

Ecology, and Evolutionary Biology

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Professors

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MAJOR

The major in ecology and evolutionary biology provides understanding of the structure and function of organisms and their evolution and ecology. Majors must complete a minimum of 34 credits comprising five core courses and five elective courses of three to four credits each. The core courses are EEOB 101/111 and CELL 101 for a total of seven credits, EEOB 308 and CELL 205 for three credits each, and EEOB 404/414 for four credits. Elective courses are selected according to the interests of the student in consultation with the major advisor. Two of the electives must be designated laboratory or field courses. A maximum of one course representing a special project, independent study, or honors thesis may be counted as an elective, but not as a laboratory-field course. In addition, a student may use a maximum of one course from another department as an elective course, based on a list of approved courses which is available from the departmental office or on the departmental web page (www.tulane.edu/~eeob/). Courses representing internship studies and seminars may not count as elective courses. Majors are also required to complete two semesters of mathematics and four semesters of chemistry, including two semesters of general chemistry 107/117, 108/118, or H109/H111, H110/H112 and two semesters of organic chemistry 241/243, 242/244 or H245/H247, H246/H248. Additional courses in biological statistics and physics are also highly recommended.

MINOR

Students who minor in ecology and evolutionary biology complete EEOB 101/111 and CELL 101 for seven credits, EEOB 308 for three credits, EEOB 404/414 for four credits, and two additional elective courses of three or four credits each in ecology and evolutionary biology for a minimum of 21 credits. One of the two elective courses must be a designated laboratory or field course. Courses from other departments may not be used as electives for the minor. Because of the interdisciplinary nature of the biological chemistry major, students in that program may not minor in ecology and evolutionary biology.

COURSES SUITABLE FOR NON-SCIENTISTS

The department offers a number of courses that are especially appropriate for satisfying the science distribution requirements, including the laboratory course requirement. There are no prerequisites for any of these courses which are listed below. These courses will also count toward major or minor requirements in the department unless otherwise indicated. Details are given below and in the course descriptions that follow.

Lecture Courses

EEOB 123 Diversity in Animal Behavior

EEOB 201 Evolution in Human Health and Disease (does not count toward the major, minor, or LAS laboratory science requirement)

EEOB 211 Tropical Biology

EEOB 221 Insect Biology

Lecture-Laboratory Course

EEOB 377 Mississippi River Colloquium (does not count toward the major or minor, or LAS laboratory science requirement.)

Lecture-Laboratory Courses Fulfilling the LAS Laboratory Science Requirement

EEOB 101/EEOB 111 Diversity of Life

EEOB 318/EEOB 319 Plants and Human Affairs

EEOB 369 Experimental Animal Behavior

EEOB 431 Plant Systematics

PREREQUISITES

The courses Ecology and Evolutionary Biology 101 and 111 and Cell and Molecular Biology 101 are prerequisites for all courses above the 100 level, except where stated otherwise. Any other prerequisites or corequisites are listed in the course descriptions. The student should be aware that some courses are offered only in alternate years or on demand.

HONORS COURSES

EEOB H105 Global Environmental Change (3)

Staff. Prerequisite: approval of department. Special course for superior students covering the material listed for EEOB 105 plus readings and discussion of recent discoveries.

EEOB H491, H492 Independent Studies (1-3, 1-3)

Staff. Laboratory or library research under direction of a faculty member.

EEOB H499-H500 Honors Thesis (3, 4)

Staff. For especially qualified juniors and seniors with approval of department and the Honors Committee.

FRESHMAN INTRODUCTORY COURSES

EEOB 101 Diversity of Life (3)

Staff. Corequisite: EEOB 111. A survey of plant and animal life emphasizing the diversity among individuals, population, species, communities, and ecosystems.

EEOB 104 Global Environmental Change (3)

Staff. An introduction to the physical and biological processes that regulate the function of the Earth system. The composition, formation, and stabilization of the Earth's atmosphere and ecosystem will be examined, emphasizing biological processes and ecosystem ecology. With an understanding of the historical rates and mechanisms of natural global change, the means by which human activities alter Earth system function at local to global scales will be explored, along with the consequences of and solutions to human-induced global change. This course meets the college non-laboratory science requirement, but it cannot count toward any major or minor requirements in ecology and evolutionary biology. Students may receive credit for only one of EEOB 104, 105, or 205.

EEOB 111 Diversity of Life Laboratory (1)

Staff. Corequisite: EEOB 101. Laboratory and field exercises designed to augment the lecture material in 101. Three hours per week.

EEOB 123 Diversity in Animal Behavior (3)

Staff. Basic concepts in animal behavior, emphasizing diversity among animals and their behaviors and the ecological and evolutionary influences on those behaviors. Course will include discussion of how behaviors are studied, physiological mechanisms of behaviors, animal diversity, and how animals communicate, find mates, reproduce, care for their young, defend and feed themselves and move within their environment. Meets the college non-laboratory science requirement. Does not count toward the requirements for a major or minor in ecology and evolutionary biology.

LECTURE COURSES

EEOB 201 Evolution in Human Health and Disease (3)

Mr. Heins. Prerequisite: none. An introduction for non-majors to the study of infectious and non-infectious diseases from an evolutionary perspective. This course meets the college non-laboratory science requirement, but it cannot count toward any major or minor requirements in ecology and evolutionary biology.

EEOB 204 Conservation of Biological Diversity (3)

Mr. Sherry. A consideration of biological diversity and its persistence, threats, human value, conservation efforts, and biological bases. Topics include extinction, global change, population viability, habitat loss and degradation, ecosystem management, restoration, agricultural ecosystems, economic and legal considerations, and the human population.

EEOB 206 Case Studies in Environmental Science (3)

Mr. Bianchi. This course uses case studies to introduce students to interdisciplinary aspects of environmental issues. Emphasis is placed on environmental topics along the Gulf Coast region; past topics have included wetland loss, mercury contamination, and hypoxia events in Louisiana coastal waters.

EEOB 210 Marine Biology (3)

Mr. Bianchi. Prerequisites: EEOB 101, 111. A systematic treatment of the organisms and habitat in the marine environment.

EEOB 211 Tropical Biology (3)

Mr. Dyer. Prerequisite: none. Introduction to ecological, evolutionary, and organismal studies of living organisms in the neotropics.

EEOB 221 Insect Biology (3)

Mr. Dyer. Prerequisite: none. Basic insect biology with an emphasis on insect interactions with humans and how insects fit into our culture.

EEOB 223 Oceanography (3)

Mr. Bianchi. A broad survey of chemical, physical, and geological oceanography with a brief historical overview and a consideration of current concepts. Same as EENS 223.

EEOB 225 Vertebrate Biology (3)

Mr. Heins. An introduction to vertebrate natural history, including evolution, systematics, zoogeography, population dynamics, behavior, ecology, conservation, and extinction.

EEOB 245 Darwinian Medicine (3)

Mr. Heins. Corequisite or Prerequisite: CELL 205. An introduction to evolutionary medicine. Consideration of the ultimate (evolutionary) causes of human diseases as contrasted with proximate (e.g., developmental and physiological) causes, including discussions of the comparative method, natural selection, adaptation, phylogeny, immunology, host-pathogen evolution, and selected diseases.

EEOB 260 Natural Resource Conservation Theory and Practice (3)

Mr. Bart. Corequisite: EEOB 389 Service Learning. This course examines the theory and practice of natural resource preservation in the United States, and the agencies and organizations involved in this endeavor. Students may not apply this course and EEOB 360 toward the course requirements for the EE Biology major.

EEOB 308 Processes of Evolution (3)

Mr. Heins, Mr. Sherry. Corequisite or prerequisite: CELL 205 or approval of instructor. Patterns and processes in the evolution of species and populations, including discussions of natural selection, gene flow, genetic drift, adaptation, speciation, origins of evolutionary novelty, and selected trends in the fossil record.

EEOB 318 Plants and Human Affairs (3)

Mr. Darwin. Prerequisite: none. Since ancient times, people have relied on plants for food, clothing, shelter, medicines, and more. This course investigates some of the ways in which plants support and

shape human life. Topics include: early ideas about plants and the origin of plant lore; plant domestication and the rise of agriculture; plant products in commercial economies; cultural uses of plants; plants and the future of civilization.

EEOB 333 Human Physiology (3)

Mr. Irschick. A discussion of the functional morphology and physiology of the human body from the molecular to the whole organism level.

EEOB 360 Forestry, Forested Ecosystems, and Public Policy (3)

Staff. Prerequisites: EEOB 101 or approval of instructor. This course introduces the practice of forestry and forest management techniques common in the U.S. South, examines forestry's positive and negative environmental impacts, and presents the Federal, State, and local laws and policies that affect the management of forests in the United States. Students will be expected to integrate what they know about biology with what they learn about forestry and public policy. Students may not apply this course and EEOB 260 toward the course requirements for the EE Biology major or minor. Same as ENST 360.

EEOB 368 Comparative Animal Behavior (3)

Mr. Christenson. Prerequisite: EEOB101 or PSYC 100 or 101. A lecture course to introduce the types of questions asked by animal behaviorists, theoretical disciplines posing these questions, and recent research in three categories: behavior as related to the environment, social behavior, and applied behavior. Designed for PSYC and EEB majors. Same as PSYC 368.

EEOB 371 Historical Ecology of Amazonia (3)

Mr. Balée. Interactions between local peoples and Amazonian landscapes from prehistory to the present. Amazonian landscapes as an analytic unit will be examined from the interdisciplinary perspective of historical ecology. Changes and development of forests and savannas since the arrival of human beings. Historical, ecological, cultural forces involved in biological and edaphic diversity in modern forests. Long-term effects of prehistoric and historic human occupations and manipulation of landscapes. Implications for conservation and development. Same as EEOB 671 and ANTH 371/671.

EEOB 404 General Ecology (3)

Mr. Sherry. Corequisite: EEOB 414 (required only for EE Biology majors and minors). A survey of the patterns and mechanisms of interaction among all organisms and their environments, including examples of human impacts on the biosphere. Lectures plus two field trips. EEOB 414 is an optional laboratory for non EE Biology majors.

EEOB 405 Ecosystem Ecology (3)

Staff. Prerequisites: EEOB 404, CHEM 241, and approval of instructor. An in depth examination of ecosystem structure and function. Emphasis will be placed on processes and how individual organisms affect processes. Human impacts on ecosystem structure and function will be considered.

EEOB 408 Biostatistics and Experimental Design (3)

Mr. Irschick. This course will teach students how to interpret statistical data in an evolutionary and ecological context. Special emphasis will be placed on understanding the nature of ecological field experiments, and experimental design. In addition, issues regarding how ecological and evolutionary analyses are perceived in the public media will be discussed. We will cover statistical methods for dealing with such problems (regression, correlation, ANOVA, etc.), and also read papers in ecological and evolutionary journals that highlight statistical issues. The class is designed for students who have not had prior experience with statistics.

EEOB 422 Advanced Oceanography (3)

Mr. Bianchi. A broad survey of biological, chemical, physical, and geological oceanography with a brief historical overview and consideration of current concepts. There will also be an examination of biogeochemical relationships at macroscales, mesoscales, and microscales in the ocean. Same as EENS 422.

EEOB 424 Host-Parasite Systems (3)

Mr. Heins. Study and discussion of the ecology and evolution of host-parasite systems emphasizing patterns and processes.

EEOB 427 Population Ecology (3)

Mr. Sherry. Prerequisite: EEOB 404 or approval of instructor. Principles of population dynamics in space and time, population regulation, and population interactions as determined from an integrated study of plants and animals, followed by exploration of the applicability of these principles to an understanding of the contemporary growth and control of the human population.

EEOB 452 Ecological Physiology (3)

Mr. Irschick. An introduction to the physiological adaptations of plant and animals via study of the interactions between organisms and their environment. The course will focus on animals, but will include examples of plants. An explicitly evolutionary and quantitative perspective will be used. The primary purpose is to provide a general introduction to the field of physiological ecology, including and overview of the field, with an emphasis on recent studies and new techniques in the field. A historical view of the origins of physiological ecology will also be covered.

EEOB 453 Comparative Animal Physiology (3)

Mr. Irschick. Discussions and readings on selected topics in comparative animal physiology. The different ways diverse organisms perform similar functions are explored.

EEOB 470 Seminar in Evolution of Reproductive Strategies (4)

Mr. Christenson. Prerequisites: EEOB 368 or PSYC 368, and approval of instructor. Discussion of the evolution and ecology of reproductive strategies. Topics include costs and benefits of sexual reproduction, sexual selection, sperm competition and mating systems. Fulfills the LAS writing requirement. Same as PSYC 470.

LABORATORY-FIELD COURSES**EEOB 319 Plants and Human Affairs Laboratory (1)**

Mr. Darwin. Prerequisite: none. Corequisite: EEOB 318. Laboratory course to accompany EEOB 318. A survey of plant products and their sources, emphasizing the structure, chemistry, and diversity of economic plants. Demonstrations, exercises, and field trips.

EEOB 369 Experimental Animal Behavior (4)

Mr. Christenson. Prerequisites: EEOB 368 and approval of instructor. A laboratory course with lectures in animal behavior in which hypothesis generation, experimental design, ethical consideration, methods of observation and data recording, and data analysis and interpretation are explored through experiments and written assignments. Fulfills the college writing requirement. Same as PSYC 369.

EEOB 377 Mississippi River Colloquium (4)

Mr. Bart. Prerequisite: none. Interdisciplinary course dealing with the Mississippi River Basin. The goal is to give students a broad overview of the important social and environmental issues surrounding the river. This course meets the college non-laboratory science requirement, but it cannot count toward any major or minor in ecology and evolutionary biology. Lectures are supplemented by weekly labs, some day field trips, and one weekend field trip. Same as ENST 377.

EEOB 406 Stream Ecology (4)

Mr. Bart. Ecology of freshwater stream environments, including physical forces influencing water flow, sediment and solute geochemistry, and composition and interactions of stream biota. Lectures supplemented by weekly labs, some day field trips, and one weekend field trip.

EEOB 410 Introduction to Marine Zoology (4)

Staff. Prerequisite: approval of instructor. Field and laboratory survey of marine animals, particularly those of the Louisiana Gulf Coast, including classification, morphology, physiology, and ecology. Offered summers only. Four weeks at a Louisiana Universities Marine Consortium coastal laboratory.

EEOB 414 General Ecology Laboratory (1)

Mr. Sherry. Corequisite EEOB 404. Quantitative laboratory and field exercises designed to augment the lecture material. Includes data collection, sampling, experimentation, statistical hypothesis testing, modeling, discussion of research results, and writing up of results in the form of three scientific papers.

EEOB 420 Ornithology (4)

Mr. Sherry. An introduction to the biology of birds emphasizing their origin, evolution, diversity, zoogeography, functional morphology, behavior, ecology, and conservation. Lectures supplemented by weekly laboratories or short field trips, and occasional weekend field trips. Students must provide own binoculars.

EEOB 421 Vertebrate Morphology (4)

Mr. Bart. Comparative morphology, evolution, and bionomics of representative vertebrates. Lectures supplemented by weekly labs.

EEOB 428 Ichthyology (4)

Mr. Bart. Biology of fish-like vertebrates, including taxonomy, evolution, anatomy, physiology, and biogeography. Lectures supplemented by weekly labs, some day field trips, and one weekend field trip.

EEOB 431 Plant Systematics (4)

Mr. Darwin. Prerequisite: none. A review of the structure and evolution of land plants and a survey of the major families of flowering plants. Laboratory emphasis on structural terminology and plant identification. Field trips required.

EEOB 433 Entomology (4)

Mr. Dyer. Insect classification and evolution, structure and function, and ecology. Insect collection required. Lectures supplemented by weekly labs.

SPECIAL TOPICS AND PROJECTS COURSES**EEOB 389 Service Learning (1)**

Staff. Prerequisite: approval of department. Students complete a service activity in the community in conjunction with the content of a three-credit corequisite course.

EEOB 456, 457 Internship Studies (1-3, 1-3)

Staff. Prerequisite: approval of department. An experiential learning process coupled with pertinent academic course work. Open only to juniors and seniors in good standing. Registration is completed in the academic department sponsoring the internship on TUTOR. (Note: A maximum of six credits may be earned in one or two courses.)

EEOB 466 Topics in Biology (1-3)

Staff. Courses offered for undergraduate students by visiting professors and permanent faculty. Consult department for specific description.

EEOB 495, 496 Special Projects in Biology (1-3, 1-3)

Staff. Individual studies in a selected field. Open to qualified juniors and seniors with approval of instructor and advisor.

EEOB 497 Topics in Marine Science (3)

Staff. Advanced lecture, laboratory, and field work on a selected topic in the marine sciences at a coastal laboratory of the Louisiana Universities Marine Consortium. By arrangement.

EEOB 498 Special Topics in Marine Science (3)

Staff. Directed undergraduate research and study at a coastal laboratory of the Louisiana Universities Marine Consortium. By arrangement.

ADVANCED UNDERGRADUATE AND GRADUATE COURSES**EEOB 602 Plant Ecology (3)**

Staff. Prerequisite: EEOB 404 or approval of instructor. Survey of vegetation patterns and an investigation of the mechanisms and processes that shape these patterns. Field trips or field projects required although this is not a laboratory-field course.

EEOB 604 Marine Ecology (3)

Mr. Bianchi. Relationship of marine and estuarine organisms to environmental factors; interactions among organisms; ecological processes of energy and material flow; communities and ecosystems of the Gulf Coast. One weekend field trip required although this is not a laboratory-field course.

EEOB 607 Restoration Ecology (3)

Staff. Prerequisite: EEOB 404 or approval of instructor. Discussion will focus on applying knowledge from ecology toward understanding how damaged ecosystems differ from relatively undisturbed systems, evaluating ecosystem health and designing plans to restore system integrity.

EEOB 608 Phylogenetics (3)

Mr. Darwin. Prerequisite: approval of instructor. A consideration of biological homology, species definition, problems of character data analysis, and Hennigian cladistics as a means of reconstructing the evolutionary history of life. The implications of phylogenetic hypotheses for biological classification, biogeography, paleontology, comparative ecology, and conservation biology. Seminars, readings, and projects.

EEOB 609 Invertebrate Paleontology (4)

Mr. Parsley. Prerequisite: EEOB 614, EENS 112, or approval of instructor. Principles of invertebrate paleontology; a systematic treatment of the fossil invertebrates and their living relatives. Emphasis on functional morphology, ontogeny, and paleontology. Lectures are supplemented by weekly labs. Same as EENS 609.

EEOB 610 Micropaleontology (3)

Staff. Prerequisite: EEOB 101 or EENS 112. The foraminifera, ostracoda, nannofossils, conodonts, and other groups of microfossils. Same as EENS 610.

EEOB 611 Tropical Ecology (3)

Staff. Prerequisite: EEOB 404 or approval of instructor. Ecology of tropical plants, animals, and ecosystems with emphasis on the New World tropics.

EEOB 613 Principles of Paleobiology (3)

Mr. Xiao. Prerequisite: EEOB 101, EENS 112, EENS 609, or approval of instructor. Selected topics on macroevolutionary theories; Phylogeny and the fossil records of metazoans; Major events in the history of life; Patterns of biodiversity through geological time; Taphonomy; Paleoecology. Same as EENS 613.

EEOB 614 Biology of Invertebrates (4)

Staff. Biology, taxonomy, and distribution of the invertebrates with emphasis on the local fauna. Lectures, laboratory, and field trips.

EEOB 616 Morphology and Evolution of Vascular Plants (3)

Mr. Darwin. Prerequisite: EEOB 431 or approval of instructor. The evolutionary history of land plants, emphasizing their structural homologies and paleobotany.

EEOB 617 Marine Invertebrate Zoology (4)

Staff. Prerequisite: EEOB 614 or approval of instructor. General study of the classification, structure, function, and ecology of marine and estuarine invertebrates emphasizing field studies on the Louisiana Gulf Coast. Offered summers only. Four weeks at a Louisiana Universities Marine Consortium coastal laboratory.

EEOB 619 Darwin and Darwinism (4)

Mr. Darwin. Prerequisite: approval of instructor. A consideration of Charles Darwin's theory of Natural Selection, including the history of evolutionary thought before Darwin's time, the circumstances surrounding Darwin's research, and the effect of Darwin's ideas on the development of contemporary biology. Readings, discussions, and written assignments. Satisfies the LAS writing requirement.

EEOB 621 Global Biogeochemical Cycles (3)

Mr. Bianchi. Prerequisite: one year of Organic Chemistry. An introduction to the global biogeochemical cycles in fresh water, marine, and terrestrial ecosystems. Emphasis will be placed on key environmental issues as they relate to perturbations of these global cycles. Open only to seniors and graduate students. Same as EENS 621.

EEOB 623 Biogeography (3)

Mr. Darwin. Prerequisite: EEOB 308, 404, or approval of instructor. An investigation of the past and present geographical distribution of plants and animals, with consideration of current biogeographical theory.

EEOB 624 Biology of Fishes (4)

Mr. Heins. Physiology, life history, systematics, ecology, and behavior of the major groups of fishes. Lectures, laboratory, and field trips.

EEOB 625 Isotopes in the Environment (3)

Mr. Marcantonio. The use of isotopes as tools to trace the movement of air, water, and sediments through the atmosphere, hydrosphere, biosphere, and lithosphere. Same as EENS 625.

EEOB 626 Paleoclimatology (3)

Mr. Marcantonio. Prerequisite: approval of instructor. Understanding past climatic variation is necessary to fully comprehend present and model future climate. The focus will be on climate change during the late Quaternary Period, with special emphasis on climate reconstruction methods. Same as EENS 626.

EEOB 630 Marine Vertebrate Zoology (4)

Staff. Prerequisite: 16 credits of EEOB or approval of instructor. General study of the marine chordates with particular emphasis on the fishes, including classification, structure, function, and ecology. Offered summers only. Four weeks at a Louisiana Universities Marine Consortium laboratory.

EEOB 633 Plant-Animal Interactions (3)

Mr. Dyer. Prerequisite: EEOB 404. Ecological, evolutionary, and applied approaches to the studies of herbivory, ant-plant interactions, pollination, and seed dispersal.

EEOB 634 Ecological Analysis (3)

Mr. Dyer. Prerequisite: EEOB 408 or PSYC 611. Study of powerful methods for designing ecological studies and analyzing ecological data, assuming a knowledge of basic parametric and nonparametric statistics.

EEOB 659 Limnology (3)

Staff. Biological, chemical, and physical characteristics of the inland aquatic environment.

EEOB 666 Special Topics in Biology (1-3)

Staff. Courses offered by visiting professors or permanent faculty. For description, consult department.

EEOB 667 Ecology of Fishes (3)

Mr. Heins. The study of topics and issues in fish ecology in relationship to general ecological and evolutionary theory. Emphasis will be placed on research in community and evolutionary ecology and the historical background from which it developed.

EEOB 669 Biochemistry of Estuaries (3)

Mr. Bianchi. Prerequisites: CHEM 242, and MATH 122 or 131. Physico-chemical and biological aspects of the zone interfacing fresh water and marine environments. Emphasis will be place on the

biogeochemical cycles of this highly dynamic ecosystem. Field trips to estuarine regions along the Gulf Coast will be required although this is not a laboratory-field course. Same as EENS 669.

EEOB 671 Historical Ecology of Amazonia (3)

See EEOB 371 for course description.

EEOB 681 Journal Review in Ecology and Evolutionary Biology (1)

Staff. Prerequisite: graduate standing or approval of instructor. Discussion of significant new publications in ecology, evolutionary biology, and related fields.

EEOB 685 Current Topics in Ecology and Evolutionary Biology (2)

Staff. Prerequisite: graduate standing or approval of instructor. In-depth examination of a selected topic in ecology and evolutionary biology.

EEOB 691, 692 Independent Studies (1-3, 1-3)

Staff. Prerequisite: junior or senior standing and approval of instructor. Advanced independent studies in a selected field of biology.

INTERDEPARTMENTAL COURSES

Any one of these courses, which are not taught by the faculty of the Department of Ecology and Evolutionary Biology, is acceptable as one of the electives in the required program for the EE Biology major.

Anthropology

314 The Primates

650 Human Evolution

Cell and Molecular Biology

301/302 Cell Biology/Laboratory

311/312 Molecular Biology/Laboratory

411 Cells and Tissues

412 Embryology

416 Developmental Biology

422/423 Microbiology/Laboratory

441 Molecular Basis of Human Genetic Disease

Chemistry

250 Environmental Chemistry

383 Introduction to Biochemistry

385 Introduction to Biochemistry Laboratory