S. Prerequisite: Sophomore standing or higher or written consent of instructor. Examination of major philosophical topics from ethics, sociopolitical philosophy, metaphysics, aesthetics.

PL 366 03(3-0-0). Philosophy of Aging. F. Philosophical problems related to experience of growing old.

PL 369 03(3-0-0). Mind and Body in Eastern Thought. S. Prerequisite: Sophomore standing or higher or written consent of instructor. Investigation of mind-body and mental activity in eastern tradition.

PL 370 03(3-0-0). Contemporary Western Religious Thought. F. Prerequisite: PL 106 or PL 171 or PL 172 or PL 270. Contemporary interpretations of significant Western religious traditions.

PL 371 03(3-0-0). Contemporary Eastern Religious Thought. S. Transformation of Indian and Chinese religious thought in the modern period.


PL 375 03(3-0-0). Science and Religion. S. Prerequisite: PL 106 or PL 171 or PL 172 or PL 270. Encounter of religious belief with Western science, influences on each other, present relations.
PL 379 03(3-0-0). Mysticism East and West. F. Prerequisite: PL 106 or PL 171 or PL 172 or PL 270. Varieties of mystical experience in selected Eastern and Western representatives.


PL 407 03(3-0-0). Phenomenology and Existentialism. F. Prerequisite: PL 205 or PL 266 or PL 300 or PL 301. Methods, epistemology, metaphysics, axiology, ethics of 20th-century phenomenologists and existentialists.

PL 409 03(3-0-0). 20th-Century Philosophy. S. Prerequisite: PL 301. Major figures, trends, and concepts in 20th-century philosophy.

PL 410 03(3-0-0). Formal Logic. F, S. Prerequisite: PL 210 or CS 270. Quantification theory, axiomatic systems, rigorous axiomatization of some logical or mathematical theory.

PL 415 03(3-0-0). Logic and Scientific Method. F, S. Approaches to analysis, assessment of scientific inference, problems of induction; applications to natural, behavioral, social sciences.

PL 425 03(3-0-0). Epistemology. S. Prerequisite: PL 210 or PL 300 or PL 301. Concepts, problems, and theories of knowledge.

PL 435 03(3-0-0). Metaphysics. F. Prerequisite: PL 210 or PL 300 or PL 301. Philosophical problems concerning nature, structure, and basic constituents of reality.

*PL 438 03(3-0-0). Philosophy of Mind. S. Prerequisite: PL 300 or PL 301 or PL 302 or PL 315 or PL 325 or PL 327 or PL 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.

PL 447 03(3-0-0). Ethical Theory. F. Prerequisite: PL 205 or PL 300 or PL 301. Fundamental problems and options in ethical theory.

PL 460 03(3-0-0). Seminar in Great Philosophers. F. Prerequisite: PL 300 or PL 301 or PL 302. Maximum of 9 credits allowed in course. Works of one major figure in the history of philosophy.

PL 461 03(3-0-0). Topics in Philosophical Problems. S. Prerequisite: PL 300 or PL 301 or PL 302. Thorough examination of a major philosophical problem.

PL 462 03(0-0-3). Capstone Seminar. F, S. Prerequisite: Senior standing and any two of the following courses: PL 300, PL 301, PL 302, PL 409. In-depth, integrative study of major topics, texts, and problems in both philosophy and religion.

PL 463 03(0-0-3). Seminar in Religious Studies. F, S, SS.

PL 479 03(3-0-0). Comparative Religions-Suffering and Evil. F. Prerequisite: PL 171 or PL 172 or PL 270; 300-level religious studies course. Comparative study of experiences and concepts of suffering and evil in several world religions.

PL 495 Var [1-9]. Independent Study.

PL 497 Var [1-9]. Group Study.

PL 499 03(0-0-3). Thesis. Prerequisite: Written consent of department head.

PL 500 03(0-0-3). Seminar in Major Philosophical Texts. F. Prerequisite: Admitted graduate student or written consent of instructor. Intensive study of one or two major works in the history of philosophy.

PL 525 03(0-0-3). Seminar in Epistemology. F. Prerequisite: PL 425. Analysis of contemporary theories of knowledge.

PL 527 03(0-0-3). Seminar in Philosophy of Science. S. Prerequisite: PL 325 or PL 327 or PL 415. Systematic survey of major 20th-century philosophies of science.

*PL 545 03(3-0-0). Concept of Natural Value. S. Prerequisite: PL 345. Philosophical analysis of nature as a value carrier. Types of value associated with nature, their interrelations.

PL 547 03(0-0-3). Seminar in Ethical Theory. S. Prerequisite: PL 447. Systematic and historical overview of 20th-century theories of meta-ethics.

PL 550/IE 550 03(3-0-0). Ethics and International Development. F. Prerequisite: Written consent of instructor. Credit not allowed for both PL 550 and IE 550. Ethical reflection applied to development goals, strategies of Third World countries; relations between developed and developing countries.

*PL 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.

*PL 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.

*PL 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.

*PL 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.

PL 593 03(0-0-3). Seminar. PL 662 03(0-0-3). Seminar. F, S, SS.

*PL 666/CM 666 03(3-0-0). Science and Ethics. S. Credit not allowed for both PL 666 and CM 666. Ethical issues of research on animals and humans; bioethics; fraud and deception in science; genetic engineering.

PL 684 Var [1-5]. Supervised College Teaching. F, S.

PL 695 Var [1-9]. Independent Study.

PL 697 Var [1-9]. Group Study.

POLITICAL SCIENCE COURSES

Department of Political Science
College of Liberal Arts


POCC 131 03(3-0-0). Current World Problems. F, S. Background and nature of international political events.

POCC 232 03(3-0-0). International Relations. F, S. Basic concepts and approaches in international relations.

POCC 241 03(3-0-0). Comparative Government and Politics. F, S. Major foreign political systems stressing cross-national comparison of political forces, parties, ideologies, and institutions.

PO 301 03(3-0-0). Political Parties and Interest Groups. F. Prerequisite: PO/POCC 101. Institutional and behavioral features of American political parties and interest groups.

PO 304 03(3-0-0). Legislative Politics. F, S. Prerequisite: PO/POCC 101. Structure, organization, behavior, processes, and policy implications of U.S. legislatures.

PO 305 03(3-0-0). Judicial Politics. F. Prerequisite: PO/POCC 101. Allocation of powers among judicial structures in American federal system.


PO 309 03(3-0-0). Urban Politics. F, S. Prerequisite: PO/POCC 101 or PO/POCC 103. Governmental structures and political processes in urban government.

PO 320 03(3-0-0). Empirical Political Analysis. F, S. Methods of empirical political inquiry.

PO 321 01(0-2-0). Empirical Political Analysis Laboratory. F, S. Coerequisite: PO 320. Laboratory applications of empirical research methods.

PO 331 03(3-0-0). Politics and Society Along Mexican Border. F, S. Analysis of U.S.-Mexican relations and domestic politics as these affect regional characteristics and development of U.S.-Mexican border region.

PO 332/EC 332 03(3-0-0). International Political Economy. F, S. Prerequisite: EA/EACC 202 or EC/ECCC 202 or PO/POCC 232. Credit not allowed for both PO 332 and EC 332. Theories on relations between international politics and economics. Policy implications of different theories and case studies.

PO 341 03(3-0-0). Western European Government and Politics. F. Prerequisite: PO/POCC 241. Politics in Western European countries such as Britain, France, and Germany, and countries influenced by European traditions.

PO 345 03(3-0-0). Russian, Central, and East European Politics. S. Prerequisite: PO/POCC 241. Political structures and processes in Russia, Central, and East Europe, and selected post-Communist countries.

PO 351 03(3-0-0). Public Administration. F, S, SS. Prerequisite: PO/POCC 101. Government organization and management; decision processes; and political and intergovernmental relations in administration.

PO 361 03(3-0-0). U.S. Environmental Politics and Policy. F, S, SS. Prerequisite: PO/POCC 101. Special fee. $20. Public and contemporary issues relating to U.S. environmental policy.

PO 371 03(3-0-0). U.S. Space Policy. F. Analysis of U.S. space politics, space law, and space policy making.

PO 410 03(3-0-0). American Constitutional Law. F. Prerequisite: PO/POCC 101. Allocation of powers among structures in American federal system.

PO 413 03(3-0-0). U.S. Civil Rights and Liberties S, SS. Prerequisite: PO/POCC 101. U.S. Constitutional provisions and cases pertaining to the rights and liberties of individuals.

PO 420 03(3-0-0). Western Political Theory. F, S. Origin, nature, and function of Western political theories.

PO 421 03(3-0-0). Modern Political Theories. F. Major political theories and ideologies of modern times.

PO 423 03(3-0-0). American Political Theories. S. Prerequisite: PO/POCC 101. Major American theories and ideologies: their development and present uses.

PO 431 03(3-0-0). International Law. F, S. Prerequisite: PO/POCC 232. Rules and obligations for conduct of relations among states and other international entities.

PO 433 03(3-0-0). International Organization. F, S. Prerequisite: PO/POCC 232. History, development, structure, process, and activity of selected public international organizations.

PO 435 03(3-0-0). United States Foreign Policy. F, S, SS. Prerequisite: PO/POCC 232. Institutions, responsibilities, processes, and issues in formulation and execution of U.S. foreign policy.

PO 436 03(3-0-0). Comparative Foreign Policy. S. Prerequisite: PO/POCC 232, PO/POCC 241. Effect of varying international and domestic contexts on foreign policy choices and outcomes across different countries, cultures, issues, and time.


PO 444 03(3-0-0). Comparative African Politics. S, SS. Prerequisite: PO/POCC 241. African political systems focusing on precolonial, colonial influences; rise of nationalism; approaches to new political order; influences of development.
PO 445 03(3-0-0). Comparative Asian Politics. F, S. Prerequisite: PO/POL 241.
East and South Asian political systems emphasizing issues of development, political culture, and institutional change.

PO 446 03(3-0-0). Politics of South America. F, S. Prerequisite: PO/POL 241.
South American political actors and institutions with emphasis on themes of development, democracy, revolution, and international affairs.

PO 447 03(3-0-0). Politics in Mexico, Central America, Caribbean. F, S. Prerequisite: PO/POL 241.
Mexican politics with comparison to one or more Central American and Caribbean countries.

PO 460 03(3-0-0). Public Policy Process. F, S. Prerequisite: PO/POL 101.
Explanations of policy formation, implementation, and impact.

PO 486A-B. Practicum. +A) Legislative politics 06(0-8-2). Special fee, $150.
B) Government Var [1-6].

PO 492 03(3-0-0). Capstone Seminar. Prerequisite: Upper-division course in at least four subfields of political science.

PO 495 Var. Independent Study.

PO 500 03(3-0-0). Governmental Politics in the U.S. F, S. Prerequisite: Three upper-division credits in American politics with grade of B or better.
Selected primary source materials on performance of government officials and institutions at federal, state, and local levels.

PO 501 03(3-0-0). Citizen Politics in the U.S. F, S. Prerequisite: Three upper-division credits in American politics with grade of B or better.
Selected primary source materials on behavior of individuals and groups in American politics.

PO 526 03(3-0-0). Theories of Political Action. F, S. Prerequisite: PO 420 or PO 421 or written consent of instructor.
Intensive review of primary material on Western political thought.

PO 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.

PO 531 03(3-0-0). Policy Making, Diplomacy, and World Politics. F, S. Prerequisite: Three upper-division credits in international relations with grade of B or better.
Theories of policy making and bargaining in international politics as applied to different countries, organizations, and historical periods.

PO 540 03(3-0-0). Comparative Politics. F, S. Prerequisite: Three upper-division credits in comparative politics with grade of B or better.
Theories, methods, and approaches to study of comparative politics.

PO 541 03(3-0-0). Political Economy of Change and Development. F, S. Prerequisite: Three upper-division credits in comparative politics with grade of B or better.
Responses of the state and its institutions to political, economic, and social change.

PO 550 03(3-0-0). Advanced Public Administration. F, S. Prerequisite: PO 351; written consent of instructor.
Overview of study of public administration; recent developments in theory and practice.

PO 552A-C 03(3-0-0). Topics in Public Administration. F, S. Prerequisite: PO 351 and GPA of 3.00 or better.

PO 620 03(3-0-0). Approaches to the Study of Politics. F. Prerequisite: Fifteen credits in political science.

PO 621 03(3-0-0). Qualitative Methods in Political Science. S. Prerequisite: PO 620 or concurrent registration.
Research design, data gathering and organization, ethical issues, and computer applications in qualitative political research.

PO 625 03(3-0-0). Quantitative Methods of Political Research. Prerequisite: PO 320.
Quantitative approaches and methods for study of political life.

PO 626 01(0-2-0). Political Research Laboratory. S. Prerequisite: PO 321, concurrent registration in PO 625.

PO 652 03(0-0-3). Public Organization Theory. F. Prerequisite: PO 351 or written consent of instructor.
Theories of behavior of individuals and organizations in government bureaucracies.

PO 660 03(3-0-0). Theories of the Policy Process. F, S. Prerequisite: PO 351 or PO 460.
Recent developments in policy analysis.

PO 670 03(3-0-0). Politics of Growth and the Environment. F. Prerequisite: Written consent of instructor.
Domestic, international, and comparative dimensions of environment and natural resource politics and policy.

PO 684 Var [1-3]. Supervised College Teaching. F, S, SS. Prerequisite: One year of graduate work.

PO 692 03(0-0-3). Seminar in Environmental Policy. Topics in domestic and/or global environmental policy.

PO 695 Var. Independent Study.

PO 699 Var. Thesis.

PO 709 03(3-0-0). Environmental Politics in the U.S. F, S. Prerequisite: PO 500 or PO 501; PO 670.
Selected primary materials on environmental politics and policy.

PO 729 03(3-0-0). Political Theory and the Environment. F, S. Prerequisite: PO 550 or PO 670.
Recent developments in political theory.

PO 730 03(3-0-0). International Environmental Politics. F, S. Prerequisite: PO 530, PO 670.
Theories and methodologies used in analyzing international environmental politics and policy.

PO 749 03(3-0-0). Comparative Environmental Politics. F, S. Prerequisite: PO 670; PO 540 or PO 341.
Application of comparative political theory to analysis of environmental politics.

PO 759 03(3-0-0). Environmental Policy and Administration. F, S. Prerequisite: PO 670.
Effects of regulation, intergovernmental relations, and resource availability on federal environmental programs in U.S.

PO 795 Var. Independent Study.

PO 799 Var. Dissertation.
PHYSIOLOGY COURSES

Department of Physiology
College of Veterinary Medicine and Biomedical Sciences

PS 110/EBCC 110 03(2-0-1), Human Health and Environmental Perspectives. F, S. Prerequisite: High school level biology. Credit not allowed for both PS 110 and EBCC 110. Survey of health and wellness, physical activity and nutrition, the environment, drugs and health, diseases and injuries, sexuality and pregnancy.

PS 120 02(2-0-0). Human Health and Disease. F, S, SS. Function of the human body in health and disease; exercises for decision making related to health.

PS 122 02(2-0-0). Drugs and the Human Body. F, S. Drugs effect on body functions; implications of drug use in society.

PS 124 03(3-0-0). Sexuality and Health. F, S. Basic concepts of human reproduction, contraception, pregnancy, abortion, and venereal disease; their relationship to health.

PS 200/A Y 200 01(0-0-1). Concepts in Human Anatomy and Physiology. F, S. Prerequisite: PS 300/A Y 300. Credit not allowed for both PS 200 and AY 200. Basic concepts in the anatomy and physiology of the human body.

PS 230/A Y 230 03(3-0-0). Animal Anatomy and Physiology. S. Prerequisite: BY/LSCC 102, C CC 107. Credit not allowed for both PS 230 and AY 230. Comparative systemic anatomy and physiology of farm animals.

PS 240 03(3-0-0). Human-Animal Interactions. S. Prerequisite: BY/LSCC 102. Animal cognition and behavior, animal ethics, and human-animal interactions: pets, livestock, service, entertainment, wildlife, teaching, and research.

PS 300/A Y 300 04(4-0-0). Principles of Human Anatomy and Physiology. F, S, SS. Prerequisite: C CC 103 or C CC 107 or C CC 111, BY/LSCC 102 or BZ/BZCC 101 or BZ/BZCC 110. Credit not allowed for both PS 300 and AY 300. Anatomy and physiology of humans.

PS 302 02(0-3-1). Laboratory in Principles of Physiology. F, S, SS. Prerequisite: AY 300/PS 300 or PS 310/BZ 310 or concurrent registration. Basic physiology lab exercises.

PS 310/BZ 310 03(3-0-0). Fundamentals of Physiology. S. Prerequisite: BY/LSCC 102 or BZ/BZCC 101 or BZ/BZCC 110, C CC 245 or concurrent registration. Credit not allowed for both PS 310 and BZ 310. Basic mechanisms of physiology: comparative and quantitative.

PS 324 02(2-0-0). Human Reproduction. F. Prerequisite: BY/LSCC 102 or BZ/BZCC 101. Reproductive biology, fertility, pregnancy, childbirth, and contraception.

PS 384 Var [1-5]. Supervised College Teaching. F, S, SS. Prerequisite: PS 300/A Y 300. Supervision by and work with graduate teaching assistants in small group learning sessions involving students enrolled in PS 300/A Y 300.

PS 410 03(3-0-0). Physiological Responses to the Environment. S. Prerequisite: AY 300/PS 300. Acute and chronic physiological responses to various environmental factors.

PS 420 03(3-0-0). Cardiopulmonary Physiology. F. Prerequisite: AY 300/PS 300. Normal and pathophysiology of cardiovascular and pulmonary systems.

PS 430 03(3-0-0). Endocrinology. F. Prerequisite: AY 300/PS 300. Physiology of the glands of internal secretion.

PS 450 03(3-0-0). Pharmacology. S. Prerequisite: AY 300/PS 300 or PS 310/BZ 310 or written consent of instructor. Pharmacologic principles, absorption, distribution, metabolism, excretion, side effects, and actions of drugs.

PS 479 02(2-0-0). Introduction to Space Biomedical Sciences. F. Exploration of changes in human physiology that occur during space flight, as well as issues important for human adaptation to living in weightlessness.

PS 495 Var. Independent Study.

PS 500 04(4-0-0). Mammalian Physiology I. F. Prerequisite: Six credits of biological science. Credit not allowed for both PS 500 and NB 501. Nervous, muscular, cardiovascular, and respiratory systems.

PS 501 04(4-0-0). Mammalian Physiology II. S. Prerequisite: Six credits of biological science. Renal, digestive, metabolic, endocrine, and reproductive function.

PS 560 03(2-0-1). Theory and Practice of Animal Biotechnology. S. Prerequisite: One semester of biochemistry or written consent of instructor. Principles of molecular technology and applications in animal and human populations, including transgenic technology and gene therapy.

PS 620 03(3-0-0). Cardiovascular Physiology. S. Prerequisite: PS 500. Physiology and biophysics of the circulatory system.

PS 625 03(3-0-0). Pulmonary Physiology. S. Prerequisite PS 420 or PS 500. Structure, function, and pathophysiology of respiratory system.


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

PS 640 05(5-0-0). Reproductive Physiology and Endocrinology. F. Prerequisite: PS 501. Reproductive physiology and endocrinology of vertebrate animals.

PS 642 01(0-3-0). Research Techniques for Gametes and Embryos. S. Prerequisite: Course in reproductive physiology. Collection, storage, evaluation, in vitro manipulation, and replacement of sperm, oocytes, embryos, and other reproductive tissues.

PS 684 Var. Supervised College Teaching. F, S, SS.

PS 710 03(3-0-0). Renal Pathophysiology. S. Prerequisite: AY 300/PS 300 or PS 501.
Urine formation, acid-base balance and renin-angiotensin-aldosterone system.

PS 740 03(3-0-0). Metabolism. F. Prerequisite: PS 501.
Applied pathophysiology of disorders of carbohydrate, lipid, protein, fluid, and electrolyte metabolism.

PS 792 Var [1-5]. Seminar.

PS 795-E Var. Independent Study.

A) Neurophysiology B) Cardiopulmonary physiology. C) Reproductive physiology.


PSYCHOLOGY COURSES

Department of Psychology
College of Natural Sciences

PYCC 100 03(3-0-0). General Psychology. F, S, SS. Also offered as telecourse.
Principles of psychology emphasizing empirical approaches; theories and research on learning, individual differences, perception, social behavior.
PY 121 01(1-0-0). Health and the Mind. F, S.
Maintenance of positive mental health.

PY 175/HD 175 03. Developmental Psychology Across the Life Span. F, S, SS. Credit not allowed for both PY 175 and HD 175.
Offered as telecourse only.
Theorv and research on physical, cognitive, and psychosocial human development across the life span.
PYCC 192 02(1-0-1). Introductory Seminar. F, S. Corequisite: PYCC 100.
Introduction to the University and the field of psychology. Examination of subareas within psychology and research methods used.

PYCC 228 03(3-0-0). Psychology of Human Sexuality. F, S, SS. Also offered as correspondence course.
Psychology of human sexuality; cross cultural issues, development, social perspectives, values, sexual dysfunction.

PY 250A-B. Experimental Psychology. F, S, SS. Prerequisite: PY/PSYC 100.
Design, analysis, and reporting of psychological research; perception, learning, motivation, psychophysics, magnitude estimation, and signal detection. A) 04(4-2-0). Special fee, $20. B) 04(4-0-0).

PY 268 02(3-0-0). Child Psychology. F, S, SS. Prerequisite: PY/PYCC 100.
Description and explanation of development of human behavior emphasizing theory and research concerned with infant and child.

PY 295 Var [1-3]. Independent Study.
Individual investigation of a special topic in psychology under direction of faculty.

PY 296 Var [1-3]. Group Study.
Collective investigation of a special topic in psychology under direction of faculty.

PY 315 03(3-0-0). Social Psychology. T, S, SS. Prerequisite: PY/PSYC 100.
Social psychological theory and research findings emphasizing research methodology; applications to contemporary social problems.

PY 316 03(3-0-0). Environmental Psychology. F, S, SS. Prerequisite: PY/PSYC 100. Also offered as correspondence course.
Social psychological theory and research on effects of behavior on the environment; environmental influences on behavior.

PY 317 02(0-4-0). Social and Environmental Laboratory. F, S, SS.
Prerequisite: PY 250A or B; PY 315 or concurrent registration or PY 314 or concurrent registration.
Exercises in social and environmental research methodology and design, including computer simulations and applications to contemporary problems.

PY 320 03(3-0-0). Abnormal Psychology. F, S, SS. Prerequisite: PY/PSYC 100. Also offered as telecourse.
Definition and description of behavior pathology; theory and research on factors in etiology and treatment of behavior disorders.

PY 325 03(3-0-0). Psychology of Personality. S. Prerequisite: PY/PSYC 100.
Theory and research related to personality as a psychological concept; analytic, phenomenological, and behavioral views.

PY 327 03(2-0-1). Psychological Perspectives on Female Experience. S. Prerequisite: PY/PSYC 100.
Contemporary theory and research focusing on emotional, cognitive, biosocial, and interpersonal contributions to female identity and sex role.

PY 340 03(3-0-0). Organizational Psychology. F. Prerequisite: PY/PSYC 100, ST/STCC 201, concurrent registration in PY 341.
Theories and research on interpersonal relations, work group processes, decision making, power, and change strategies within organizations.

PY 341 01(0-2-4). Organizational Psychology Laboratory. F. Corequisite: PY 340.
Application of organizational psychology through simulations and field involvements.

PY 352 03(3-0-0). Psychology of Learning. F, S, SS. Prerequisite: PY/PSYC 100 or written consent of instructor.
Current research and theoretical issues on reinforcement, punishment, extinction, generalization, discrimination learning, transfer, and retention.

PY 353 02(0-4-0). Psychology of Learning Laboratory. F, S. Prerequisite: PY 250A or B; PY 352 or concurrent registration. Special fee, $50.
Operant techniques emphasizing behavior theory, equipment, animal care, shaping, selected experiments in operant behavior.

*Maximum of 12 credits allowed for psychology majors toward graduation for any combination of PY 295, PY 296, PY 384, PY 480, PY 488, PY 495, PY 496, PY 498, PY 499; enrollment limited to one per student per semester.
PY 370 03(3-0-0). Psychological Measurement and Testing. F, S. Prerequisite: PY/PYCC 100, ST/STCC 301 or ST 311, concurrent registration in PY 371. Measurement theory including scale properties, reliability, and validity; construction and evaluation of psychological tests.


PY 384 Var [1-3]. Supervised College Teaching. F, S, SS. Prerequisite: PY/PYCC 100, written consent of department head. Maximum of 12 credits allowed in course. Supervised teaching, training, and discussion leadership in undergraduate courses.

PY 401 03(3-0-0). History and Systems of Psychology. F, S. Prerequisite: PL/PLCC 120, PY/PYCC 100, 5 credits in psychology. Philosophical and scientific underpinnings of psychology; major historical developments in psychology; schools of psychological thought.

PY 440 03(3-0-0). Industrial Psychology. S. Prerequisite: PY/PYCC 100, ST/STCC 201, concurrent registration in PY 441. Problems and procedures in selection and classification of personnel; work motivation; job satisfaction; leadership.

PY 441 01(0-2-0). Industrial Psychology Laboratory. S. Corequisite: PY 440. Laboratory and field experiences in job analysis, selection strategies, performance appraisal, and evaluation of development.

PY 452 03(3-0-0). Cognitive Psychology. F, S. Prerequisite: PY/PYCC 100 or written consent of instructor. Also offered as correspondence course. Human thinking and information processing as related to attention, pattern recognition memory, forgetting, hypothesis testing, and problem solving.

PY 453 02(4-0-0). Cognitive Psychology Laboratory. S. Prerequisite: PY 452 or concurrent registration.

PY 454A-B 03. Physiological Psychology. F, S. Prerequisite: A) PY/PYCC 100 or written consent of instructor. B) PY 250 A or B. Neuronanatomical and neurophysiological basis of behavior, relationships among anatomy and physiology and motivation, emotion, learning, memory, and sleep. A) 03(3-0-0) B) 03(2-0-1).

PY 455A-B 02(4-0-0). Physiological Psychology Laboratory. F, S. Prerequisite: PY 250A or B, PY 454A or concurrent registration. A) Research techniques in physiological psychology with animal research emphasis: animal care, surgery, brain stimulation and recording, histology. B) Research techniques in physiological psychology with human research emphasis: functional neuroanatomy (human brains), clinical neuropsychology.

PY 456 03(3-0-0). Sensation and Perception. F. Prerequisite: PY 454A or B. Review of research on physiological substrates of sensation; methods of scaling sensory experience; role of perception in behavioral adaptation.

PY 457 02(0-4-0). Sensation and Perception Laboratory. F, S. Prerequisite: PY 250A or B, PY 456 or concurrent registration. Exercises in laboratory research techniques and methodology; independent research on sensory and perceptual processes.

PY 460 03(3-0-0). Child Exceptionality and Psychopathology. F, S, SS. Prerequisite: PY/PYCC 100. Definition and description of child exceptionality and psychopathology; theory and research in etiology, educational implications, and treatment.

PY 465 03(3-0-0). Adolescent Psychology. F, S. Prerequisite: PY/PYCC 100. Contemporary theory and research on adolescence including physiological and psychological changes, social influences.

PY 486 Var [1-3]. Practicum. Supervised work experience in approved psychological setting with periodic consultation of faculty.

PY 488 Var [1-3]. Field Placement. F, S, SS. Supervised affiliation with and/or service work in approved psychological setting.

PY 492 Var [1-3]. Seminar. Prerequisite: For psychology majors or written consent of instructor. Special topics in psychology; may include psychology of women, psychology of religion, and clinical psychology.

PY 495 Var [1-3]. Independent Study. Individual investigation of a special topic in psychology under direction of faculty.

PY 496 Var [1-3]. Group Study. Collective investigation of a special topic in psychology under direction of faculty.

PY 498 Var [1-3]. Research. Independent research project culminating in formal research paper.

PY 499 Var [1-6]. Thesis. Independent research project culminating in a thesis presented to a faculty committee.

PY 580A-B 02(2-0-0). Special Topics in Psychology and Mental Health. F, S, SS. Offered only through Division of Educational Outreach.

PY 591 Var. Practicum. Collective investigation of a special topic in psychology under direction of faculty.

PY 595 Var. Independent Study. Individual investigation of a special topic in psychology under direction of faculty.

PY 596 Var. Group Study. Collective investigation of a special topic in psychology under direction of faculty.


PY 610 02(2-0-0). Counseling and Clinical Pre-practicum I. F. Prerequisite: Written consent of instructor. Basic assessment and intervention skills; accurate observation, conceptualization, and response.
PY 611 02(1-0-1). Counseling and Clinical Pre-practicum II. S. Prerequisite: PY 610. Counseling and clinical techniques; assessment and intervention strategies; special applications.

PY 643 03(3-0-0). Industrial/Organizational Psychology I. F. Prerequisite: PY 340, PY 440. Integration of multiple perspectives for examining work organizations, roles, and relationships, and organizational entry and socialization.

PY 644 03(3-0-0). Industrial/Organizational Psychology II. S. Prerequisite: PY 643. Multiple perspectives for examining individual and organizational development, orientation to organizations, and science and practice in industrial/organizational psychology.

PY 645 02(2-0-0). Industrial/Organizational Psychology at Work I. F. Prerequisite: PY 644, concurrent registration in PY 686C or PY 786C. Integrating theory, research, and practice in industrial/organizational settings. Assessment and development of applications of psychology in organizations.

PY 660 02(2-0-0). Industrial/Organizational Psychology at Work II. S. Prerequisite: PY 645, concurrent registration in PY 686C or PY 786C. Development and application of scientific, ethical, and professional standards and competencies in applying psychology in industrial/organizational settings.

PY 652 04(3-2-0). Methods of Research in Psychology I. F. Prerequisite: ST/STCC 201. Psychological research emphasizing hypothesis testing and simple research designs, introducing general linear model approach.

PY 653 04(3-2-0). Methods of Research in Psychology II. S. Prerequisite: PY 652. Advanced research designs emphasizing general linear model approach.


PY 670 03(3-0-0). Psychological Measurement-Personality. F. Prerequisite: PY 370. Construction, administration, interpretation of objective measures of personality including aptitudes, abilities, interests.

PY 672 03(3-0-0). Psychological Assessment. S. Prerequisite: PY 610, PY 670. Use of test data to determine cognitive functioning and predict behavior; supervised test administration and interpretation.

PY 675 03(3-0-0). Ethics and Professional Psychology Practice. F. Prerequisite: PY 611. Ethical practice of psychology, duty-to-warn statutes, Colorado law, problematic ethical situations.

PY 684A-D 03(3-0-0). Empirically Validated Therapies. S. Prerequisite: PY 611 or PY 692B or PY 692C or PY 692D. A) Counseling and diagnosis I. B) Experimental I. C) Industrial-organizational I. D) School I.

PY 692A-E 03(3-0-0). Diversity Issues in Counseling. F. Prerequisite: PY 611. Multiple perspectives for examining individual and organizational development, orientation to organizations, and science and practice in industrial/organizational psychology.

PY 699A-C 03(3-0-0). Empirically Validated Therapies. S. Prerequisite: PY 611. Overview of therapy theory including psychodynamic, behavioral, philosophical, information, systems, integrative/eclectic treatment approaches.

PY 720 03(3-0-0). Empirically Validated Therapies. S. Prerequisite: PY 611. Outline of major empirically validated approaches to assessment and treatment including cognitive-behavioral therapies, interpersonal therapy.

PY 727 03(3-0-0). Psychopathology. F. Prerequisite: PY 320. Adult and child behavior pathology; theory, research, and methods related to etiology, defining characteristics, and maintaining causes.

PY 728 03(3-0-0). Psychotherapy. F. Prerequisite: PY 727. Overview of therapy theory including psychodynamic, behavioral, philosophical, information, systems, integrative/eclectic treatment approaches.

PY 754 03(3-0-0). Psychopathology. F. Prerequisite: PY 655A-C. Overview of therapy theory including psychodynamic, behavioral, philosophical, information, systems, integrative/eclectic treatment approaches.
RADIATIONAL HEALTH SCIENCES
COURSES

Department of Radiological Health Sciences
College of Veterinary Medicine and Biomedical Sciences

R 300 03(3-0-0). Introduction to Radiation Biology. S. Prerequisite: BY/LSCC 102, PPH/CC 121.
Genetic and somatic effects of radiation on cells, tissues, and the whole organism; tumor therapy; carcinogenesis; risks vs. benefits of radiation.

R 400 03(2-3-0). Radiostotope Techniques. F. Prerequisite: C/C CC 112, PPH/CC 122, R 300.
Radiation measurement, radiochemistry, waste management, radiotracer experiments. Prepares student to act as principal user in radiation laboratory.

R 455 03(2-2-0). Interactive Information Processing in Biology. F. Prerequisite: ST/STCC 201.
Data management and analysis for biologists via interactive terminals.

R 530 03(3-0-0). Radiological Physics and Dosimetry I. F.
Prerequisite: PPH/CC 122.
Theory and detection of ionizing radiation; measurement and calculation of exposure and dose.

R 532 02(1-3-0). Nuclear Instruments and Measurements. F.
Prerequisite: R 530 or concurrent registration.
Instrument systems for measurement and identification of ionizing radiations.

R 550 05(5-0-0). Principles of Radiobiology. S. Prerequisite: BY 310; R 300 or R 530.
Dose-response relationships; physical, chemical, and biological modification of radiation damage; radiation oncology; radiation genetics and oncogenesis.

R 561 02(2-0-0). Radiation Public Health. S. Prerequisite: R 530, R 550 or concurrent registration; or R 300 and R 400 with written consent of instructor.
Aspects of radiation public health for students in health physics with emphasis on contemporary issues in radiation protection.

R 563 02(2-0-0). Environmental Contaminant Modeling I. S.
Prerequisite: M/M CC 155.
Mathematical modeling of radionuclide and chemical transport in aquatic and terrestrial ecosystems.

R 570 02(2-0-0). Radiocology. S.
Environmental transport and exposure assessment of radioactive and other contaminants; estimating risk for human health and ecological impacts.

R 595B-K Var. Independent Study.

R 630 02(2-0-0). Radiological Physics and Dosimetry II. S.
Prerequisite: R 530.
Calculations and measurement techniques for dosimetry shielding and protection from ionizing radiations.

R 632 02(1-3-0). Techniques in Radiation Dosimetry. S. Prerequisite: R 630 or concurrent registration.
Techniques for determining the absorbed dose in tissue from ionizing radiations.

R 633 01(0-3-0). Radiation Detection Methods in Radiobiology. S.
Prerequisite: R 630 or concurrent registration.
Detection and measurement of ionizing radiation appropriate for radiobiologists.

R 665 03(2-3-0). Radiochemistry. F. Prerequisite: C 114, M/M CC 155, R 530 or concurrent registration.
Theory and application to physical and biological systems.

R 671 01(0-3-0). Experimental Radiobiology. S. Prerequisite: Concurrent registration in R 570; R 400 or R 532.
Experimental techniques used in radioecological and environmental radiobiology studies.


R 701 Var. Radiographic Technique. F, S, SS. Prerequisite: VM 786A or B.
Radiographic techniques and special procedures.

R 711 Var. Radiographic Interpretation. F, S, SS. Prerequisite: VM 786A or B or C or D.
Radiographic interpretation of disease processes of all major systems in large and small animals.

R 721 Var [1-3]. Radiation Oncology. F, S, SS.
Management of spontaneous and experimental tumors with emphasis on radiation therapy.

R 751 03(3-0-0). Advanced Radiation Biology I. F.
Prerequisite: R 550.
Molecular and cellular mechanisms of radiation damage and repair; mammalian radiation genetics.

R 753 03(3-0-0). Advanced Radiation Biology II. S.
Prerequisite: R 550.
Perturbations in cell cycle and cell population growth kinetics by radiation; radiation effects on normal tissues; radiation oncogenesis.

R 765 01(0-3-0). Environmental Contaminant Modeling II. SS.
Prerequisite: R 563, R 570.
Development and analysis of advanced computer models for radionuclide and chemical transport in aquatic and terrestrial ecosystems.

R 770 01(0-0-1). Radiation Biology Basic to Tumor Therapy. F, S, SS.
Prerequisite: Written consent of instructor.
Current aspects of radiation biology pertinent to improvements in radiation therapy.

R 784 Var. Supervised College Teaching. F, S, SS.

R 786 Var. Practicum. Prerequisite: R 530.

R 792 01(0-0-1). Seminar.


R 796 Var. Group Study.

RESTAURANT/RESORT MANAGEMENT COURSES

Department of Food Science and Human Nutrition
College of Applied Human Sciences

RM 101 03(3-0-0). Hospitality Industry. F, S.
Food service, lodging, and tourism industries; exploration of various industry segments and career opportunities.

RM 200 03(3-0-0). Resort Operations. S. Prerequisite: RM 101 or written consent of instructor.
Front office and housekeeping management as related to resorts and hotels. Computer application, financial controls, employee and guest relations.

RM 350 03(3-0-0). Restaurant and Resort Marketing. F. Prerequisite: RM 101.
Restaurant and resort operations marketing, including planning, promotion, and special industry considerations.

RM 415 03(0-6-0). Catering Techniques and Culinary Arts. F, S. Prerequisite: FN 311. Special fee, $25.
Management of advanced techniques in culinary technique; catering of food and beverages for special functions.

RM 492 03(3-0-0). Seminar on Restaurant and Resort Management. Prerequisite: RM 350.
Capstone seminar in strategic restaurant and resort management using case studies, term papers, group presentations, and strategic planning proposals.

NATURAL RESOURCE RECREATION AND TOURISM COURSES

Department of Natural Resource Recreation and Tourism
College of Natural Resources

RR 100 03(3-0-0). Foundations of Recreation and Tourism. F.
Current concepts, terminology, suppliers, and the social, economic, and personal benefits from recreation, leisure, and tourism.

RR 231 03(3-0-0). Principles-Parks/Protected Area Management. F.
Tools and strategies used by managers in parks and protected areas.

RR 261 03(3-0-0). Principles of Interpretation. F. Prerequisite: RR 100.
Principles for using interpretation as a tool for managing natural and cultural resources.

RR 270 03(3-0-0). Principles of Natural Resource Tourism. F. Prerequisite: RR 100.
Tourism and private commercial outdoor recreation industry in America.

RR 320 03(3-0-0). International Issues-Recreation and Tourism. F, S.
History, development, and preservation of international parks, preserves, tourist and historical sites.

RR 330 03(3-0-0). Social Aspects of Natural Resource Management. S.
Visitor behavior in recreation environments applied to planning management and interpretive services in outdoor recreation.

RR 331 03(2-3-0). Management of Parks and Protected Areas. S. Prerequisite: RR 231, RR 330.
Comprehensive assessment of problems confronted by park professionals and the techniques and tools applied to their solution.

RR 350 03(2-2-0). Wilderness Leadership. F.
Practical and philosophical aspects of wilderness usage including safety, group dynamics, and backcountry skills.

RR 351 03(2-2-0). Wilderness Instructors. S. Prerequisite: RR 350 or written consent of instructor.
Preparation to safely lead and instruct groups in outdoor wilderness programs; further refine skills including judgment and leadership.

RR 363 03(2-2-0). Outdoor Recreation Programming. S. Prerequisite: RR 100.
Develop administrative and program planning skills for private, public, and nonprofit recreation/tourism organizations.

RR 371 03(2-1-0). Techniques in Interpretation. F. Prerequisite: RR 261.
Skill development in personal and non-personal interpretation.

RR 375 03(2-2-0). Budgeting and Revenue Resources. F. Prerequisite: RR 100.
Budget development, presentation, types, techniques; computer-aided budgeting using spread sheets; revenue generating sources.

RR 376 03(2-2-0). Recreation Measurements. F. Prerequisite: RR 100, ST/STCC 201.
Recreation measurement techniques.

RR 377 02(1-0-1). Recreation Resources Administration. S.
Prerequisite: RR 100.
Concepts, theory, and principles applied to administrative concerns of recreation resources organizations.

RR 384 Var. Supervised College Teaching. F, S, SS.

RR 431 03(0-6-0). Park and Protected Area Management. S. 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.

RR 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.

RR 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.
RR 435 03. Trails, Facility Design, Operation, Maintenance. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

RR 436 02. Recreation, Visual, Cultural Resource Management. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

RR 437 02. Off-Road Vehicle, River, and Winter Recreation. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

RR 438 02. Management of Wilderness. F, S, SS. Prerequisite: Written consent of instructor. Offered as correspondence course only.

RR 439 03(3-0-0). Open Space and Natural Area Management. S. Prerequisite: RR 440 or RR 431.

RR 440 03(3-0-0). Tourism Planning. S. Prerequisite: RR 270.

RR 450 03. Wilderness Philosophy and Ethic Development. F, S, SS. Offered as correspondence course only.

RR 451 03. National Wilderness Preservation System. F, S, SS. Prerequisite: RR 450. Offered as correspondence course only. Early history and key components of the Wilderness Act, wilderness legislation since 1964, and related natural systems.

RR 452 04. Management of the Wilderness Resource. F, S, SS. Prerequisite: RR 451. Offered as correspondence course only. Ecosystem characteristics, basic principles of wilderness management, and management of specific resources and nonconforming uses.

RR 453 03. Management of Recreation Resources. F, S, SS. Prerequisite: RR 451. Offered as correspondence course only. Managing for quality visitor experiences and for minimal recreation impacts, techniques for wilderness education/information.

RR 454 03. Wilderness Management Planning. F, S, SS. Prerequisite: RR 451. Offered as correspondence course only. Agency differences in planning, basic planning concepts, and the Limits of Acceptable Change.

RR 455 03. Wilderness Management Skills and Projections. F, S, SS. Prerequisite: RR 451. Offered as correspondence course only. Using primitive means to achieve management objectives, no-trace camping methods and volunteers, and expectations for the future.

RR 457 03. Off-Highway Vehicle Recreation in America. F, S, SS. Offered as correspondence course only. Overview of the supply and demand of off-highway vehicle recreation.

RR 458 03. Planning for Off-Highway Vehicle Recreation. F, S, SS. Prerequisite: RR 457. Offered as correspondence course only. Develop working knowledge of the planning tools, concept, and process for off-highway vehicle recreation.

RR 459 03. Managing Off-Highway Vehicle Recreation. F, S, SS. Prerequisite: RR 457. Offered as correspondence course only. Developing working knowledge of the management tools, techniques, trends, and challenges with off-highway vehicle recreation.

RR 460 02(2-0-0). Event and Conference Planning. S. Prerequisite: RR 270. Foundation in planning, organizing, and producing social events and conferences. Functions and strategies necessary for effective event management.

RR 461 03(2-2-0). Interpretation Techniques. S. Prerequisite: RR 261. Special variable ($50-$70) fee determined by department. Application of interpretive concepts to communicate natural, historic, and cultural resource values to the public.

RR 470 03(3-0-0). Tourism Impacts. F. Prerequisite: RR 270. Social, cultural, physical, and economic impacts of tourism; techniques for assessing impacts.

RR 487 Var. Internship.


RR 496 Var. Group Study.

RR 504/ER 504 02(2-0-0). Water-Based Recreation. S. Prerequisite: Written consent of instructor. Credit not allowed for both RR 504 and ER 504. Identify issues and management strategies for recreation utilization of water resources.

RR 531 03(1-4-0). Recreation Resource Management Field Studies. F. Prerequisite: S 310 or ST 311, and written consent of instructor. Application of problem-solving techniques to resolve current recreation management problems.

RR 550 03(3-0-0). Ecotourism. S. Prerequisite: RR 470. Concept of ecotourism, impacts associated with ecotourism, and role of education/interpretation in mitigating these impacts.

RR 565 01(0-0-1). Research Issues. F. Research issues, scientific process, nomenclature, ethics, and philosophy.

RR 570 03(0-6-0). Regional and Community Tourism Development. S. Prerequisite: RR 270. Application of planning principles for improving tourism potential for a selected region.

RR 604 02(2-0-0). Administration of Recreation Areas. S. Prerequisite: NRNRCC 320. Case studies of current problems facing public park and recreation area administrators.

RR 605 03(3-0-0). Recreation Behavior Theory. S. Prerequisite: RR 330. Application of theories and conceptual approaches from social sciences to study of recreation behavior and natural resource issues.

RR 665 03(2-2-0). Research Methods in Recreation and Tourism. S. Prerequisite: RR 565, ST/STCC 301. Research designs, sampling, analysis, computer packages, and proposal development.


RR 698 Var. Research.

RR 765  03(2-2-0). Advanced Research Methods. F. Prerequisite: RS 665.
Application and interpretation of multivariate statistics to human dimensions in natural resources, recreation, and tourism.

RR 784 Var. Supervised College Teaching. F, S, SS.

RR 796 Var. Group Study.

RR 798 Var. Research.


RANGELAND ECOSYSTEM SCIENCE COURSES

Department of Rangeland Ecosystem Science
College of Natural Resources

RS 289  02(1-2-0). Range-Watershed Survey. SS. Prerequisite: Written consent of instructor. Offered only through Division of Educational Outreach.
Field course in integrated natural resource management emphasizing range-watershed management and field measurement techniques.

RS 300  03(3-0-0). Principles of Range Management. F, S, SS. Prerequisite: BY 103 or BI/BZ/BI/CC 120. Also offered as an on-line course.
Conservation and management of rangeland-ecosystem values using sustainable practices.

RS 320/SC 320  03(3-0-0). Forage and Range Management. S. Prerequisite: One course in biological sciences. Credit not allowed for both RS 320 and SC 320.
Biology and management of introduced and native forage crops including production, preservation, and utilization.

RS 331  03(2-2-0). Rangeland Ecogeography. F, PREREQUISITE: RS 300, BI 223 or F 210 or NR 220.
Production characteristics and ecological niches of important plants and their rangeland communities.

+RS 352  02(1-3-0). Range Measurements. PREREQUISITE: ST/STCC 201 or ST/STCC 301 or ST/STCC 307 or EH/EHCC 307, RS 300 or concurrent registration, NR 220 or RS 331. Special fee, $30.
Field measurements of rangelands emphasizing vegetation sampling.

Biotic and abiotic factors affecting primary production, decomposition, and biogeochemical cycling in rangeland ecosystems.

RS 352  03(3-0-0). Range Animal-Habitat Interactions. S. PREREQUISITE: BY 220, RS 300 or RS 320/SC 320.
Ecosystem function and dynamics of interactions between producers and consumers.

RS 400  02(2-0-0). Rangeland Improvements. F. PREREQUISITE: RS 300 or RS 320/SC 320.
Improvement of rangelands through biological and cultural methods; management of improved rangelands.

RS 420  03(1-4-0). Grass Taxonomy. PREREQUISITE: BI 223 or written consent of instructor.
Anatomy, morphology, and identification of grasses.

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 470 or concurrent registration.
Definition of grazing management, grazing systems. Synthesis of animal, plant responses to grazing management. Structure, function of rangeland planning.

RS 472  04(1-4-0). Rangeland Ecosystem Planning. S. PREREQUISITE: RS 471.
Range allotment, ranch and restoration planning.

+RS 478  03(3-0-0). Restoration Ecology. S. PREREQUISITE: BY 220 or BI/BZ/CC 335 or F 311, SC 240.
Analysis of environmental factors influencing restoration of disturbed lands and practices for successful restoration of disturbed ecosystems.

RS 493  01(0-0-1). Seminar in Grassland and Shrubland Ecology.
RS 495 Var. Independent Study-Rangeland Ecosystem.
RS 496 Var. Group Study-Rangeland Ecosystem.

RS 501  03(3-0-0). Range Habitat Manipulation. F. PREREQUISITE: RS 300 or RS 320/SC 320.
Improvement of range habitats and effects on ecosystem components.

Explores and evaluates current issues and policies concerning range use.

RS 531  03(2-3-0). World Grassland Ecogeography. F. PREREQUISITE: BI 223.
Distribution, climate, and structure of the world's major grasslands with emphasis on North America.

Measurement, analysis techniques for rangeland vegetation. Applications to management emphasized.

RS 552  04(3-0-1). Range Animal Production and Management. S. PREREQUISITE: One course in ecology and one course in animal or wildlife management.
Biological and ecological basis for production of meat from rangelands.

Analysis of basic and applied ecological principles involved in reclamation of drastically disturbed western lands.

RS 630  03(3-0-0). Ecology of Grasslands and Shrublands. F. PREREQUISITE: One course in ecology.
Distributions and climatic controls on grassland and shrubland plant communities.

+RS 640  03(3-0-0). Vegetation-Environment Analysis. F. PREREQUISITE: ST/STCC 301.
Multivariate analyses and ecological interpretations of vegetation communities.
**SOCIETY COURSES**

**Department of Sociology**
**College of Liberal Arts**

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<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
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<tr>
<td>S 100</td>
<td>General Sociology</td>
<td>F, S, SS</td>
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<td>S 105</td>
<td>Social Problems</td>
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<td>S 192</td>
<td>Civic Culture and Social Responsibility</td>
<td>F, S</td>
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<tr>
<td>S 205</td>
<td>Contemporary Race-Ethnic Relations</td>
<td>F, S</td>
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<td>S 255</td>
<td>Introduction to Criminal Justice</td>
<td>S/SCC 100 or S/SCC 105</td>
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<td>S 301</td>
<td>Development of Sociological Thought</td>
<td>S/SCC 100 or S/SCC 105</td>
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<td>S 302</td>
<td>Contemporary Sociological Theory</td>
<td>F, S, SS</td>
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<td>S 310</td>
<td>Quantitative Sociological Analysis</td>
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<td>S 311</td>
<td>Methods of Sociological Inquiry</td>
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<td>S 312</td>
<td>Population-Natural Resources and Environment</td>
<td>F</td>
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<td>S 330</td>
<td>Social Stratification</td>
<td>S/SCC 100 or S/SCC 105</td>
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<td>S 331</td>
<td>Community Dynamics and Development</td>
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<td>S 332</td>
<td>Comparative Majority-Minority Relations</td>
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<td>S 333</td>
<td>Gender Roles in Society</td>
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<td>S 340</td>
<td>Bureaucracy and Modern Organizations</td>
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<td>S 341</td>
<td>Sociology of Rural Life</td>
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<td>Leisure and Society</td>
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<td>S 343</td>
<td>Sport and Society</td>
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<td>S 352</td>
<td>Criminology</td>
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<td>S 354</td>
<td>Law Enforcement and Society</td>
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<td>S 355</td>
<td>Sociology of Law</td>
<td>F, S</td>
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<td>S 356</td>
<td>Public Opinion in Mass Society</td>
<td>S/SCC 100 or S/SCC 105</td>
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Additional courses include:
- RS 651: Primary Production and Decomposition
- RS 652: Secondary Production in Rangeland Ecosystems
- RS 693: Seminar
- RS 695: Independent Study-Rangeland Ecosystem
- RS 696: Group Study-Rangeland Ecosystem
- RS 698: Research
- RS 699: Thesis
- RS 793: Seminar
- RS 795: Independent Study-Rangeland Ecosystem
- RS 798: Research
- RS 799: Dissertation

*Course codes and titles may vary.*
S 358 03(3-0-0). Correctional Organizations. S. Prerequisite: S 253.
Social and organizational issues in the administration of punishment and correction.

S 359 03(3-0-0). Criminal Justice Ethics. F. Prerequisite: S 253.
Definitions and analysis of standards of ethical conduct in law enforcement, the courts, and corrections.

S 360 03(3-0-0). Political Sociology. S. Prerequisite: S/S CC 100 or S/S CC 105.
Analysis of power as a sociological concept, emphasizing competing theories of the state and power.

S 362 03(3-0-0). Social Change. S. Prerequisite: S/S CC 100 or S/S CC 105.
Sources of stability and stress in changing societies, consequences of planned and unplanned change, future trends.

S 364 03(3-0-0). Agriculture and Global Society. S. Prerequisite: S/S CC 100 or S/S CC 105.
Analysis of relationships between global agriculture and social change.

S 366 03(3-0-0). Peoples and Institutions of Latin America. F.
Prerequisite: S/S CC 100 or S/S CC 105.
Change in the cultures and institutions of contemporary Latin America.

S 371 03(3-0-0). Symbolic Interaction. F, S. Prerequisite: S/S CC 100 or S/S CC 105.
Basic concepts and issues in sociological perspective of social action and interactionism.

S 372 03(3-0-0). Sociology of Deviance. F, S, SS. Prerequisite: S/S CC 100 or S/S CC 105.
Description, comparison, and analysis of theories and research of deviance.

S 374 03(3-0-0). Sociology of Occupations and Professions. F.
Prerequisite: S/S CC 100 or S/S CC 105.
Sociological analysis of various occupations, professions, overview of organization, processes, relationships, implications of work as a social activity.

S 375 03(3-0-0). Sociology of Religion and Medicine. F. Prerequisite: S/S CC 100 or S/S CC 105.
Descriptions and analyses of the roles and relationships of religion and medicine as modern social institutions.

S 403 03(3-0-0). Capstone Seminar. F, S. Prerequisite: S 310, S 311; S 301 or S 302, S 111.
Student demonstration of central concepts and procedures currently employed in sociology discipline.

S 412/AP 422 03(2-0-1). Comparative Legal Systems. S.
Prerequisite: AP/APCC 100 or S/S CC 100. Credit not allowed for both S 422 and AP 422.
Traditional approaches to law, comparing concepts of law in the global system, and experiences of minorities in state legal systems.

S 429 03(3-0-0). Comparative Urban Studies. S. Prerequisite: S/S CC 100 or S/S CC 105.
World urbanization and metropolitan development, measurement of growth and change in cities, and sociological perspective in planning.

S 444/ET 444 03(3-0-0). Federal Indian Law and Policy. S.
Credit not allowed for both S 444 and ET 444.
Indian policy processes and their impact on Native lives and culture, particularly Native sovereignty.

S 464 03(3-0-0). Environmental Justice. F. S. Prerequisite: S/S CC 100 or S/S CC 105.
Unequal distribution of environmental risks, benefits, policies, and regulatory practices across different populations.

S 466 03(3-0-0). Technology, Society, and Environment. F.
Prerequisite: S/S CC 100 or S/S CC 105.
Technology as a social phenomenon interacting with social organization and the natural environment.

S 467 03(3-0-0). Sociology of Water Resources. S. Prerequisite: S/S CC 100 or S/S CC 105.
Social aspects of water resource utilization; interface of social organization with physical environment.

S 468 03(3-0-0). Sociology of Disaster. S. Prerequisite: S/S CC 100 or S/S CC 105.
Determinants and consequences of behavior and response to environmental extremes including floods, earthquakes, wind, severe storms, and technological emergencies.

S 487 04(0-9-1). Internship. Prerequisite: S 301 or S 302, S 310, S 311, S 313.
Academic-based work experience with selected organizations or agencies. Supervised application of sociological principles and seminar participation.

S 492 01(0-0-1). Seminar.

S 495 Var. Independent Study.

S 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.

S 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.

S 502 03(3-0-0). Foundations of Theoretical Sociology. F.
Prerequisite: S 500 or concurrent registration.
Contributions of major sociological theorists prior to mid-20th century.

S 510 03(3-0-0). Sociological Methods I. F. Prerequisite: S 310 or S 311.
Linkage of sociological theory and conceptual models; case studies; data-gathering techniques.

S 511 03(3-0-0). Sociological Methods II. S. Prerequisite: S 510.
Linkage of sociological theory and conceptual models; case studies; data-gathering techniques.

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

S 602 03(3-0-0). Contemporary Sociological Theory. S.
Prerequisite: S 502.
Contributions of major sociological theorists since mid-20th century.

S 610 03(0-0-3). Seminar in Methods of Qualitative Analysis. F.
Prerequisite: S 311.
Examination and application of qualitative techniques of analysis.

S 612 03(0-0-3). Seminar in Methods of Evaluational Research. S.
Prerequisite: S 511.
Quantitative and qualitative techniques of evaluating social action programs.
S 613 03(0-0-3). Seminar in Multiple Regression and Path Analysis. F. Prerequisite: S 511.
Analysis and application of techniques for multiple regression and path analysis.

*S 614 03(3-0-0). Comparative Sociology. S. Prerequisite: S 500.
Examination of problems and prospects in extending and carrying out sociological research across social systems.

*S 630 03(3-0-0). Social Stratification. S. Prerequisite: S 500.
Theory and research on class structure, status attainment, ideology, and social change.

*S 631 03(3-0-0). Sociology of Rural Development. F. Prerequisite: S 500.
Rural social organization and development, modernization, and social change as it relates to rural social systems; underdeveloped regions of the world.

*S 632 03(3-0-0). Theories of Modern Organizations. S. Prerequisite: S 340.
Comparison of various theoretical perspectives on functioning of modern large-scale organizations.

*S 639/CE 630 03(3-0-0). Technology Assessment and Social Forecasting. F. Prerequisite: S 500. Credit not allowed for both S 639 and CE 630.
Interrelationship between technology and society emphasizing procedures for evaluating impacts and forecasting alternatives.

*S 640 03(3-0-0). Theories and Issues in Developmental Change. F. Prerequisite: S 500.
Central concepts, issues, and approaches in sociology of development.

*S 660 03(3-0-0). Gender and Global Society. S. Prerequisite: S 500.
Gender relations and social change in global society.

S 662 03(0-0-3). Seminar in Sociological Policy Analysis. S. Prerequisite: S 500.
Examination of sociological perspectives on formulation and impact of policies to deal with social problems.

*S 663 03(3-0-0). Sociology of Sustainable Development. S. Prerequisite: S 500.
Social dimensions of sustainable Third World development and implications for policy.

*S 664 03(3-0-0). Sociology of Water Resources. F. Prerequisite: S 500.
Social organization, conflict, and power in arid environments.

S 665 03(3-0-0). Sociology of Science and Technology. F. Prerequisite: Ten credits of undergraduate natural sciences; SS/CC 101.
Examination of connections among science, technology, and social development in national and global context.

*S 666 03(0-0-3). Globalization and Socioeconomic Restructuring. S. Prerequisite: S 500.
Sociological theories and issues in globalization, socioeconomic restructuring of the world economy.

S 667 03(1-0-2). Theories of State, Economy, and Society. S. Prerequisite: S 500.
Major classical and contemporary sociological theories of state-economy-society relations emphasizing development.

S 669 03(0-0-3). International Stratification and Change. F. Prerequisite: S 500.
Major issues in global stratification and change from a historical and contemporary perspective.

S 671 03(0-0-3). Metatheoretical Issues in Sociology. F. Prerequisite: S 502.
Analysis of metatheoretical concepts and issues in sociological theory.

*S 674 03(0-0-3). Seminar in Social Movements and Collective Behavior. S. Prerequisite: S 500.
Theory and research on causes, organizational structure, and outcomes of social movements and collective behavior.

S 695 Var. Independent Study.


*S 708 03(0-0-3). Seminar in Theory Construction. F. Prerequisite: S 602; S 610 or S 612 or S 613.
Techniques of integrating theory and research methods for macro-sociological analysis.

*S 750 03(0-0-3). Seminar in Strategies of Applied Social Change. F. Prerequisite: S 660.
Review and critique of intervention strategies.

*S 751 03(0-0-3). Seminar in Theories of Autonomous Change. S. Prerequisite: S 660.
Review and critique of selected theories of autonomous change.

*S 752 03(0-0-3). Seminar in Utopian Thought. F. Prerequisite: S 602.
Sociological analysis of major utopian writings.

*S 761 03(3-0-0). Social Choice. S. Prerequisite: Two graduate-level courses in social science.
Evaluation of adequacy of traditional policy models as a basis for social action.

*S 763 03(0-0-3). Seminar in Social Conflict and Development. F. Prerequisite: S 660.
Critique of planning, social conflict, and development theories.

S 764 03(0-0-3). World System Theory. F. Prerequisite: S 660.
Global interconnectedness of social change and development processes.

*S 768 03(3-0-0). Directed Social Change. S. Prerequisite: S 500.
Issues of directed social change.

S 784 Var. Supervised College Teaching. F, S, SS.

S 787 Var. Internship.

S 795 Var. Independent Study.

*S 797 03(0-0-3). Group Study in Developmental Change. Prerequisite: S 660.
Critique of selected theories in developmental change.

SOIL AND CROP SCIENCES COURSES

Department of Soil and Crop Sciences
College of Agricultural Sciences

SC 100 04(3-2-0). General Crops. F
Production and adaptation of cultivated crops; principles affecting growth, development, management, and utilization.

SCCC 192 03(0-0-3). Water in the West. F
History and current status of water resources management and policy in the western United States.

SC 200 01(0-2-0). Seed Anatomy and Identification. F, S, SS.
Prerequisite: One course in biology or SC 100 or H/H CC 100 or written consent of instructor. Also offered as correspondence course.
Principles of seed anatomy including reproduction, identification, and seed characteristics of plant families.

SC 201 01(0-2-0). Seed Development and Metabolism. F, S, SS.
Prerequisite: One course in biology or SC 100 or H/H CC 100 or written consent of instructor. Also offered as correspondence course.
Basic processes controlling seed development, maturation, dormancy, storage, germination, and how these factors relate to seedling growth.

SC 240 04(3-2-0). Introductory Soil Science. F, S, SS. Prerequisite: CC CC 107 or CC CC 111.
Formation, properties, and management of soils emphasizing soil conditions that affect plant growth.

SC 309 02(0-0-4). Seed Germination and Viability, F, S, SS.
Prerequisite: SC 201 or written consent of instructor. Also offered as correspondence course.
Seed viability tests including standard germination and tetrazolium, seed viability, dormancy, parameters of viability and evaluation.

SC 340 03(2-2-0). Geographic Information Systems in Agriculture. F. Prerequisite: CS 110. Credit not allowed for both SC 340 and CB 340.
Introduction to geographic information systems and global positioning systems with applications to agriculture.

SC 370 03(3-0-0). Irrigation Principles and Management. S.
Prerequisite: H/H CC 100 or SC 100, SC 240.
Application and measurement of irrigation water, measurement of soil water, soil-water-plant and irrigation efficiency-environment relationships.

SC 378 03(3-0-0). Environmental Soil Science. F. Prerequisite: SC 240.
Environmental problems related to soil, including toxic substances, land use impacts, air pollutants, and organic waste amendments.

SC 384 Var [1-5], Supervised College Teaching. F, S, SS.
Maximum of 10 credits allowed in course.

SC 414 03(2-2-0), Agricultural Experimental Design. S. Prerequisite: ST/STCC 201 or ST/STCC 301.
Design of agricultural experiments and statistical analysis of resulting data.

SC 420 03(3-0-0). Crop and Soil Management Systems I. S.
Prerequisite: H/H CC 100 or SC 100, SC 240.
Principles of crop, soil management emphasizing environmental factors influencing crop growth and development, interactions with soil organic matter.

SC 421 04(3-2-0). Crop and Soil Management Systems II. F.
Prerequisite: H/H CC 100 or SC 100, SC 240.
Principles of crop and soil management with emphasis on soil erosion control, water conservation, and plant-water relationships.

SC 430 03(3-0-0). Applications of Plant Biotechnology. S.
Prerequisite: SC 330.
Current and potential applications of DNA-based biotechnology in crop agriculture and other plant disciplines.
SC 755 03(3-0-0). Advanced Soil Microbiology. S. Prerequisite: MB 624 or SC 455.
Ecology of soil microorganisms emphasizing population and activity relationships, nitrogen fixation, and microbe-pesticide interactions.

SC 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.

SC 770 04(3-2-0). Advanced Soil Physics. S. Prerequisite: M 261 or SC 470.
Description and analysis of principles of storage and movement of water, solutes, heat, and gases in soils.

SC 784 Var. Supervised College Teaching. F, S, SS.

SC 792 01(0-0-1). Seminar.

SC 795 Var. Independent Study.

SC 796 Var. Group Study.


SPEECH COMMUNICATION COURSES

Department of Speech Communication
College of Liberal Arts

SPCC 100 03(3-0-0). Communication and Popular Culture. F, S, SS.
Classical tradition of speech communication, its extension to broadcasting, and integration of both in contemporary culture.

SPCC 192 03(0-0-3). Introduction to Intercultural Communication. F
Analysis of communication differences and similarities across cultures and co-cultures; effective communication in intercultural interactions.

SPCC 200 03(3-0-0). Public Speaking. F, S, SS.
Fundamentals of public speaking emphasizing content, organization, delivery, audience response.

SPCC 201 03(3-0-0). Rhetoric in Western Thought. F, S.
Major concepts of Western rhetoric from Greece to modern times and their relationship to present-day approaches to communication.

SP 205 03(3-0-0). Group Communication. F. S. Prerequisite: SP/SPCC 200.
Principles and methods of group communication emphasizing face-to-face and electronically mediated problem solving and decision making.

SPCC 207 03(3-0-0). Rhetoric and Argumentation. F, S.
Principles of logical reasoning in speeches of advocacy including analysis, use of evidence, inductive and deductive reasoning.

SP 215 01(0-2-0). Intercollegiate Forensics. F, S. Maximum of 4 credits allowed in course.
Principles of debate, public speaking, and oral interpretation practiced in intramural, local, and/or novice intercollegiate events.

SP 217 03(3-0-0). Nonverbal Communication. S.
Nonlanguage symbols in communication; systems and functions of nonverbal communication behaviors.

SP 231 03(3-0-0). Oral Reading. F, S.
Analysis and reading of rhetorical and poetic writing leading to understanding, appreciation, and expressive communication.

SP 260 03(0-0-3). Advanced Public Speaking. F, S, SS. Prerequisite: SP/SPCC 200.
Advanced technique in public speaking; emphasis on argument construction and refutation, style, and manuscript delivery.

SP 302 03(3-0-0). Parliamentary Procedure. SS.
History, principles, and effective practice of parliamentary procedure and law.

SP 303 03(3-0-0). Business and Professional Speaking. S. Prerequisite: SP/SPCC 200.
Principles and practice of communication in business and professional settings, emphasizing interviews and personal presentations.

SP 305 03(3-0-0). Intercultural Communication. F, S.
Influences on communication between people of different nations; communication rules/norms in specific cultures; cultural adaptation.

SP 306 03(3-0-0). Co-Cultural Communication. F, S, SS.
Cultural concerns of communication among co-cultures of United States; diversity; self-awareness as cultural imperative for enhanced communication.

SP 309 03(3-0-0). Conflict Management and Communication. S.
Theories and principles of communication in conflict management; application to conflict resolution situations.

SP 310 03(3-0-0). Interpersonal Communication Skills. S, SS.
Analysis, exploration, and skill enhancement strategies for interpersonal communication in friendship, couple, family, and business relationships.

SP 311 03(3-0-0). Historical Speeches on American Issues. F.
Significant speeches and speakers as they reflected and affected American issues from colonial period through early 20th century.

SP 315 01(0-2-0). Public Discussion and Debate. F, S. Prerequisite: SP 215. Maximum of 4 credits allowed in course.
Advanced principles of debate, public speaking, and oral interpretation with practical application at intercollegiate forensics tournaments.

SP 317 03(3-0-0). Women and Communication. F.
Analysis and exploration of communication as it relates to women, their roles, and their identities.

SP 341 03(3-0-0). Evaluating Contemporary Television. F.
Rhetorical standards applied to content, ethical, and artistic aspects of American televised discourse; emphasizing nonentertainment programming.

SP 344 03(3-0-0). Critical Media Studies. F, S.
Analysis of communication media; history, structure, regulation, policy, and impact upon society.

SP 346 03(2-2-0). Virtual Culture and Communication. F, S. Prerequisite: SP/SPCC 100.
Rhetorical theory applied to planning, producing, and evaluating computer-mediated messages.
SP 347 03(2-2-0). Video Communication. F, S. Prerequisite: SP/SPCC 100. 
Rhetorical theory applied to planning, producing, and evaluating video messages and using video technology.

SP 349 03(2-0-0). Freedom of Speech. F. 
Historical and philosophical precedents to freedom of speech; development of free speech principles in the U.S.; ethical obligations of speakers.

SP 354 03(1-4-0). History and Appreciation of Film. F. 
Screening and evaluation of landmark fiction and nonfiction films; assessment of cinema as an art form and a social force.

SP 355 03(2-2-0). Evaluating Contemporary Film. S. Prerequisite: SP 254. 
Theory and development of film criticism; application of critical approaches to modern fiction and nonfiction film.

SP 356 03(3-0-0). Rhetoric of Documentary Film. F. Prerequisite: SP 354. 
History and evolution of documentary film. Analysis of conventions and rhetorical strategies of the genre.

SP 384 Var [1-3]. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course. 
Open only to undergraduate students who are invited to assist in teaching selected courses.

SP 387 01(1-0-0). Communication Internship. Prerequisite: SP/SPCC 100, SP/SPCC 200, SP/SPCC 201, SP/SPCC 207, 2.0 GPA.

SP 403 03(0-0-0). Rhetoric in Contemporary Social Movements. F. 
Case studies of campaigns and social movements; genesis, leadership, and use of traditional and electronically mediated rhetoric to achieve objectives.

SP 409 03(3-0-0). Studies in Persuasion. S. 
Rhetorical and behavioral theories of persuasion applied to persuasive practice in public and interpersonal arenas of social influence.

SP 411 03(3-0-0). Contemporary Speeches on American Issues. S. 
Significant speeches and speakers as they reflect and affect issues, 1930 to present.

SP 412 03(3-0-0). Evaluating Contemporary Rhetoric. S. 
Exploration and evaluation of contemporary persuasive communication in order to understand and assess a variety of forms of messages and symbols.

SP 417 03(3-0-0). Communication, Language, and Thought. S. 
Influence of rhetoric, ranging from spoken language to electronically mediated communication, on human understanding and Western thought.

SP 443 03(3-0-0). Radio-Television Writing. S. 
Application of rhetorical principles to commercial and noncommercial spot-writing formats; political campaign writing; feature writing.

SP 447 03(3-0-0). Television-Radio Programming and Management. F. 
Management of electronic media in contemporary American culture; emphasis on factors influencing program decision making.

SP 449 03(3-0-0). Law and Policy of Communication Technologies. F. 
Constitutional guarantees; statutory and administrative law; policy relating to existing and emerging communication technologies.

SP 450 02(0-0-2). Capstone Seminar. F, S. 
Application of rhetorical and communication principles; student demonstration of speech communication theory and skills.

SP 454 03(3-0-0). Chicano/a Film and Video. F. 
Emergence of Chicano/a cinema from a place of displacement, resistance, and affirmation found in contemporary Chicano/a film, video.

SP 495 Var. Independent Study.

SP 496 Var. Group Study.

SP 503 03(3-0-0). Transformations in Rhetorical Theory. S. 
Prerequisite: SP/SPCC 201 or graduate status. 
Changes in rhetorical theory from 1450 to 1950, including psychological, dramatic, literary, historical, and political influences.

SP 505 03(3-0-0). Ethnography of Communication. F. 
Theoretical and methodological concerns in the ethnography of communication; qualitative research/fieldwork; critical-cultural data interpretation.

SP 510 03(3-0-0). Theories of Interpersonal Communication. S. 
Theories of communication in development, maintenance, and deterioration of friendship, couple, family, group, and business relationships.

SP 512 03(3-0-0). Rhetorical Criticism. F. Prerequisite: Fifteen 300-400 level credits in speech and/or English. 
Traditional and contemporary methods for analyzing persuasive discourse.

SP 514 03(3-0-0). British Origins of American Discourse. S. 
Major British speakers from 18th, 19th, and 20th centuries who significantly influenced American discourse.

SP 523 03(3-0-0). Feminist Theories of Discourse. F. 
Exploration and evaluation of contemporary feminist theories of rhetoric and discourse.

SP 527 03(3-0-0). Communication in Organizations. SS. 
Communication theory and strategy for empowerment of nonsupervisory and supervisory personnel.

SP 530 03(3-0-0). Communication Research Methods. S. 
Historical and philosophical context of communication research; relationship between theory and method; dominant forms of communication research.

SP 601 03(3-0-0). Ancient and Medieval Rhetoric. F. Prerequisite: Fifteen 300-400 level credits in speech and/or English. 
Rhetorical theories: Greek, Roman, and medieval times.

SP 620 03(3-0-0). Communication Theory. F. Prerequisite: Fifteen 300-400 level credits in speech and/or English. 
Examination of communication theories and perspectives; analysis of modern theories of face-to-face communication.

SP 623 03(3-0-0). Contemporary Theories of Discourse. S. 
Prerequisite: Fifteen 300-400 level credits in speech, English, or philosophy. 
Contemporary perspectives on rhetoric, discourse, and human communication.

SP 646 03(3-0-0). Theories of Mediated Communication. S. 
Prerequisite: Fifteen 300-400 level credits in speech communication, English, or journalism. 
Survey of the broad range of rhetorical/qualitative theories that inform media studies.

SP 684 Var [1-3]. Supervised College Teaching. F, S, SS.
STATISTICS COURSES

Department of Statistics
College of Natural Sciences

Population, sample, variation, data, relationships, probability and risk, polls, prediction, margin of error, critical assessment of studies.

Use of statistical tools in real-life problems using computer packages; integration of critical thinking skills using case studies.

STCC 19201 00(0-1-3). First-Year Seminar in Mathematical Sciences. F, S, SS. Prerequisite: In order to fulfill first-year seminar requirement, students also need to pass M/M CC 192.
Richness and variety of problems encountered in the mathematical sciences.

STCC 201 03(2-0-1): General Statistics. F, S, SS. Prerequisite: M/M CC 120A-B. Intended as a one-semester terminal course. Credit not allowed for both ST/STCC 201 and ST/STCC 204.
Graphs, descriptive statistics, confidence intervals, hypothesis tests, correlation and simple regression, tests of association.

STCC 204 03(2-2-0). Statistics for Business Students. F, S, SS. Prerequisite: M/M CC 120A-B. Credit not allowed for both ST/STCC 204 and ST/STCC 201.
Surveys, sampling, descriptive statistics, confidence intervals, hypothesis tests, correlation and simple regression, tests of association.

STCC 301 03(3-0-0). Introduction to Statistical Methods. F, S, SS. Prerequisite: M/M CC 121. Credit allowed for only one course: ST/STCC 301, ST/STCC 307, EH/EHCC 307, ST/STCC 309, ST 311.
Techniques in statistical inference; confidence intervals, hypothesis tests, correlation and regression, analysis of variance, chi-square tests.

ST 302 03(3-0-0). Design of Experiments. F, S, SS. Prerequisite: ST/STCC 301 or ST/STCC 307 or EH/EHCC 307 or ST/STCC 309 or ST 311.
Analysis of variance, covariance, randomization; completely randomized, randomized block, Latin-square, split-plot, factorial and other designs.

ST 303/EE 303 02(2-0-0). Introduction to Communications Principles. F, S: Prerequisite: M 260. Credit not allowed for both ST 303 and EE 303.
Basic concepts in design and analysis of communication systems.

ST 304 03(3-0-0). Multiple Regression Analysis. F, S, SS. Prerequisite: M 229, ST/STCC 301 or ST/STCC 307 or EH/EHCC 307 or ST/STCC 309 or ST 311.
Estimation and testing for linear, polynomial, and multiple regression models; analysis of residuals; selection of variables; nonlinear regression.

ST 305 03(3-0-0). Sampling Techniques. F, S. Prerequisite: ST/STCC 301 or ST/STCC 307 or EH/EHCC 307 or ST/STCC 309 or ST 311.
Sample designs; simple random, stratified, systematic, cluster, unequal probability, two phase, methods of estimation and sample size determination.

STCC 307/EHCC 307 03(3-0-0). Introduction to Biostatistics. F, S, SS. Prerequisite: M/M CC 121. Credit allowed for only one course: ST/STCC 301, ST/STCC 307 or EH/EHCC 307, ST/STCC 309, ST 311.
Biostatistical methods; confidence intervals, hypothesis tests, simple correlation and regression, one-way analysis of variance.

STCC 309 03(3-0-0). Statistics for Engineers and Scientists. F, S, SS. Prerequisite: M/M CC 161 or M/M CC 255. Credit allowed for only one course: ST/STCC 301, ST/STCC 307 or EH/EHCC 307, ST/STCC 309, ST 311.
Calculus-based probability and statistics; distribution theory, estimation, hypothesis testing, applications to engineering and the sciences.

ST 310 03(3-0-0). Data Analysis and Database Management Tools. F, S. Prerequisite: ST/STCC 301 or ST/STCC 307 or EH/EHCC 307 or ST/STCC 309 or ST 311.
Principles and practice of database management, statistical packages, graphics, and Internet resources.

ST 311 03(3-0-0). Statistics for Behavioral Sciences I. F. Prerequisite: M/M CC 121. Credit allowed for only one course: ST/STCC 301, ST/STCC 307 or EH/EHCC 307, ST/STCC 309, ST 311.
Classification, descriptive statistics; inference, testing, estimation; categorical data analysis; odds ratio.

ST 312 03(3-0-0). Statistics for Behavioral Sciences II. S. Prerequisite: ST 311 or written consent of instructor.
One-way analysis of variance, factorial designs, blocked designs, multiple comparisons of means, and multiple regression.

ST 312 03(3-0-0). Elementary Probabilistic-Stochastic Modeling. S. Prerequisite: M/M CC 121 or two years of high school algebra; knowledge of a computer language.
Probabilistic and stochastic models of real phenomena; distributions, expectations, correlations; averages; simple Markov chains and random walks.

ST 420 03(3-0-0). Probability and Mathematical Statistics I. F. Prerequisite: M/M CC 255 or M 261.
Probability, random variables, distribution functions, and expectations; joint and conditional distributions and expectations; transformations.

ST 430 03(3-0-0). Probability and Mathematical Statistics II. S. Prerequisite: ST 420.
Theories and applications of estimation, testing, and confidence intervals; sampling distributions including normal, gamma, beta X^2, t, and F.

ST 440 03(3-0-0). Applied Multivariate Analysis. S. Prerequisite: ST 304.
Principles for multivariate estimation and testing; multivariate analysis of variance, discriminant analysis; principal components, factor analysis.

ST 472 03(0-0-3) Statistical Consulting. S. Prerequisite: ST 310 or concurrent registration or written consent of instructor.
Statistical consulting skills including data analysis, problem solving, report writing, oral communication, and planning experiments.

ST 495 Var. Independent Study. Prerequisite: ST/STCC 301, written consent of instructor.
ST 720 04(4-0-0). Probability Theory. S. Prerequisite: M 517, ST 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.

ST 725 03(3-0-0). Time Series and Stationary Processes. F, S, SS. Prerequisite: ST 720, ST 730.
Spectral theory of multivariate stationary processes; estimation, testing for spectral, linear, AR-MA representations; best linear predictors, filters.

ST 730 04(4-0-0). Advanced Theory of Statistics I. F. Prerequisite: ST 530, ST 730.
Decision theory model; Bayes, e-Bayes, complete, and admissible classes; applications to sequential analysis and design of experiments.

ST 740 03(3-0-0). Advanced Statistical Methods. F, S. Prerequisite: ST 640.
Generalized additive models; recursive partitioning regression and classification; graphical models and belief networks; spatial statistics.

ST 750 03(3-0-0). Advanced Theory of Design. F, S. Prerequisite: ST 590 or written consent of instructor.
Information theory; design evaluation, factorial designs and optimal designs, orthogonal and balanced arrays, designs with discrete/continuous factors.

ST 760 03(3-0-0). Theory of Multivariate Statistics. F, S. Prerequisite: ST 640, concurrent registration in ST 730.
Theory of multivariate normal; maximum-likelihood inference, union-intersection testing for single sample; theory of a multivariate linear model.

ST 770 03(3-0-0). Approximation Theory and Methods. F. S. Prerequisite: ST 720.
Edgeworth expansions, saddlepoint methods; applications of weak convergence and other approximation methods in mathematical statistics.

ST 792 Var. Seminar.

ST 795 Var. Independent Study.

ST 796 Var. Group Study.
Methodology, stochastic processes, experimental design, multidimensional statistics


SOCIAL WORK COURSES

Department of Social Work
College of Applied Human Sciences

SWCC 110 03(3-0-0). Contemporary Social Welfare. F, S, SS.
Principles, values and institutions of U.S. social welfare in context of human need within family, groups, and society.

SW 150 04(4-0-0). Introduction to Social Work. F, S. Prerequisite: PYCC 100 or concurrent registration; S/S CC 100 or S/S CC 105 or concurrent registration. Also offered as telecourse.
Historical development of social welfare. Knowledge, values, intervention skills, settings, and groups served by social workers.

SW 223 03(3-0-0). Systems Perspective for Social Work. F. S. Prerequisite: HD/HDCC 101 or concurrent registration; SW 150 or concurrent registration.
Knowledge of human behavior and the social environment; knowledge building for social work practice from a systems perspective.

SW 286A-B 03(0-3-2). Practicum. Prerequisite: SW 286A and SW 286B must be taken in sequence. SW 23) or concurrent registration. Maximum of 6 credits allowed in course.
Development of beginning helping relationships. Communication and applied helping skills used in social work. Point for progression to the major. A) Communication skills. B) Applied helping skills.

SW 330 03(3-0-0). Human Diversity Practice Issues. F. S. Prerequisite: SW 233 or concurrent registration.
Knowledge about human differences and similarities essential for social work practice.

SW 340 03(0-0-3). Generalist Practice-Individuals and Families. F, S, SS. Prerequisite: Progression into the major. SW 286B or concurrent registration.
Problem-solving approach applied to individuals and families within a generalist practice framework.

SW 341 03(0-0-3). Generalist Practice-Small Groups. F, S, SS. Prerequisite: SW 286B or concurrent registration.
Problem-solving approach applied to small groups within a generalist practice framework.

SW 342 03(0-0-3). Generalist Practice-Organizations/Communities. F, S, SS. Prerequisite: SW 340.
Problem-solving approach applied to organizations and communities within a generalist practice framework.

SW 350 03(0-0-3). Legal Issues in Human Services. SS.
Legal principles, procedures, and issues relevant to social work including policy research and courtroom testimony.


SW 384 Var [1-5]. Supervised College Teaching. F, S, SS. Maximum of 10 credits allowed in course.
Assist instructor in teaching selected classes, group training, or discussion group leadership.
SW 410 03(3-0-0). Social Welfare Policy. F. S. Prerequisite: SW 342 or concurrent registration. Issues and processes shaping social welfare institutions, definitions of social welfare policy; analytical framework for policy analysis.

SW 487 Var [1-6]. Internship. Internship in non-profit agency administration.

SW 488 Var [5-10]. Field Placement. F, S. SS. Prerequisite: S 311 or concurrent registration. SW 341, SW 342. Maximum of 10 credits allowed in course. Application of knowledge, values, skills, methods, and processes of practice with individuals, families, groups, organizations, and communities.


SW 492 0(3-0-0). Seminar. Corequisite: SW 488. Integrative seminar for field experience and social work knowledge, values, skills, methods, and processes.

SW 495 Var [1-12]. Independent Study.

SW 496 Var [1-12]. Group Study.

SW 500 03(3-0-0). Principles and Philosophy of Social Work. F, S, SS. Prerequisite: Eighteen credits of socio/behavioral sciences. Also offered as telecourse.

SW 510 03(0-0-3). Theoretical Analysis of Small Client Systems. F. Prerequisite: SW 500.

SW 511 03(0-0-3). Generalist Practice-Small Client Systems. F. Prerequisite: SW 500, admission to M.S.W. program, concurrent registration in SW 512.

SW 512 01(0-2-0). Small Client Systems Skills Laboratory. F. Corequisite: SW 511. Application of communication and relationship skills for professional practice.


SW 570 VE 570 03(0-0-3). Teamwork-Serving People With Special Needs. F, S. SS. Prerequisite: Written consent of instructor. Credit not allowed for both SW 570 and VE 570. Teamwork approach to serving persons with special needs values, issues, and best practices related to creating desirable futures for them.

SW 588 Var [1-5]. Field Placement. Prerequisite: SW 511, concurrent registration in SW 592. Supervised professional practice.

SW 590 Var [1-6]. Workshop.

SW 592 0(1-0-0). Seminar. Corequisite: SW 588.

SW 600 03(0-0-0). Methods of Research I. F. Prerequisite: ST/STCC 201, concurrent registration in SW 520. Social work research: role of practitioners as consumers and initiators of research.

SW 601 03(3-0-0). Methods of Research II. S. Prerequisite: SW 600. Data analysis, computer processing in social work research, and methods for evaluating one's own practice.

SW 620 03(0-0-2). Macro-Level Practice Research. A) F. B) S. Prerequisite: Concurrent registration in SW 688. A) SW 601. B) SW 602A.

