

Biology (BIOL)

Courses

BIOL 50071. Seminar in Biology. 1 Hour.

Discussion of selected topics and review of current literature in any area of the biological sciences. (Typically offered: Fall and Spring) May be repeated for up to 2 hours of degree credit.

BIOL 50173. Laboratory in Prokaryote Biology. 3 Hours.

Laboratory techniques in prokaryote culture, identification, physiology, metabolism, and genetics. Laboratory 6 hours per week. Prerequisite: BIOL 40403. (Typically offered: Fall and Spring)

BIOL 50274. Insect Diversity and Taxonomy. 4 Hours.

Principles and practices of insect classification and identification with emphasis on adult insects. 2.5 hours lecture, 4 hours lab. Previous knowledge of basic entomology is necessary. Graduate degree credit will not be given for both BIOL 40274 and BIOL 50274. Prerequisite: Instructor consent. Corequisite: Lab component. (Typically offered: Fall)

This course is cross-listed with ENTO 50204.

BIOL 50374. Wildlife Management Techniques. 4 Hours.

To familiarize students with techniques used in the management of wildlife populations. Students will be exposed to field methods, approaches to data analysis, experimental design, and how to write a scientific paper. Management applications will be emphasized. Lecture 3 hours, laboratory 3 hours per week. Graduate degree credit will not be given for both BIOL 47374 and BIOL 50374. Corequisite: Lab component. Prerequisite: BIOL 38773. (Typically offered: Irregular)

BIOL 50403. Prokaryote Biology. 3 Hours.

An in-depth coverage of prokaryote diversity, genetics, metabolism, growth, structures and functions. (Typically offered: Spring)

BIOL 50573. Insect Ecology. 3 Hours.

Teaches important ecological concepts through study of dynamic relationships among insects and their environment. Introduces literature of insect ecology, and interpretation and critique of ecological research. Previous knowledge of basic entomology and/or ecology will be assumed. 2 hours lecture/2 hours lab. Graduate degree credit will not be given for both BIOL 40573 and BIOL 50573. Prerequisite: Instructor consent. Corequisite: Lab component. (Typically offered: Fall Even Years)

This course is cross-listed with ENTO 50503.

BIOL 50703. Mitochondrial Biology and Medicine. 3 Hours.

Overview of mitochondrial biology with a focus on the clinical spectrum of human diseases affected by dysfunctional mitochondria. Introduces basic mitochondrial biology, structure and function, genetics and bioenergetics. Highlights common and rare diseases influenced by mitochondrial malfunction. Prerequisite: Graduate Standing. (Typically offered: Fall)

BIOL 51074. Taxonomy of Flowering Plants. 4 Hours.

Identifying, naming, and classifying of wildflowers, weeds, trees, and other flowering plants. Emphasis is on the practical aspects of plant identification. Lecture 3 hours, laboratory 3 hours per week. Graduate degree credit will not be given for both BIOL 41074 and BIOL 51074. Corequisite: Lab component. Prerequisite: BIOL 10303 and BIOL 10301 and BIOL 23373 and BIOL 30473. (Typically offered: Spring)

BIOL 51173. Insect Behavior and Chemical Ecology. 3 Hours.

Basic concepts in insect senses and patterns of behavioral responses to various environmental stimuli. Previous knowledge of basic entomology is helpful, but not required. Prerequisite: Instructor consent. Corequisite: Lab component. (Typically offered: Spring Even Years)

This course is cross-listed with ENTO 51103.

BIOL 51262. Food Microbiology. 2 Hours.

The study of food microbiology including classification/taxonomy, contamination, preservation and spoilage of different kinds of foods, pathogenic microorganisms, food poisoning, sanitation, control and inspection and beneficial uses of microorganisms. Graduate degree credit will not be given for both BIOL 41272 and BIOL 51263. Prerequisite: BIOL 20003 and BIOL 20001 or BIOL 25473. (Typically offered: Fall)

This course is cross-listed with FDSC 51202.

BIOL 51274. Dendrology. 4 Hours.

Morphology, classification, geographic distribution, and ecology of woody plants. Lecture 3 hours, laboratory 3 hours per week, and fieldtrips. Graduate degree credit will not be given for both BIOL 41174 and BIOL 51274. Prerequisite: BIOL 38773. (Typically offered: Fall)

BIOL 51573. Practical Programming for Biologists. 3 Hours.

Hands-on instruction in the fundamentals of biological computing. Students learn how to set up a Unix work station, work from the command line, install software, build databases, and program in Python, a popular scripting language for biological applications. Most examples focus on the analysis of genomic data. (Typically offered: Spring)

BIOL 51673. Dynamic Models in Biology. 3 Hours.

Mathematical and computational techniques for developing, executing, and analyzing dynamic models arising in the biological sciences. Both discrete and continuous time models are studied. Applications include population dynamics, cellular dynamics, and the spread of infectious diseases. Graduate degree credit will not be given for both BIOL 41673 and BIOL 51673. Prerequisite: MATH 24004. (Typically offered: Irregular)

BIOL 51774. Conservation Genetics. 4 Hours.

Covers concepts of biodiversity identification and illustrates how genetic data are generated and analyzed to conserve and restore biological diversity. Corequisite: Lab component. Prerequisite: BIOL 30473, BIOL 38773 and STAT 28233 (or equivalent) and graduate standing. (Typically offered: Spring)

BIOL 52173. Biological Regulation and Subcellular Communication. 3 Hours.

Combines lectures, review of primary literature, student presentations, and small group discussions to explore a diversity of topics related to mechanisms of biological regulation and subcellular communication. Prerequisite: Graduate standing. (Typically offered: Irregular)

BIOL 52273. Bacterial Lifestyles. 3 Hours.

The course will introduce students to bacteria as prokaryotic organisms, different from eukaryotes such as plants and animals. Model microbial systems will be studied in more detail to identify unique strategies that bacteria employ to thrive in their respective environment, whether they are causing diseases or establishing beneficial interactions with animal or plants or coexisting with other microorganisms in diverse ecological environments. The course will also cover special adaptations that bacteria have evolved to adapt to harsh environments and how these adaptations can be harnessed to control pollution. Prerequisite: (BIOL 20003 and BIOL 20001) or BIOL 40403. (Typically offered: Spring Odd Years)

This course is cross-listed with PLPA 51203.

BIOL 52373. Genomics and Bioinformatics. 3 Hours.

Principles of molecular and computational analyses of genomes. Prerequisite: BIOL 25473 or BIOL 23373. (Typically offered: Spring)

BIOL 52461. Ichthyology Laboratory. 1 Hour.

Practical application of fish identification based on anatomy, fish sampling methods, and curation of fish specimen. Laboratory component of BIOL 52463. Corequisite: BIOL 52463. (Typically offered: Spring Odd Years)

BIOL 52463. Ichthyology. 3 Hours.

Comprehensive overview of the diversity of fishes. Covers anatomy, physiology, evolution, taxonomy, ecology, behavior, zoogeography and conservation of marine and freshwater fishes. Lecture 3 hours per week. Corequisite: BIOL 52461. (Typically offered: Spring Odd Years)

BIOL 52574. Comparative Physiology. 4 Hours.

Comparison of fundamental physiological mechanisms in various animal groups. Adaptations to environmental factors at both the organismal and cellular levels are emphasized. Lecture 3 hours, laboratory 3 hours per week. Graduate degree credit will not be given for both BIOL 42384 and BIOL 52574. Prerequisite: BIOL 25473 and CHEM 36203 and (CHEM 36201 or CHEM 361H1). (Typically offered: Fall)

BIOL 52673. Cell Physiology. 3 Hours.

In-depth molecular coverage of cellular processes involved in growth, metabolism, transport, excitation, signaling and motility, with emphasis on function and regulation in eukaryotes, primarily animals. Prerequisite: BIOL 23373, BIOL 25473, BIOL 25471, CHEM 38103, and PHYS 20203. (Typically offered: Fall)

BIOL 52773. Endocrinology. 3 Hours.

In endocrinology we study hormonal integration of living processes at all levels from molecule to organism. We will work with the mechanisms of hormone action, the endocrine control axes and hormones physiological role. The course will include paper discussions and student presentations on topics of special interest. (Typically offered: Spring)

BIOL 53173. Molecular Cell Biology. 3 Hours.

In-depth molecular coverage of transcription, cell cycle, translation, and protein processing in eukaryotes and prokaryotes. Prerequisite: BIOL 25473 and BIOL 23373 and CHEM 36053 and CHEM 36051 and CHEM 36203 and CHEM 36201. (Typically offered: Spring)

BIOL 53273. Comparative Neurobiology. 3 Hours.

Exploration of modern research approaches to understanding the development and function of animal nervous systems, with emphasis on molecular and cellular approaches in non-human animal models commonly used in biomedical research. Format combines lectures, group discussions, and student presentations using examples from the primary neurobiology literature. Prerequisite: Graduate standing. (Typically offered: Irregular)

BIOL 53473. Advanced Immunology. 3 Hours.

Aspects of innate, cell-mediated, and humoral immunity in mammalian and avian species. Molecular mechanisms underlying the function of the immune system are emphasized. A course in Basic Immunology prior to enrollment in Advanced Immunology is recommended but not required. Lecture 3 hours per week. (Typically offered: Spring)

This course is cross-listed with POSC 53403.

BIOL 53572. Immunology in the Laboratory. 2 Hours.

Laboratory course on immune-diagnostic laboratory techniques and uses of antibodies as a research tool. Included are cell isolation and characterization procedures, immunochemistry, flow cytometry, ELISA and cell culture assay systems. Laboratory 6 hours per week. Prerequisite: POSC 53403 or BIOL 53473. (Typically offered: Spring)

This course is cross-listed with POSC 53502.

BIOL 53583. Ecological Genetics/genomics. 3 Hours.

Analysis of the genetics of natural and laboratory populations with emphasis on the ecological bases of evolutionary change. Prerequisite: BIOL 23373 and BIOL 23371, BIOL 30473 and MATH 24004 and STAT 28233 or equivalents. (Typically offered: Fall Odd Years)

BIOL 54074. Comparative Botany. 4 Hours.

A comparative approach to organisms classically considered to be plants with emphasis on morphology, life history, development, and phylogeny. Three hours lecture, 4 hours lab per week. Corequisite: Lab component. Prerequisite: Graduate standing. (Typically offered: Fall Odd Years)

BIOL 54373. Principles of Evolution. 3 Hours.

Advanced survey of the mechanisms of evolutionary change with special emphasis on advances since the Modern Synthesis. Historical, theoretical, and population genetics approaches are discussed. Recommended: BIOL 30473 and BIOL 23371 and BIOL 38771. Prerequisite: BIOL 23373 and BIOL 38773. (Typically offered: Fall Even Years)

BIOL 54671. Population Ecology Laboratory. 1 Hour.

Demonstration of the models and concepts from BIOL 55183. Pre- or Corequisite: BIOL 55183. (Typically offered: Fall Even Years)

BIOL 54673. Physiological Ecology. 3 Hours.

Interactions between environment, physiology, and properties of individuals and populations on both evolutionary and ecological scales. Prerequisite: BIOL 38773 and BIOL 42384. (Typically offered: Spring Odd Years)

BIOL 55183. Population Ecology. 3 Hours.

Survey of theoretical and applied aspects of populations processes stressing models of growth, interspecific interactions, and adaptation to physical and biotic environments. Corequisite: BIOL 54671. Prerequisite: BIOL 38773. (Typically offered: Fall Even Years)

BIOL 55273. Plant Ecology. 3 Hours.

To develop understanding of important ecological concepts through study of dynamics relationships among plants and their environment. To become familiar with the literature of plant ecology, and interpretation and critique of ecological research. Prerequisite: BIOL 38773. (Typically offered: Spring Even Years)

BIOL 55284. Developmental Biology with Laboratory. 4 Hours.

An analysis of the concepts and mechanisms of development emphasizing the experimental approach. Students may not receive degree credit for both BIOL 55473 Developmental Biology and BIOL 55284 Developmental Biology with Laboratory. Corequisite: Lab component. (Typically offered: Fall)

BIOL 55473. Developmental Biology. 3 Hours.

An analysis of the principles and mechanisms of development emphasizing the embryonic and postembryonic development of animals. Degree credit will not be allowed for both BIOL 55473 and BIOL 55284. (Typically offered: Irregular)

BIOL 55573. Astrobiology. 3 Hours.

Discusses the scientific basis for the possible existence of extraterrestrial life. Includes the origin and evolution of life on Earth, possibility of life elsewhere in the solar system (including Mars), and the possibility of life on planets around other stars. Prerequisite: Instructor consent. (Typically offered: Irregular)
This course is cross-listed with SPAC 55503.

BIOL 55673. