

GRADUATE COURSES OF INSTRUCTION

Sections of courses are listed in alphabetical order,
by the prefix of the academic discipline.

Most credit notations on the far right are in the pattern 3-0-3. The first number is the number of lecture hours (or equivalent) each week; the second number is the number of laboratory hours (or equivalent) each week; the third number is the number of semester hours credit. The suffix K designates courses in which a laboratory is included; the suffix L designates a lab course that is separate.

ACED: ADULT AND CAREER EDUCATION

- ACED 7000 Foundations and Trends in Business Education** 2-0-2
An overview of the history and development of the field of business education. Emphasis on the various components of the business education profession; federal and state legislative implications for business education; current trends, issues, and problems in business education; and contributions of various leaders in the field of business education.
- ACED 7020 History and Philosophy of Adult and Career Education** 3-0-3
Inquiry into the background, purpose, philosophies, policies, and principles of career education. Students will study the impact of federal and state legislation.
- ACED 7030 Curriculum Issues and Trends in Adult and Career Education** 3-0-3
Principles, procedures, and considerations for developing curriculum in adult and career education.
- ACED 7100 Current Practices in Training and Development** 3-0-3
Introduction to training and development, organizational development, and human resource development. Emphasis on models of program design, needs assessment, costs, and benefits to the sponsoring corporation or agency; and methods of enhancing human performance.
- ACED 7110 Introduction to Human Performance Technology** 3-0-3
An introduction to the emerging performance technology field. Students develop skills in performance analysis and benchmarking, change management, and in the design of effective performance interventions, excluding training. The role of internal and external consultants is examined.
- ACED 7120 Electronic Courseware Design and Development** 3-0-3
An overview of emerging technologies used to develop interactive, computer-based training applications for distribution via corporate Intranets, the Internet, and CD-ROM. Emphasis is placed on learning technical skills and design skills while developing a broad understanding of the capabilities and limitations of computer-based training applications in corporate and other adult education settings.

- ACED 7150 Perspectives on the Adult Learner** 3-0-3
Facilitation of learning and performance improvement in the workplace and adult education environment. The course includes application of instructional methods, informal and incidental learning strategies, coaching, team building, and formal and informal on-the-job learning tactics. The course also focuses on facilitating individual and group learning to effect organizational change.
- ACED 7200 Improvement of Instruction in Keyboarding** 3-0-3
Development of strategies for teaching keyboarding. Emphasis on course objectives, equipment, materials, skill development, standards, and evaluative criteria.
- ACED 7220 Improvement of Instruction in Computer Technology** 3-0-3
An analysis of methods, strategies, and problems associated with teaching computer technology courses. Also included are the selection and acquisition of state-of-the-art hardware and software and the design and maintenance of a technology lab in an educational setting.
- ACED 7230 Improvement of Instruction in Accounting and Basic Business Subjects** 3-0-3
Strategies for teaching accounting and basic business subjects. Emphasis is placed on examining the use of computers in the teaching/learning process; motivation techniques; evaluation tools; and application of research to the instructional process.
- ACED 7240 Improvement of Instruction in Office Education** 3-0-3
Competencies needed by students preparing for office work are analyzed; teaching methods, course content, and evaluation procedures are discussed.
- ACED 7300 Practicum in Adult/Career Education** 3 hours credit
Prerequisite: Major in appropriate specialization; permission of the advisor must be obtained before registration.
- ACED 7310 Practicum in Adult/Career Education** 3 hours credit
Prerequisite: Major in appropriate specialization; permission of the advisor must be obtained before registration.
- ACED 7400 Computer Technology for the Workplace** 3-0-3
Introductory, hands-on computer applications for development of workplace skills. Topics include word processing, databases, spreadsheets, communication, and presentation software.
- ACED 7410 New Teacher Institute** 6-0-6
Basic instructional and management skills for new secondary career education teachers. Emphasis is on survival skills related to teaching methodology and curriculum implementation that will help them to be successful during their first or second year of teaching.
- ACED 7500 Organization and Administration of Career Education** 3-0-3
Organization of career education on the local, state, and national levels; federal and state government roles; and types of career education programs in education and industry.
- ACED 7530 Supervision of Adult and Career Education Programs** 3-0-3
Selection and evaluation of personnel, supervisory techniques, and methods of leadership for leaders in education and industry.
- ACED 7600 Applied Computer Technology** 3-0-3
Prerequisite: ACED 2400/ACED 7400 or consent of instructor. Development of instructional materials for specific teaching areas using the advanced features of word processing, spreadsheets, databases, communication, and presentation software. Designed for in-service teachers and will require the development of practical computer-related projects which can be used in the teachers' respective classrooms.
- ACED 7620 Evaluation of Adult and Career Education Programs** 3-0-3
Development and understanding of program evaluation methodology for the purpose of school improvement. Emphasis placed on alternative approaches, models, and practical guidelines.