SW 620A 02(0-0-2). Direct Service Assessment and Evaluation. A) F. B) S. Prerequisite: Concurrent registration in SW 688. A) SW 601. B) SW 602A. Selection and application of techniques for assessment and evaluation of direct practice activities.

SW 610 03(0-0-3). Theoretical Analysis of Large Client Systems. S. Prerequisite: SW 510. Socio-behavioral principles relevant to generalist social work with groups, organizations, and communities.

SW 611 03(0-0-3). Generalist Practice-Large Client Systems. S. Prerequisite: SW 511. Practice knowledge and skills to intervention with groups, organizations, and communities.

SW 630 02(0-0-2). Advanced Generalist Practice. A) F. B) S. Prerequisite: SW 611. B) S. Prerequisite: SW 630A. A) Individuals. B) Groups and families.


SW 632 02(0-0-2). Advanced Organizational Practice. F. Prerequisite: SW 611. Models for advanced generalist practice in and with organizations.

SW 633 02(0-0-2). Advanced Social Welfare Policy Analysis. S. Prerequisite: SW 620. Application of social welfare policy analysis models; normative aspects of policy analysis and assessment skills.

SW 688 Var [1-8]. Field Placement. F, S. Prerequisite: SW 588, SW 601, SW 610, SW 611. Maximum of 15 credits allowed in course. Supervised professional practice.


SW 695 Var. Independent Study.

SW 696 Var. Group Study.

SW 698 02. Research. Prerequisite: SW 688. Maximum of 6 credits allowed in course.

SW 699 03. Thesis. Maximum of 6 credits allowed in course.
THEATRE COURSES

Department of Music, Theatre, and Dance
College of Liberal Arts

THCC 141 03(3-0-0). Introduction to Theatre. F, S, SS.
Theatre as an art and one of the humanities, its impact upon society, and its relationship to other art forms.

TH 151 03(1-5-0). Acting I. F, S.
Basic theories and techniques; practical experience through classroom performance.

TH 160 02(0-4-0). Graphic Expression for the Theatre. F.
Techniques of graphic communication for the theatre.

TH 161 03(2-2-0). Technical Theatre I. F, S. Prerequisite: TH 160.
Basic theory and techniques of executing settings, lighting, properties for stage.

THCC 192 03(0-0-3). From Page to Stage: Freshman Theatre Seminar. F, S, SS.
Collaborative creative processes required to transfer literature to theatrical performances with faculty artists/scholars.

TH 255 03(1-5-0). Directing I. F. Prerequisite: TH 151.
Basic principles of directing; experience in directing scenes.

TH 263 03(2-2-0). Costume and Makeup I. F. Prerequisite: TH 160.
Basic theory and technique for visualization of theatrical characters through costume and makeup.

TH 265 03(1-4-0). Design I. S. Prerequisite: TH 161.
Theory and practice of scenic design and lighting emphasizing individual projects and readings.

TH 286 01(0-3-0). Practicum. F, S, SS. Maximum of 4 credits allowed in course.
Practical experience in mounting theatrical productions.

TH 341 03(3-0-0). History of Theatre I.
History of theatre: origins through French neoclassicism.

TH 342 03(3-0-0). History of Theatre II.
History of theatre, Restoration to present.

TH 351 03(1-5-0). Acting II. F. Prerequisite: TH 151.
Scene work and other appropriate training for acting students.

TH 355 03(1-5-0). Directing II. S. Prerequisite: TH 255.
Intensive practical experience in direction of scenes focusing on specific directorial problems posed by various types of plays.

TH 361 03(1-4-0). Technical Theatre II. F. Prerequisite: TH 161.
Theory and methods in advanced technical production.

TH 363 03(1-4-0). Costume and Makeup II. S. Prerequisite: TH 263.
Theory and practice of advanced costume design and makeup techniques.

TH 365 03(1-4-0). Design II. F. Prerequisite: TH 265.
Theory and practice of scenic design and lighting emphasizing individual projects and readings.

TH 475 03(0-0-3). Practicum. F, S, SS. Prerequisite: TH 286.
Maximum of 4 credits allowed in course.

TH 491 Var. Repertory Theatre Workshop. Prerequisite: Audition only.
Principles and practice of repertory theatre operation; practical experience offered.

TH 495 Var. Independent Study.

TH 499 03. Thesis. Prerequisite: TH 341, TH 342; performing arts/theatre majors only.
Theatre majors will research, execute, and document a comprehensive project in performance, production, or scholarship directed by a faculty mentor.

TH 695 Var. Independent Study.

VOCAATIONAL EDUCATION COURSES

School of Education
College of Applied Human Sciences

VE 300 02(0-0-2). Principles of Vocational Education. SS. Offered only through the Division of Educational Outreach.

VE 370 03(3-0-0). Laboratory Management, Safety, and Liability. S, SS.
Organic and management of learning laboratories. Approved principles and practices of classroom and laboratory safety including impact of accidents.

VE 386 Var. Practicum. Prerequisite: VE 300 or concurrent registration; admission to Teacher Licensure Program.

VE 387 Var. Internship.
Coordinated and supervised experiences in business, industry, or agriculture selected to strengthen the intern's specialty through experience.

VE 402 02(0-0-2). Student Organizations in Vocational Education. F, SS.
Offered only through the Division of Educational Outreach. Skills and techniques necessary for advising vocational student organizations.

VE 403 02(0-0-2). Coordination Techniques of Cooperative Programs. F, SS.
Techniques and methods employed in organization, development, and maintenance of a cooperative program.

VE 410 Var. Internship.

VE 420 Var. Internship.

VE 425 04(0-0-4). Agricultural Experience and Adult Education. S.
Developing secondary agriculture experience programs. Organizing and teaching adult education classes in agriculture.

VE 425 04(0-0-4). Methods/Materials in Agricultural Education. F.
Prerequisite: Admission to Teacher Licensure Program; concurrent registration in ED 450, ED 4861, VE 492.

VE 429 04(0-0-0). Methods/Materials in Agricultural Education. F.
Prerequisite: Admission to Teacher Licensure Program; concurrent registration in ED 450, ED 4861, VE 492.

VE 450 04(0-0-0). Methods/Materials in Agricultural Education. F.
Prerequisite: Admission to Teacher Licensure Program; concurrent registration in ED 450, ED 4861, VE 492.

VE 492 Methods and procedures in teaching and evaluating agricultural education in the classroom and laboratory; vocational foundations; microteaching.
**VE 431 04(0-0-4). Methods/Materials in Business Education.** F. Prerequisite: Successful completion of Phase II of Teacher Licensure Program or written consent of instructor. Also offered as an on-line course.

Methods for teaching business education.

**VE 441 01(0-0-1). Methods/Materials-Vocational Marketing Education.** F. Prerequisite: ED 320; VE 451 or concurrent registration; admission to Teacher Licensure Program or written consent of instructor. Also offered as an on-line course.

Instructional methods and resource materials development for vocational marketing education.

**VE 451 04(0-2-3). Methods-Consumer and Family Studies Education.** F. Prerequisite: ED 320, concurrent registration in ED 450. Teaching methods, processes, and materials for consumer and family studies education.

**VE 465/830(0-0-3). Methods and Materials in Technology Education.** S, SS.

Strategies and practices of teaching in a technical laboratory setting.

**VE 471 02(0-0-0). Orientation and Assessment of New Teachers.** F, S, SS. Offered only through the Division of Educational Outreach.

Orientation to teaching and individual assessment of teaching skills: development and implementation of professional growth plan.

**VE 472 01(0-0-1). Classroom Management.** F, S, SS. Prerequisite: Admission to VATLP and VE 471, or full-time credential. Offered only through the Division of Educational Outreach.

Introduction to student management techniques and program management. Teachers will create a preliminary plan for instruction.

**VE 473 01(0-0-1). Communication Strategies.** F, S, SS. Prerequisite: Admission to VA/TLP and VE 471, or full-time credential. Offered only through the Division of Educational Outreach.

Introduction to improved communication techniques, conflict resolution, performing occupational advisement, and facilitating leadership activities.

**VE 485 Var. Student Teaching.** F, S, SS.

**VE 486 Var [1-6]. Practicum.** Prerequisite: Admission to Teacher Licensure Program.

**VE 492 Var. Seminar.**

**VE 494 Var. Independent Study.**

**VE 496 Var. Group Study.**

**VE 500 03(0-0-3). Career and Employment Concepts.** F, SS. Prerequisite: Bachelor's degree.

Career and lifestyle studies that provide an understanding of career development, employment concepts, and career counseling resources.

**VE 506 03(0-0-0). Human Resource Development.** F. Prerequisite: Written consent of instructor.

Human resource development foundations and techniques related to vocational training and development for industry, business, education, and government.

**VE 530 Var. Teaching Agricultural Education.** SS. Prerequisite: VE 425.

Methods of teaching recent developments in the field of agriculture and allied industries.

**VE 570/SW 570 03(0-0-0-3). Teamwork-Serving Persons with Special Needs.** F, SS. Prerequisite: Written consent of instructor. Credit not allowed for both VE 570 and SW 570.

Teamwork approach to serving persons with special needs values, issues, and best practices related to creating desirable futures for them.

**VE 571 03(0-0-3). Vocational Assessment for Special Needs.** S. Information and techniques regarding vocational assessment of special needs students including traditional and curriculum-based strategies.

**VE 572 03(0-0-3). Special Needs-Foundations and Practices.** SS. Prerequisite: Teacher licensure.

Theory related to foundations and professional practices relevant for teaching students with mild/moderate special needs.

**VE 575 04(0-0-0). Methods for Mild/Moderate Special Needs.** S. Prerequisite: VE 372; teacher licensure.

Methods addressing learning of students with mild/moderate special needs and instructional accommodations in regular classes.

**VE 590 Var. Workshop.**

**VE 601 03(0-0-3). Philosophy/Organization of Workforce Education.** F, S, SS.

Principles, philosophy, practices, and innovations of workforce education and human resources.

**VE 610 03(0-0-3). Principles of Supervision and Evaluation.** F, SS. Prerequisite: VE 601.

Supervision and evaluation of instruction including required Colorado evaluation training.

**VE 611 03(0-0-3). Introduction to Educational Administration.** S, SS. Prerequisite: ED 485A or B.

Structure, organization, administrative organization of public education and the educational administrator.

**VE 612 03(0-0-3). Vocational Administrative Strategies.** S, SS. Prerequisite: VE 601. Offered only through the Division of Educational Outreach.

Basic educational systems; the scientific method as a basis for analysis; systems as a tool for planning and decision making.

**VE 618 03(0-0-3). School Law.** S, SS. Prerequisite: VE 611.

Legal framework for operation and management of public and private schools emphasizing legal responsibilities for administrators and teachers.

**VE 620 02(0-0-2). Advanced Teaching of Vocational Agriculture.** S. Prerequisite: VE 425.

Course construction related to agricultural enterprises and occupations as applied to yearly plans, long-term job outlines, job analysis.

**VE 622 02(0-0-2). Supervising FFA Activities.** SS. Prerequisite: VE 402.

Principles, practices, and innovations in all phases of the organization emphasizing leadership training and ways and means of improving local FFA chapter.

**VE 623 02(0-0-2). Program Planning in Vocational Agriculture.** SS. Prerequisite: VE 425.

Course construction related to agricultural enterprises and occupations as applied to yearly plans, long-term job outlines, job analysis.

**VE 630 02(0-0-2). Organization of Business and Office Education.** SS. Prerequisite: VE 300. Also offered as on-line course.

Procedures for organizing new programs and for managing or modifying existing programs.

**VE 631 02(0-0-2). Management of Business-Office Departments.** SS. Prerequisite: VE 300. Also offered as on-line course.

Preparation of teachers and administrators for implementation of vocational business and office education programs.
VE 640 02(0-0-2). Methods in Vocational Marketing Education. SS. Prerequisite: VE 441. Also offered as on-line course. Instruction and curricula for secondary and postsecondary vocational marketing education.

VE 641 02(0-0-2). Programs in Vocational Marketing Education. SS. Prerequisite: VE 441. Also offered as on-line course. Techniques used in determining need for and implementations of new or additional programs of vocational marketing education.

VE 656 03(0-0-3). Tests and Assessment. F, SS. Prerequisite: ED 606. Use of tests in educational and vocational assessment.

VE 665 03(0-0-3). HRD Consultation and Analysis of Organizations. S. Prerequisite: ED 600. Identify and evaluate human resource development and organization change needs and strategies in response to organization performance issues.

VE 666 03(0-0-3). Program Evaluation. F. Prerequisite: ED 600. Models and practices of program evaluation in both public and private sector organizations.

VE 684 Var. Supervised College Teaching. F, S, SS.

VE 687 Var. Internship.

VE 692 A-E Var. Seminar.

VE 693 Var. Seminar.

VE 694 Var. Independent Study.

VE 696 Var. Group Study.

VE 698 Var. Research.


VE 700 03(0-0-3). Quantitative Research Methods. S, SS. Prerequisite: VE 706 or concurrent registration. Design, data analysis, interpretation of results, and evaluation of educational research studies.

VE 706 03(0-0-3). Analysis of Relationships. S, SS. Prerequisite: ED 600. Inferential and correlational data analysis.

VE 713 03(0-0-3). Alternative Instructional Delivery Systems. SS. Prerequisite: VE 601. Managing nontraditional postsecondary instructional delivery systems including cooperative education, customized training, and distance education.

VE 745 03(0-0-3). Strategic Planning of Education for Work. F. Prerequisite: EC 504, VE 665. Human capital as component of strategic planning of education, training and development at national, regional, and organizational levels.

VE 746 03(0-0-3). Cross-Culture and International Training. S. Prerequisite: AD 624, VE 506. Issues, models, techniques of development and delivery of human resource development and training programs across cultural, interregional, national barriers.

VE 786 Var. Practicum.

VE 792 A-P Var. Seminar. Prerequisite: N) VE 792K or written consent of instructor. K) and N) also offered as on-line courses.

VE 793 Var. Seminar.


VETERINARY MEDICINE COURSES

College of Veterinary Medicine and Biomedical Sciences

VM 601 02(2-0-0). Perspectives in Veterinary Medicine. F. Prerequisite: Admission to professional curriculum in veterinary medicine. Identification and development of personal, professional, and leadership skills and orientation to PVM program and veterinary profession.

VM 606 02(2-0-0). Veterinary Immunology. F. Prerequisite: Admission to professional curriculum in veterinary medicine. Basic components and principle regulatory mechanisms of immunity.

VM 610 07(3-5-1). Functional Anatomy. F. Prerequisite: Admission to professional curriculum in veterinary medicine. Comparative anatomy, histology, and physiology of musculoskeletal system; basic concepts of histology, cell biology, and embryology.

VM 618 07(5-4-0). Organ Systems-Anatomy and Physiology. F. Prerequisite: Admission to professional curriculum in veterinary medicine. Gross, microscopic anatomy and physiology of gastrointestinal, cardiovascular, respiratory, hematopoietic, urinary systems in selected domestic animals.

VM 619 04(3-3-0). Veterinary Neurobiology. S. Prerequisite: Enrolled in professional veterinary medicine program. Structural and functional foundations of nervous system activity; introduction to clinical neurology.

VM 623 02(2-0-0). Veterinary Nutrition and Metabolism. S. Prerequisite: Enrolled in professional veterinary medicine program. Intermediary metabolism, nutrients, and animal nutrition.

VM 624 03(2-2-0). Veterinary Feeds and Feeding. S. Prerequisite: VM 623. Description, advantages, and limitations of feedstuffs fed to domestic livestock; nutrient requirements and formulation of rations for various needs.

VM 625 01(1-0-0). Principles of Diagnostic Imaging. S. Prerequisite: Admission to professional curriculum in veterinary medicine. Diagnostic radiography, computed tomography, ultrasound, magnetic resonance, and nuclear medicine.

examination of body systems.

VM 726 02(1-0-1). Principles of Imaging Interpretation


Basic orientation to food animal production units, herd health concepts, and issues of food safety from preharvest through processing and distribution.

VM 659 01(0-1-0). Veterinary Microbiology Laboratory Techniques. S. Prerequisite: VM 606, VM 638 or concurrent registration.

Microbiological laboratory techniques using immunology, bacteriology, and virology for diagnosis of animal diseases.

VM 704 01(1-0-0). Veterinary Ethics. F. Prerequisite: Admission to professional curriculum in veterinary medicine.

Moral and ethical issues affecting the veterinary profession.

VM 705 01(1-0-0). Veterinary Jurisprudence. F. Prerequisite: Admission to professional curriculum in veterinary medicine.

Legal and professional issues affecting the practice of veterinary medicine.

VM 706 01(1-0-0). Introduction to Preventive Medicine. F. Prerequisite: VM 606.

Vaccination programs, parasite control, and other common preventive medical practices.

VM 711 02(2-0-0). Applied Dairy Nutrition. S.

Nutrient requirements of dairy animals; feedstuffs in dairy ration; computer ration formulation.

VM 712 04(4-0-0). Veterinary Practice Management. S. Prerequisite: VM 705.

Veterinary practice management including marketing, finance, information systems, personnel issues, and client relations.

VM 714 02(2-0-2). Epidemiology and Environmental Health. F. Prerequisite: VM 638, VM 640.

Principles of epidemiology and environmental health hazards in veterinary medicine.

VM 720 01(1-0-0). Alternative and Complementary Therapeutics. S. Prerequisite: Successful completion of second year of professional veterinary medicine curriculum.

Mechanisms and efficacy of alternative and complementary therapeutics used in veterinary medicine.

VM 722 04(4-0-0). Veterinary Pharmacology. F. Prerequisite: VM 619.

Basic and clinical pharmacology, therapeutic practice, and pharmacy management.

VM 724 06(4-0-2). Bioanalytical Pathology. F. Prerequisite: VM 640.

Mechanisms, interpretation, and applications of laboratory analyses for solving diagnostic problems.

VM 726 02(1-0-1). Principles of Imaging Interpretation I. S. Prerequisite: VM 625.

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: VM 726.

Interpretation of clinical imaging techniques used in diagnosis of specific diseases of organ systems.


Behaviors of domestic animals with emphasis on safe handling, diagnostic evaluations, and modification through training, medication, or surgery.

VM 733 02(2-0-0). Principles of Surgery. S. Prerequisite: VM 722.

Principles and concepts of general and orthopedic surgery.

VM 737 02(2-0-0). Principles of Anesthesia. S. Prerequisite: VM 722.

Integration of physiological and pharmacological principles in clinical anesthesia.

VM 741 04(3-0-1). Biology of Disease II. F. Prerequisite: VM 638, VM 640.

Pathogenesis of toxicologic/metabolic, and immune-mediated diseases; systemic pathology.

VM 742 02(1-0-1). Biology of Disease III. S. Prerequisite: VM 741.

Pathogenesis of disease in organ systems, systemic pathology.

VM 744 03(2-1-0). Theriogenology. S. Prerequisite: VM 619.

Reproductive function and disease, including mammary gland and endocrine regulation of reproduction and lactation.

VM 745 05(5-0-0). Clinical Sciences I. S. Corequisite: VM 742.

Diagnostic approaches to common medical problems of cardiovascular, urinary, and digestive-hepatic systems.

VM 747 04(4-0-0). Clinical Sciences II. S. Prerequisite: VM 745.

Diagnostic approaches to common medical problems of organ systems.

VM 749 05(3-0-0). Clinical Sciences III. F. Prerequisite: VM 747.

Diagnostic approaches to common medical problems of organ systems.

VM 751 01(1-0-0). Veterinary Clinical Toxicology. F. Prerequisite: VM 747.

Pathophysiology, epidemiology, diagnosis, and treatment of plant and chemical intoxicant diseases of animals.

VM 753 05(5-0-0). Clinical Sciences IV. F. Prerequisite: VM 749.

Diagnostic approaches to common medical problems of organ systems.

VM 757 03(1-0-0). Bovine Herd Medicine. S. Prerequisite: VM 747.

Health management, and diagnosis and treatment of diseases of food animals.

VM 763 04(4-0-0). Equine Medicine and Surgery I. S. Prerequisite: VM 747.

Health management, and diagnosis and treatment of diseases of horses.

VM 773 04(4-0-0). Small Animal Medicine and Surgery I. S. Prerequisite: VM 747.

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: VM 747.

Health management, and diagnosis and treatment of diseases of dogs and cats.


A) Avian and exotic animal medicine. 02(0-0-2). B) Biology and disease of rabbits and rodents. 01(0-0-1). D) Camelid medicine. 01(0-0-1).
CLINICAL SCIENCES COURSES

Department of Clinical Sciences
College of Veterinary Medicine and Biomedical Sciences

**VS 300 03(3-0-0). Prevention and Control of Livestock Diseases.** F. Common ailments of livestock, sanitation and disease prevention and control.

**VS 320 03(3-0-0). Birds of Prey-Health Care and Natural History.** S, SS. Prerequisite: BY 103 or BZ/BZCC 110 or written consent of instructor. Natural history of birds of prey; health care for field or clinic. Designed for wildlife, zoology, interpretation, and preveterninary medicine students.

**VS 570 A 570 02(2-0-0). Issues in Animal Agriculture.** F. Credit not allowed for both VS 570 and A 570. Issues that have a major impact on the direction of changes in animal agriculture.

**VS 575 01(5,1-5,0). Basic Principles/Techniques of Animal Surgery.** S. Prerequisite: Admission to graduate program or written consent of instructor. Basic principles and techniques of animal surgery to prepare students for experimental procedures.

**VS 602 02(1-0-1). Critical Evaluation of Scientific Literature.** F. Prerequisite: EH/EHCC 307/ST/STCC 307 or ST/STCC 301. Method of evaluating scientific literature. Students present critiques of papers they have chosen.

**VS 605 02(2-0-0). Comparative Anesthesiology.** S. Prerequisite: PS 450. Techniques in anesthesia for large and small animals.

**VS 606 01(0-3-0). Comparative Anesthesiology Laboratory.** S. Prerequisite: VS 605 or concurrent registration. Techniques in anesthesia for large and small animals.

**VS 612 02(2-0-0). Plastic and Reconstructive Surgery.** F. Prerequisite: VM 786B. Advances in surgical patient care, surgical instrumentation, and reconstruction.

**VS 613 01(0-3-0). Plastic and Reconstructive Surgery Laboratory.** F. Prerequisite: VM 786B. Advances in surgical patient care, surgical instrumentation, and reconstruction.

**VS 626 02(2-0-0). Infertility and Genital Disease.** F. Prerequisite: PS 500 or written consent of instructor. Infectious and noninfectious causes of reproductive failure in food animals.

**VS 630 03(3-0-0). Orthopedic Surgery.** F. Techniques, devices, and prosthetic materials in rehabilitating musculoskeletal problems.

**VS 631 01(0-3-0). Orthopedic Surgery Laboratory.** F. Prerequisite: VM 786A or B; VS 630 or concurrent registration. Procedures applied to skeletal preparations and living animals.

**VS 642 05(4-2-0). Ophthalmology.** F. Prerequisite: Written consent of instructor. Instrumentation, ocular therapeutics, and clinical ophthalmology.

**VS 645 03(2-3-0). Surgery of the Eye.** S. Prerequisite: VS 642. Techniques, indications, and complications.

**VS 650 03(3-0-0). Comparative Abdominal Surgery.** F. New techniques in surgery of abdominal viscera.

**VS 651 01(0-3-0). Comparative Abdominal Surgery Laboratory.** F. Prerequisite: VM 786A or B; VS 650 or concurrent registration. Reparative and reconstructive abdominal surgical procedures.

**VS 660 03(3-0-0). Neurology and Neurosurgery.** S. Diagnostic and surgical techniques for the nervous system.

**VS 661 01(0-3-0). Neurology and Neurosurgery Laboratory.** S. Prerequisite: VM 786A or B; VS 660 or concurrent registration. Production and correction of surgically amenable lesions in central and peripheral nervous system; electrodiagnosis.

**VS 662/EH 662 03(2-0-1). Applied Research/Planning/Design/Analysis.** S. Prerequisite: EH/EHCC 307/ST/STCC 307. Credit not allowed for both VS 662 and EH 662. Training to conceptualize and execute an independent research project.

**VS 673 03(3-0-0). Thoracic and Cardiovascular Surgery.** F. Surgical approaches to the thorax and the central and peripheral cardiovascular system.

**VS 674 01(0-3-0). Thoracic and Cardiovascular Surgery Laboratory.** F. Prerequisite: VM 786A or B, VS 673 or concurrent registration. Surgical procedures applied to the chest, heart, and vessels.

**VS 699 Var. Thesis.**

**VS 701 Var [1-3]. Postgraduate Medicine I.** F. Prerequisite: D.V.M. or written consent of department head. Comprehensive review, update of immunology, emergency medicine, dermatology, and endocrinology.

**VS 702 Var [1-3]. Postgraduate Medicine II.** S. Prerequisite: D.V.M. or written consent of department head. Comprehensive review, update of neurology, gastroenterology, and ophthalmology.

**VS 703 Var [1-3]. Postgraduate Medicine III.** F. Prerequisite: D.V.M. or written consent of department head. Comprehensive review, update of oncology, cardiology, reproduction, ophthalmology, and radiology.

**VS 704 Var [1-3]. Postgraduate Medicine IV.** S. Prerequisite: D.V.M. or written consent of department head. Comprehensive review, update of hematology, nephrology, urology, respiratory, hepatic, and pancreatic.

*Offered every third year.*
WEED SCIENCE COURSES

Department of Biagiicultural Sciences and Pest Management
College of Agricultural Sciences

*W 308 03(2-2-1). Biology and Control of Weeds. F. Prerequisite: BY 103 or BZ/BZCC 120, C/C CC 107 or C/C CC 111. Special fee, $7.
  Classification, characteristics, reproduction, identification, ecology of weeds; weed control by cultural, biological, and chemical means; herbicides.

  Prerequisite: Introductory biological science or introductory chemistry.
  Credit allowed for only one of the following: EN 310, PD 310, W 310.
  Identification, properties, use, labeling, environmental interactions, and application of major classes of pesticides.

*S 506/EN 506/PD 506 03(3-0-0). Environmental Fate of Pesticides. S. Prerequisite: One course in soils, organic chemistry, or plant physiology, or written consent of instructor. Credit allowed for only one of the following: EN 506, PD 506, W 506.
  Processes that affect fate of pesticides and their metabolites in the environment with emphasis on soil and water.

*W 509 03(1-3). Herbicide Selectivity and Action. S. Prerequisite: BZ 440, W 308.
  Selectivity of major photosynthetic and growth inhibitor herbicides based on herbicide transport, metabolism, and mode of action.

*S 510 03(3-0-0). Ecophysiology of Weeds. F. Prerequisite: BZ 440, W 308.
  Comparative ecophysiology of weeds with crops and factors involved in weed competition and population dynamics.

*W 543/EN 543/PD 543 03(3-0-0). International Crop Protection.
  S. Prerequisite: Crop Protection course and/or written consent of instructors. Credit allowed for only one of the following: W 543, EN 543, PD 543.
  Insects, disease, and weed management strategies for developing countries. Emphasizes appropriate control measures for limited resource farmers.

*W 556/EN 556/PD 556 03(3-0-0). Biological Control of Plant Pests.
  F. Prerequisite: Ten credits of biology. Credit allowed for only one of the following: W 556, EN 556, PD 556.
  Management of insect pests of plants, plant pathogens, and weeds using biological control agents such as insects, bacteria, viruses, and fungi.

WOMEN'S STUDIES COURSES

Office of Women's Programs and Studies

WS 200 03(3-0-0). Introduction to Women's Studies. F.
  Examination of gender roles in work, education, spirituality, relationships, health, institutions, and organizations.

WS 397 03(3-0-4). Group Study.

WS 472A-C 03(3-0-0). Seminar in Women's Studies. F. S.
  Prerequisite: Enrolled in Women's Interdisciplinary Studies Program or written consent of instructor.

WS 495 Var [1-3]. Independent Study. Prerequisite: Approval of Women's Studies Director and relevant department head(s).

WS 687 Var [1-3]. Internship in Women's Studies.
  Supervised work experience in an approved agency or setting.

WS 692 03(0-0-3). Seminar in Women's Studies. Prerequisite: One semester of enrollment in Women's Interdisciplinary Graduate Studies Program or written consent of instructor.

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.