- ACED 7640 Issues and Trends in Adult and Career Education** 3-0-3
Exploration and analysis of recent research and societal developments affecting adult and career education. Emphasis is on ethical and professional responsibilities, liability, emerging trends, and issues.
- ACED 7680 Improvement of Instruction in Adult and Career Education** 3-0-3
Theory and practical application of various delivery techniques, principles of teaching and learning, and the development of instructional materials.
- ACED 7740 Educators and Industry** 3-0-3
Designed to increase career awareness among educators, students, business and industry, and the community. Interaction among educators, business and industry, and community leaders concerning how to meet the needs of local industry.
- ACED 7850 Adult and Career Education Internship** 3 hours credit
Prerequisite: Permission from instructor.
- ACED 7900 Special Topics in Adult and Career Education** 3-0-3
Prerequisite: Permission from instructor. Exploration of topics specific to adult and career education. Emphasis is on the examination of adult and career education research, as applied to educational and/or business settings.
- ACED 7950 Directed Study in Adult and Career Education** 1-0-1 to 3-0-3
Prerequisite: Consent of the department head. An opportunity for intensive individual study on an approved topic.
- ACED 7990 Evaluation and Analysis of Research in Business Education** 3-0-3
Develop and enhance students' ability to analyze relevant research in business education. Emphasis placed on research methodology, research findings, and implementations and implications for business education.
- ACED 8310 Communication Theory** 3-0-3
Focus on the development of communication theory. An examination of organizational culture, perception and communication, interpersonal patterns, communication barriers, and nonverbal communication.
- ACED 8450 Multimedia Authoring and Design** 3-0-3
Provides skills in designing and authoring multimedia courseware for education and training environments. Emphasis placed on using multimedia authoring and presentation software to design dynamic materials for individualized and group instruction.
- ACED 8530 Instructional Supervision in Adult and Career Education** 3-0-3
Information and experiences for the development of skills related to supervision of instruction in the career education classroom and laboratory.
- ACED 8995 Practicum in Adult/Career Education** 3 hours credit
Prerequisite: Consent of the department head.
- ACED 9400 Adult Learning Strategies** 3-0-3
Design, development, and implementation of adult learning programs. Particular emphasis will be placed on curriculum models, goals, organization, methodology, career development, and evaluation for adult learners and learning programs.
- ACED 9410 Students with Special Needs in Adult and Career Education** 3-0-3
Integration of instructional and/or management activities in assisting students with special needs in adult and career education programs. Emphasis will be placed on regulations, interagency activities, curriculum, transition, assessment, and instruction of learners.
- ACED 9420 Issues in Adult and Career Education** 3-0-3
Emphasis on topics relating to adult and career education that are considered to be especially significant to the field because of current research developments and legislation.

- ACED 9430 Leadership in Adult and Career Education** 3-0-3
 Exploration of theory and development of leadership in adult and career education settings. Emphasis will be placed on identifying effective leadership characteristics, expanding leadership skills, and developing a philosophy of effective leadership.
- ACED 9440 Seminar in Adult and Career Education** 3-0-3
 Exploration of topics specific to adult and career education in industry and/or educational settings. Emphasis will be given to examination of research, as applied in the public and private sectors.
- ACED 9999 Dissertation in Adult and Career Education** 1 to 3 hours credit
Prerequisite: Completion of major courses and approval of advisor or dissertation chair. Development and defense of the dissertation proposal and the dissertation. Must be taken each fall and spring semester until the dissertation is completed. Number of hours taken per term must be approved by the dissertation chair. A minimum of 9 hours must be completed.

ARED: ART EDUCATION

- ARED 6150 Stimulating Creative Behavior** 3-0-3
 The study of theories of creativity, visual thinking, creative problem finding and problem solving strategies, identifying external and internal blocks to creativity, testing for creativity, the relationships between creativity, cognition, and visual thinking, and creative thinking challenges and stimuli. An emphasis is placed on methods to elicit creative behavior.
- ARED 6900 Special Topics in Art and Art Education** 1-0-1 to 3-0-3
 A special course designed to fit a special need in the curriculum. May be used for a study abroad course or for inter-sessions as is appropriate. May be repeated for up to six graduate hours.
- ARED 6950 Workshop in Art Education** 0-2-1 to 0-6-3
 An intensive summer or inter-session course designed to serve a special need for instructional methods or curricular design in art education contexts.
- ARED 7150 Research Problems In Art Education** 3-0-3
Prerequisites: RSCH 7100 and ARED 7500. Analysis of selected studies in the field of Art Education. Students will prepare a research proposal.
- ARED 7450 Art Education Curricula** 3-0-3
Prerequisite: Art Education major or permission of the department head. The study of art curricula, philosophies, rationales, purposes and goals in American schools, K-12. Field applications and observations are required.
- ARED 7500 Issues And Trends In Art Education** 3-0-3
 The study of selected issues and current trends in the field of Art Education. A research paper and /or project and field applications are required.
- ARED 7670 Aesthetic Inquiry And Art Criticism** 3-0-3
Prerequisites: Nine semester hours of art history or equivalent background. This course will focus on aesthetics and critical methods for art and Art Education. Field applications of critical methods and/or issues related to aesthetics are required.
- ARED 7900 Directed Study in Art Education** 1 to 3 hours credit
Prerequisites: Approval of the instructor and department head. Selected individual problems in art education as defined by the student with the approval and guidance of the supervising instructor. May be repeated for credit.
- ARED 7930 Capstone Project** 1 to 3 hours credit
Prerequisite: RSCH 7100. A capstone course wherein students will develop, with departmental approval, applied research projects based on research findings, curriculum issues, or methodological studies relevant to Art Education contexts. Field applications are required. For students not selecting the thesis option.

ARED 7950 Art Administrative Internship **1 to 3 hours credit**

Prerequisites: Master of Art Education students only. Approval of Department Head and Graduate Program Coordinator. A capstone supervised clinical experience within a local, regional, or state art agency, museum, gallery, or approved organizational art facility for the purpose of interning and working with an experienced art administrator. Required for students not seeking certification. May be repeated.

ARED 7999 Thesis **1 to 3 hours credit**

Prerequisite: RSCH 7100. A capstone research course resulting in the proposal and preparation of a thesis in APA style. A thesis defense is required. For students not selecting the terminal project option.

ART: ART STUDIO

ART 6000 Watercolor **0-6-3**

A course designed for the student who is experienced with aqueous media and has demonstrated success as a self-directed watercolor painter. Students are expected to provide a portfolio for review by the instructor. The student will develop and resolve artistic problems relevant to the media. Works produced will undergo analysis and critical reviews. This course may be repeated for credit.

ART 6100 Ceramics **0-6-3**

Prerequisite: Three semester hours credit of intermediate ceramics at the undergraduate level or permission of the instructor. This course emphasizes wheel throwing techniques, decorative processes, ceramic materials formulation, and firing strategies.

ART 6200 Drawing And Composition **0-6-3**

Prerequisite: Three semester hour credits of intermediate drawing at the undergraduate level or permission of the instructor. The study of drawing in various media with an emphasis on individual stylistic development. The production of a thematic portfolio and solo or group exhibition is expected.

ART 6450 Painting **0-6-3**

Prerequisite: Three semester hour credits of intermediate painting at the undergraduate level or permission of the instructor. This course requires the student, under the guidance of the instructor, to develop individualized problems in painting using a variety of media and techniques. The emphasis is on the development of a personal stylistic approach to painting. A solo or group exhibition is expected.

ART 6650 Technical Problems in Art **0-2-1 to 0-6-3**

Prerequisite: Permission of the instructor. A course for advanced students capable of independent research and study in the production of a body of related works in selected media. A problem statement and procedural plan will be developed. A solo or group exhibition is required.

ART 6950 Workshop in Art **0-2-1 to 0-6-3**

Selected topics presented in an intensive workshop setting for studio production of art works. Critical reviews and the exhibition of art works produced are expected. May be repeated for credit under different topic headings.

ART 7070 Electronic Imaging **0-6-3**

Prerequisite: Three semester hours credit at the undergraduate level or permission of the instructor. This course emphasizes the application of computer graphics processes to visual arts problems. Students will demonstrate an understanding of the range of computer graphics applications, a working knowledge of selected graphics software, and will prepare still or animated work for presentation. Specific assignments will be developed in relation to the student's professional goals.

ART 7900 Directed Study in Art 0-2-1 to 0-6-3
Prerequisite: Approval of the instructor and Department Head. Individual problems in art selected and defined with approval of the supervising instructor. May be repeated for credit.

ARTH: ART HISTORY

ARTH 6510 Special Topics in Art History and Criticism 1-0-1 to 3-0-3
Prerequisite: ART 1100 or equivalent undergraduate art history/appreciation course.
A seminar course for the study of special topics or contemporary trends in art, art history, and art criticism. Research, analysis, and short essays will be emphasized. Course may be repeated for credit.

ARTH 7650 Late Twentieth Century Art 3-0-3
Prerequisite: nine semester hour credits of art history at the undergraduate or graduate level. This course examines the art and theories of art from 1970 to the present. Students will identify, classify, and place in theoretical context selected works of late twentieth century art. A critical essay and presentation a selected contemporary issue or theory is expected.

ASTR: ASTRONOMY

ASTR 5101-5102 Principles of Astronomy I, II 3-2.5-4 each
A calculus-based course covering astronomical observations, analysis of celestial motions, and a study of the solar system in 5101, and covering the physics of the Sun and stars, stellar evolution, galactic structure and the universe in 5102.

ASTR 6100 Observational Techniques 2-2-3
Aspects of instrumental and observational astronomy including the optics of the telescope, spectroscopy, photography, photometry, electronics, CCDs, astrometrical problems, the operation of the observatory, and mathematical methods of data reduction.

ASTR 6400 Physics of the Solar System 3-0-3
Celestial mechanics; physical features of the Sun, planets, moons, and other material in the solar system.

ASTR 6410 Astrophysics 3-0-3
Radiative transfer in the stellar atmosphere, the interior structure of stars, stellar evolution, physical processes in gaseous nebulae, cosmology.

ASTR 6800 Internship in Astronomy 0-6-3 to 0-12-6
Active participation in research in astronomy, or in some field of science closely allied with astronomy, or work with a planetarium or museum which involves planetarium operations and programs. A daily log of activities, a report on the work done, and a research paper relating the work done to the field of astronomy are required.

ASTR 6900 Special Topics in Astronomy 1-0-1 to 4-4-6
Topics to be assigned by instructor; may be taken more than once if topics are different; up to a total of 6 credit hours.

ASTR 6950 Directed Study in Astronomy 1-0-1 to 4-4-6
Study in area or subject not normally found in established courses offered by the department; may also allow student to explore in more detail and/or depth an area or subject covered by the department in astronomy; up to a maximum of 6 credit hours.

BIOL: BIOLOGY

- BIOL 5000 Biostatistics** 2-4-4
Prerequisite: Admission into the graduate program or permission of the instructor.
An introduction to univariate and multivariate analyses of data. Laboratory work will allow students to collect data typical of the diverse disciplines in biology and subject data to appropriate biometrical analyses, using a calculator or computer. Students will be required to keep a detailed lab notebook of the statistical methods studied and also complete a term project and a scientific report. Two 2-hour laboratory periods per week.
- BIOL 5100 Microbiology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
Survey of microbiology covering eubacteria, archaebacteria, protozoa, fungi, algae, and viruses. Includes fundamental techniques, microbial physiology and genetics, biotechnology, medical applications, and applied microbiology. Two 1.5 hour laboratory periods per week.
- BIOL 5200 Genetics** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
A survey of modern genetics including: Mendelian and molecular genetics, as well as selected topics in population and quantitative genetics and genetic engineering. Laboratory will emphasize genetic analysis using live *Drosophila* and computer simulated crosses, chi-square analysis of progeny data, and application of these principles to laboratory analysis of genetic variation at the DNA level.
- BIOL 5300 Ecology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
Corequisite: BIOL 3200, or consent of instructor. Basic ecological principles including behavior of individuals, populations, and communities in the context of their physical and biotic environments. Reviews population genetics and basic evolution; emphasizes scientific method, including the role of theory, hypothesis testing, statistical analysis and scientific writing. Observation and data collection mostly in the field within a variety of local ecosystems. One weekend field trip required.
- BIOL 5400 Plant Physiology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
An introduction to basic principles of plant function including physical processes occurring in plants, water relations in whole plants and plant tissues, cell physiology and biochemistry, and growth and development.
- BIOL 5450 Vertebrate Physiology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
Study of general physiological processes of vertebrates; emphasis at organ and organ system levels.
- BIOL 5500 Mycology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
Biology of fungi with emphasis on morphology, taxonomy, physiology, and ecology, includes the roles of fungi as both beneficial organisms and as causal agents in plant and animal diseases.
- BIOL 5550 Phycology** 3-4-4
Prerequisite: Admission into the graduate program or permission of the instructor.
An introduction to the study of the algae, including taxonomy, phylogeny, physiology, and ecology. Laboratories will focus on the examination of live material, and will include methods for the isolation and culture of algae.
- BIOL 5600 Local Flora** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
A field-oriented study emphasizing identification, distribution, and ecology of locally occurring seed-bearing plants. Two or three weekend field trips are routinely scheduled.

- BIOL 5650 Taxonomy of Seed Plants** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. A survey of the principles of plant taxonomy that includes identification, nomenclature, evolution, and classification of seed-bearing plants. A systematic survey of plant families will be used with emphasis on local representatives.
- BIOL 5800 Invertebrate Zoology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. A study of the morphology, phylogeny, and ecology of invertebrates.
- BIOL 5810 Introduction to Biogeography** 3-0-3
Also offered as GEOG 5810. Prerequisite: Admission into the graduate program or permission of the instructor. An overview of factors controlling the distribution of plants and animals on the Earth. Topics discussed include ecological and evolutionary processes, geophysical and climatic phenomena, and historical and anthropogenic events that have influenced current distributions.
- BIOL 5840 Entomology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. Introduction to the study of insect biology including ecology, behavior, and taxonomy. Laboratory includes field observation, sampling and identification of local fauna.
- BIOL 5870 Parasitology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. A study of the morphology, life cycles, and host-parasite relationships of representative protozoan and metazoan parasites. Human parasites are emphasized.
- BIOL 5900 Ichthyology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. A study of the taxonomy, distribution, ecology, behavior and evolution of freshwater and marine fishes. One or two overnight field trips on weekends will be scheduled, with emphasis placed on the collection and preservation of specimens and the identification of habitats occupied by various species. Other field trips scheduled during normal laboratory periods.
- BIOL 5920 Herpetology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. Introduction to the study of amphibians and reptiles, including anatomy, physiology, ecology, behavior, and classification coordinated with field study of local species.
- BIOL 5950 Ornithology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. Lectures on morphology, evolution, ecology, behavior, and distribution of birds of the world. Lab emphasizes gross anatomy and identification of local species by sight and sound; mostly in the field. Five-day field trip to south Florida required; other Saturday trips offered.
- BIOL 5980 Mammalogy** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. Lectures emphasize morphology, evolution, ecology, zoogeography and classification of mammals of the world. Lab emphasizes gross anatomy and identification of mammal specimens, especially those found in North America. Four-day field trip to Blue Ridge Mountains (NC) required; Manatee dive (FL) offered.
- BIOL 6000 Topics in Biology I** 3-0-3
Prerequisite: Admission into the graduate program or permission of the instructor. Selected topics in the biological sciences. May be repeated if the topic is different. This course does not include a laboratory

- BIOL 6010 Topics in Biology II** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Selected topics in the biological sciences. May be repeated if the topic is different. This course includes a laboratory.
- BIOL 6100 Morphology of Land Plants** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Study of vegetative organization and reproductive cycles of bryophytes, pteridophytes and seed plants, which incorporates phylogenetic and ecological relationships.
- BIOL 6200 Plant Anatomy** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Origin and development of tissues and organs of vascular plants. The laboratory stresses microtechnique including preparation of plant tissues in paraffin and plastic resins, sectioning, staining for specific components of plant tissues, and use of different optical methods.
- BIOL 6300 Comparative Vertebrate Anatomy** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Anatomical and phylogenetic survey of representative vertebrate animals.
- BIOL 6350 Vertebrate Embryology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. A study of the fertilization process and embryology of selected vertebrates with the greatest emphasis placed on chick development.
- BIOL 6400 Vertebrate Histology** 3-4-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Study of vertebrate histology with emphasis on the four primary tissues (epithelium, connective, muscle, and nerve). Laboratory work consists primarily of detailed microscopic study and drawings of tissues from prepared slides. Two 2-hour laboratory periods per week.
- BIOL 6500 Cell Biology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 The organization and function of cellular structures in animal, plant, and microbial systems. Emphasis on the molecular basis of metabolism, transport, mobility, nerve conduction, and the cell cycle.
- BIOL 6510 Virology** 3-0-3
Prerequisite: Admission into the graduate program or permission of the instructor.
 An introduction to viruses and other non-cellular infectious agents. Topics include the structure and composition of these agents, their replication, effects on their hosts, and host responses. Methods for studying these agents, their origin and evolution, and their uses in biotechnology will also be discussed.
- BIOL 6550 Immunology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Basic concepts of immunology, including antigen and antibody structure, the generation of diversity, the nature of T cell and B cell receptors, cellular cooperation, and the down regulation of immune responses.
- BIOL 6580 Molecular Genetics** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 The study of the molecular nature of eukaryotic genomes, with emphasis on biotechnology. The lecture will focus on using modern molecular genetic techniques as a means to understand complex eukaryotic genomes. Emphasis will be placed on reading current, relevant scientific literature. The laboratory will involve hands-on experience in which the student will learn the latest technology of molecular genetic analysis and manipulation.

- BIOL 6600 Evolution** 3-0-3
Prerequisite: Admission into the graduate program or permission of the instructor.
 Study of the theoretical aspects and the patterns and processes of micro- and macro-evolutionary change.
- BIOL 6650 Animal Behavior** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor.
 Introduction to the major concepts of causation, development, evolution, and ecology of animal behavior, emphasizing the behavior of social animals.
- BIOL 6700 Limnology** 3-3-4
Prerequisite: Admission into the graduate program or permission of the instructor. A study of the physical, chemical, and biological aspects of fresh waters.
- BIOL 6750 Population Biology** 3-0-3
Prerequisite: Admission into the graduate program or permission of the instructor. A review of the theory and applications of population biology, including single-species population growth models (exponential, geometric, logistic, life tables, state and age-structured matrix models, metapopulation models), population genetics models, and multi-species interaction models (competition, predator-prey, succession, and parasite-host). Integrated computer exercises will allow students to manipulate model parameters and understand model predictions and dynamics.
- BIOL 6950 Directed Study** 0-12-4
Prerequisite: Admission into the graduate program or permission of the instructor. Limited to selected students with approval of instructor and department head. A specific problem to include supervised investigation and a report in format of biological journals.
- BIOL 7000 Introduction to Research** 0-2-1
Prerequisite: Acceptance into the graduate program in biology. An introduction to the scientific method, primary research literature, methods of literature review, and scientific writing. A research prospectus is required by the end of the semester. This course is to be taken during the student's first semester in the graduate program.
- BIOL 7900 Graduate Seminar** 0-3-1
Prerequisite: Acceptance into the graduate program in biology. Discussion and reports of current topics in biology and related sciences. Students are expected to demonstrate comprehension of topics and communication skills, both oral and written. Students must take this course twice for credit. This course may be repeated for a maximum of six times for credit.
- BIOL 8999 Thesis** [0]-[3-18]-[1-6]
Prerequisites: Completion of BIOL 7000 and permission of the student's major advisor. Students are required to enroll in thesis hours when doing original research towards the thesis. Students must complete a minimum of six hours of BIOL 8999 prior to defense of the thesis. BIOL 8999 may be repeated for credit.

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CHEM: CHEMISTRY

- CHEM 5000 Workshop for Teachers** 3-0-3
A workshop for middle school and high school chemistry teachers, designed to improve subject mastery. Content and level of presentation will be designed to broaden the participants' background in chemistry and will be related to topics taught in middle and high school chemistry classes.
- CHEM 5801 Physical Chemistry I** 3-3-4
Prerequisites: CHEM 3402, MATH 2262, and PHYS 2212K with a grade of "C" or better. A theoretical and mathematical treatment of the fundamental theories and laws of chemistry with an emphasis on thermodynamics. Experimental investigations will supplement the study of phase diagrams, solution calorimetry, bomb calorimetry, thermodynamic modeling and additional solid, liquid, and gas phase energy transfer studies. Permission for graduate credit must be arranged with the instructor prior to enrolling in the course and will involve the completion of a significant project.
- CHEM 5802 Physical Chemistry II** 3-3-4
Prerequisite: CHEM 5801. A theoretical and mathematical treatment of the fundamental theories and laws of chemistry with an emphasis on quantum mechanics, kinetics, and statistical mechanics. Experimental investigations will supplement the study of quantum mechanics, kinetics, and statistical mechanics as applied to systems of interest to chemists. Permission for graduate credit must be arranged with the instructor prior to enrolling in the course and will involve the completion of a significant project.
- CHEM 6420 Physical Organic Chemistry** 3-0-3
Prerequisites: CHEM 3402, CHEM 3802. A study of the methods used to elucidate organic reaction mechanisms. Topics covered include: reaction kinetics, isotope effects; linear free energy relationships; general acid and base catalysis and the acidity functions; reactive intermediates including free radicals, carbenes, carbanions, and carbocations; symmetry controlled reactions; photochemistry. Permission for graduate credit must be arranged with the instructor prior to enrolling in the course and will involve the completion of a significant project.
- CHEM 6810 Computational Chemistry** 1-3-2
Prerequisites: CHEM 3802 with a grade of "C" or better. Computational and modeling software will be introduced through projects involving systems in physical chemistry and spectroscopy as well as organic chemistry, inorganic chemistry, and biochemistry. Computational predictions will be correlated with laboratory experimental results, either from literature sources or from laboratory work done by the student. Permission for graduate credit must be arranged with the instructor prior to enrolling in the course and will involve the completion of a significant project.

CIED: CURRICULUM AND INSTRUCTION

- CIED 7060 Curriculum, Instruction, and Technology Integration** 3-0-3
An exploration of curriculum issues and trends, curriculum development, integration of technology into the curriculum, implementation of innovative instructional techniques, and legal/ethical issues across content areas and grade levels.
- CIED 7440 Teaching and Curriculum in Higher Education** 3-0-3
Design, development, and implementation of postsecondary instruction, with an emphasis on practical teaching strategies, curriculum and course development, implementation of innovative instructional technologies, and integration of technology.

- CIED 9100 Curriculum and Instructional Systems** 3-0-3
Study of concepts, theories, and trends for curriculum, instructional systems, and the change process. Includes a current review of related literature and reflective analysis of practice.
- CIED 9200 Curricular and Instructional Needs Assessment** 3-0-3
Prerequisite: CIED 9100. Assessment of curricular and instructional needs in educational organizations and agencies through a study of relationships among models of learning, learner characteristics, learning environments, and society.
- CIED 9300 Curricular and Instructional Needs-Based Proposal Development** 3-0-3
Prerequisite: CIED 9200. Design and development of a proposal for an innovative curriculum and instruction project based on needs.
- CIED 9400 Curricular and Instructional Design and Development** 3-0-3
Prerequisite: CIED 9300. Planning for the implementation and evaluation of a curriculum and instruction innovation in an educational setting. Includes design, development, and evaluation of project materials.
- CIED 9500 Curriculum and Instruction Implementation and Evaluation** 3-0-3
Prerequisite: CIED 9400. Field implementation and evaluation of the innovative curriculum and instruction project
- CIED 9600 Dissertation Topic Conceptualization** 3-0-3
Prerequisite: Completion of major courses and approval of advisor. Seminar for the development of the dissertation topic.
- CIED 9900 Special Topics in Curriculum and Instruction** 1-0-1 to 3-0-3
Advanced study of specific contemporary issues in curriculum and instruction.
Course may be repeated under different topics.
- CIED 9999 Dissertation in Curriculum and Instruction** 1 to 3 hours credit
Prerequisites: Completion of major courses and approval of advisor. Development and defense of the dissertation proposal and the dissertation. Must be taken each fall and spring semester until the dissertation is completed. The number of hours taken per term must be approved by the dissertation chair. A minimum of 9 hours must be completed.

COMD: COMMUNICATION DISORDERS

- COMD 5010 Language Disorders in Young Children** 3-0-3
Prerequisites: Completion of undergraduate CD course sequence. An advanced study of the nature and treatment of language disorders in young children through age 5. Focus is placed on the role of the communication environment and intervention planning and implementation. This course may be taken by non-CD majors with the addition of a lab component.
- COMD 5020 Diagnostics (lab arranged)** 3-1-3
Prerequisites: Completion of undergraduate CD course sequence. An in-depth study of the evaluation and assessment processes for communication disorders. Content encompasses appraisal planning, interviewing, ecological observation, instrumentation, informal and standardized procedures appropriate for determination of eligibility and program planning.
- COMD 5030 Phonological Disorders** 3-0-3
Prerequisites: Completion of undergraduate CD course sequence. Advanced study of assessment and treatment of speech sound disorders. Emphasis placed on motor based as well as cognitive-linguistic based analyses and treatment strategies.
- COMD 5040 Fluency Disorders** 3-0-3
Prerequisites: COMD 2999 and completion of undergraduate CD course sequence. Advanced course in differential diagnosis and treatment of stuttering in adults and children. Additional topics include cluttering and stuttering behaviors associated with acquired neuropathies.

- COMD 5050 Beginning Practicum** 1-2-2
Prerequisites: Completion of undergraduate CD course sequence. A supervised experience in a university or community-based setting requiring application of assessment and treatment procedures for individuals primarily with mild to moderate articulation and language disorders. This course will include a weekly seminar on topics related to the profession.
- COMD 5060 Language Disorders of School Age Children** 3-0-3
Prerequisites: COMD 2999 and COMD 5010. A continuation of the study of language disorders with focus on children from elementary school through adolescence. Topics include advanced language development, school curriculum, impact of communicative and linguistic deficiencies on academic progress, collaborative models of intervention, narratives and discourse analysis. May be taken by non majors with a lab component.
- COMD 5070 Traumatic Brain Injury, Dementia, and Progressive Neurological Disorders** 3-0-3
Prerequisites: COMD 5030. Application of diagnostic and therapeutic principles related to persons with traumatic brain injury, dementia, and progressive neurological disorders.
- COMD 5080 Dysphagia and Motor Speech Disorders** 3-0-3
 A study of diagnostic and therapeutic principles related dysphagia and motor speech disorders.
- COMD 5090 Aural Habilitation/Rehabilitation** 0-3-3
Prerequisite: COMD 2999. The study of hearing habilitation and rehabilitation methods, materials and amplification/assistive devices for children and adults with hearing impairment.
- COMD 5100 Intermediate Practicum** 1-4-3
Prerequisites: COMD 2999, COMD 5050, and Grade Point Average of 3.0. A supervised experience in a university, community, or home-based setting requiring application of assessment and treatment procedures to individuals with mild to moderate articulation, language, fluency, voice, and hearing communication disorders. This course will include a weekly seminar on topics related to the profession.
- COMD 5110 Science in Communication Disorders** 3-0-3
 Advanced theoretical and applied experimental design and implementation in communication disorders.
- COMD 5120 Aphasia and Other Neurogenic Disorders** 3-0-3
Prerequisites: COMD 2999 and COMD 5010. A study of the diagnostic and therapeutic principles related to aphasia, TBI, and progressive neurological communication disorders.
- COMD 5130 Oro-Facial/ Syndrome Disorders** 3-0-3
Prerequisites: COMD 5080. Advanced study of communication disorders associated with oral-facial anomalies. Specific emphasis on cleft palate/cleft lip and various syndromes or disorders in which oral-facial anomalies are present.
- COMD 5140 Advanced Practicum** 1-4-3
Prerequisites: COMD 5100 and Grade Point Average of 3.0. A supervised experience in a university, community, or home-based setting with emphasis on test administration, scoring, and interpretation for client services. Treatment of moderate to severe articulation, language, fluency, voice, hearing, and neurogenic communication disorders is emphasized. Weekly student seminars centered on presentations of diagnostic reports/results and proposed intervention strategies are included in this course.
- COMD 5150 Advanced Audiology** 3-0-3
 Advanced study of audiometric diagnostic procedures and interpretation. Students will participate in a variety of experiences designed to provide a working knowledge of the audiometric test battery.

- COMD 5160 Voice Disorders** 3-0-3
Prerequisites: COMD 5110, COMD 5020, COMD 5130. A theoretical and applied study of the diagnosis and treatment of vocal disorders.
- COMD 5170 Issues and Trends in Communication Disorders** 2-0-2
Addresses current professional issues in speech-language pathology and audiology which affect service delivery including the code of ethics of the profession addressed in light of changing social, economic and political arenas.
- COMD 5180 Cultural and Dialectical Issues in Communication Disorders** 2-0-2
Prerequisites: COMD 5010, COMD 5060. Seminar on the interrelation of sociological variables and linguistic performance with special emphasis on communication differences and disorders among culturally and linguistically diverse populations.
- COMD 5190 Applied Practicum in the Public School** 0-0-9
Prerequisites: 3.0 GPA, minimum of 100 client contact hours, completion of or concurrent enrollment in all graduate course work and consent of instructor. Supervised practicum consisting of full-time off-campus placement in public schools under the direct supervision of a speech-language pathologist holding the certificate of clinical competence. Students participate in client management, diagnosis, scheduling, staffing, and other activities specific to the setting. May be repeated with instructor's consent.
- COMD 5200 Augmentative/Alternative Communication** 3-0-3
Study of communication options, techniques, and strategies for persons with severe communication disorders resulting from a variety of conditions.
- COMD 5210 Externship in Communication Disorders** 0-0-9
Prerequisites: 3.0 GPA; minimum of 100 client contact hours; completion of all graduate course work; an on-site interview and consent of instructor. Supervised practicum consisting of full-time, off-campus placement in clinical settings such as hospitals, clinics, rehabilitation centers and private practice sites under the direct supervision of a speech-language pathologist holding the certificate of clinical competence. Students participate in supervised client management, diagnosis, staffings, scheduling and other activities specific to the setting.
- COMD 5220 Directed Study in Communication Disorders** 3-0-3
Prerequisites: with prior approval of instructor, advisor and Department Head. This course enables the student to explore in depth a topic relevant to his/her special interest in communication disorders. This course may be repeated.
- COMD 5230 Thesis** 1-0-1 to 3-0-3
Prerequisites: RSCH 7100, COMD 5170. Research project resulting in the completion of a thesis.
- COMD 5450 Auditory and Oral Methods for Teachers** 2-0-2
This course covers application of diagnostic and therapeutic principles related to the development of oral speech in children with significant loss of auditory acuity.
- COMD 8010 Contemporary Issues and Trends in Communication Disorders** 3-0-3
A course designed for presentation and discussion of current issues of local, state, and national importance related to the prevention or solution of problems which impact the field of communication disorders.
- COMD 8020 Seminar in Theory and Applied Intervention** 1-0-1
Seminar presentations regarding in-depth exploration of problems, theories, treatments, and research in specific areas of communication disorders and state of the art interventions based on theoretical conceptualizations. Students will complete 4 one-hour seminars. This course may be repeated for credit when the topic(s) covered is different. Individual topics to be announced with suffix and title.

- COMD 8030 Professional Communication and Collaboration** 3-0-3
 A seminar designed to help the speech-language pathologist organize programs, prepare and administer budgets, supervise professional personnel and physical plant facilities, and provide in-service training.
- COMD 8080 Thesis** 0-0-6
 This course is for the development and defense of the thesis prospectus.

CRJU: CRIMINAL JUSTICE

- CRJU 7000 Criminal Justice Administration** 3-0-3
 An introduction to the administration and organizational structure of criminal justice agencies and the criminal justice system as a whole.
- CRJU 7010 Advanced Comparative Criminal Justice Systems** 3-0-3
 A seminar on crime, law, and criminal justice systems of major legal systems allowing for cross-cultural comparisons
- CRJU 7100 Seminar in Law Enforcement** 3-0-3
 A seminar in which administrative issues pertinent to policing are examined. These include ethics, rural policing, and community policing, among others.
- CRJU 7300 Seminar in Criminal Law And Procedure** 3-0-3
 A seminar in which rapidly changing controversial legal issues which have a major impact on criminal justice are explored.
- CRJU 7350 Seminar in Forensic Investigation** 3-0-3
 An introduction to special topics in forensic science involving the use of forensic techniques in criminal investigations. This course will examine different areas related to the solving of crimes using forensic techniques currently available to the investigator. As needed, experimental forensic techniques will be discussed. Each student will gain an understanding of how forensic science is an integral part of the criminal justice system.
- CRJU 7370 Ethical and Legal Issues** 3-0-3
 An introduction to the study of criminal justice ethics as a classical and contemporary discipline. Modern criminal justice codes of ethics and professional standards will be studied and critiqued. Students will be encouraged to examine critical values and moral beliefs and to develop humanistic philosophies. Questions about the ethical spirit and consequences of specific laws or policies and the disparities between these relatively narrow requirements and more generous professional and personal ethics will be addressed.
- CRJU 7411 Applied Statistics and Research in Criminal Justice** 3-0-3
Prerequisite: Proficiency in basic statistical methods as demonstrated by undergraduate or graduate course work. A study of advanced statistical techniques and research methodology used in criminal justice.
- CRJU 7413 Criminal Justice Planning and Evaluation** 3-0-3
Prerequisite: CRJU 7411. An analysis of criminal justice program development through planned change and techniques or program evaluation, with emphasis on procedure and design.
- CRJU 7500 Seminar in Criminal Behavior and Personality** 3-0-3
 An advanced study of specific criminal behavior types emphasizing violent offenders, sexual deviants, the anti-social personality, and the criminally insane.
- CRJU 7510 Advanced Correctional Therapies** 3-0-3
Prerequisite. CRJU 7500. Study and practice in the development and application of theoretically based correctional treatment plans.

- CRJU 7600 Advanced Criminological Theory** 3-0-3
Prerequisite: Undergraduate or graduate credit for criminological theory or its equivalent as supported by documentation, or permission of the instructor. An intensive overview of each of the major criminological perspectives regarding the etiology of crime.
- CRJU 7610 Seminar in Gang, Group, and Multiple Offender Criminality** 3-0-3
 An intensive study of gang, mob, mass, and other types of group criminality. The course includes an examination of the formulation, evolution, characteristics, and threat of multiple offender violence. Topics include but are not limited to youth gangs, cults, organized crime, mob violence, vigilante groups, and domestic terrorist groups.
- CRJU 7620 Seminar in Criminal Victimization** 3-0-3
 An introduction to the study of crime victims by examining different areas related to crime victims, including identification, research and statistical data used to assess crime victims. A major emphasis of this course will focus on victims' rights legislation and individual responsibility of criminal justice agencies to abide by and provide for special services and programs afforded crime victims. The course will include an outside classroom project that involves each student working with a criminal justice agency, focusing on that agency's role in handling crime victims.
- CRJU 7630 Advanced Crime Prevention** 3-0-3
 Basic concepts of crime prevention theories and techniques. Students will study past and current techniques, programs, and research used to establish crime prevention in today's society. Course requirements include a hands-on creation of a crime prevention program for an existing criminal justice agency, business, or other entity whose use of a crime prevention program is necessary for its success or survival.
- CRJU 7700 Special Topics in Criminal Justice** 3-0-3 to 6-0-6
 A variable hours course that may be taken for 3 to 6 semester hours.
- CRJU 7710 Seminar in Juvenile Justice** 3-0-3
 A seminar on the Juvenile Justice System and major issues related to the administration of juvenile justice. These include administrative issues, legal issues, and issues revolving around theory and rehabilitative goals.
- CRJU 7720 The Media and Criminal Justice** 3-0-3
 An introduction to the portrayal of the criminal justice system through popular media. Students will view films based on true events. Using books or other information on the actual events, students will examine the interaction between the media and criminal justice from varied perspectives.
- CRJU 7730 Great Works in Criminal Justice** 3-0-3
 An introduction to the study of historical and contemporary writings in criminal justice. Students will read and discuss original words from the writings comprising the intellectual history that has shaped criminal justice and original full-length works of unusual merit.
- CRJU 7900 Directed Study In Criminal Justice** 0-3-1 to 0-18-6
May be taken for a maximum of 6 credit hours. Graded "Satisfactory" or "Unsatisfactory." The study plan must be determined in advance and approved by the Coordinator of the Criminal Justice Graduate Program as well as the instructor of record. Independent study or research under the guidance of a criminal justice graduate faculty member.
- CRJU 7990 Area Paper** 3 hours credit
Graded "Satisfactory" or "Unsatisfactory." The student must be registered for CRJU 7990 in the term in which the degree is earned. For students electing the non-thesis option and writing an Area Paper as per established guidelines.
- CRJU 7999 Thesis** 0-3-1 to 0-18-6
 The student must be registered for CRJU 7999 in the term in which the degree is earned. For students developing and writing a thesis and as recommended and approved by the student's thesis advisor. Must be taken for a total of 6 hours.

CS: COMPUTERSCIENCE

- CS 6140 Data Communications and Computer Networks** 3-0-3
Prerequisite: CS 3410. Basic concepts of data communications and computer networks architectures: including OSI and TCP/IP models, packet switching, local area and high speed networks. Error control, routing, and transmission media.
- CS 6321 Software Engineering I** 3-0-3
Prerequisite: CS 3410. Early stages of the software-development process, with emphasis upon analysis and specification. Also, life-cycle definition, software project management, the computer as a system component, and object-oriented approaches. CASE tools will be used as appropriate.
- CS 6322 Software Engineering II** 3-0-3
Prerequisite: CS 3410 (note that CS 4321/6321 is not a prerequisite). The later stages of the software-development process with emphasis upon design, implementation, verification/ validation, and maintenance. Also, human factors, object-oriented techniques, reliability, and quality-assurance issues.
- CS 6330 Theory of Programming Languages** 3-0-3
Prerequisite: CS 3410 or consent of instructor. Formal description of programming languages, standard and advanced features of modern programming languages, complexity.
- CS 6335 Principles of Compiler Design** 3-0-3
Prerequisites: CS 3102 and CS 3410. Introduction to programming language structure, lexical analysis, syntax analysis, code generation, and optimization. A large programming project will be required.
- CS 6340 Systems Programming** 3-0-3
Prerequisite: CS 3410. Implementation of concepts pertaining to the UNIX environment: process control and interprocess communication, job control, file and directory structures, and client/server processes.
- CS 6500 Foundations of Computer Science** 3-0-3
Prerequisites: CS 2620 and CS 3410. The course covers concepts pertaining to regular expressions, finite state machines, regular languages, regular grammars, non regular languages, decidability, context-free grammars, and Turing machines.
- CS 6720 Database Design** 3-0-3
Prerequisite: CS 3410. Examines the logical organization of databases: the entity-relationship model; the hierarchical model, network, and relational models. Hardware characteristics; file organization and evaluation. Functional dependencies and normal forms. Query optimization, concurrency control, and distributed database systems.
- CS 6820 Artificial Intelligence** 3-0-3
Prerequisites: CS 2620 and CS 3410. Definition of artificial intelligence, Common Lisp, logic programming, search techniques, knowledge representation including schemas and scripts, ART-enterprise as an expert system, and principles of expert systems.
- CS 6825 Neural Networks** 3-0-3
Prerequisites: MATH 2150 and MATH 2262. Concepts pertaining to neural networks including: definition of neural intelligence, basic neural computational models, learning: supervised and unsupervised, knowledge bases neural networks, back-propagation neural networks, radial basis neural networks.
- CS 6830 Computer Graphics** 3-0-3
Prerequisites: CS 3410 and MATH 2150. A survey of graphics systems and graphics programming. Topics include output primitives, transformations and viewing, modeling, user interfaces, and interactive methods. Both 2-D and 3-D concepts are discussed.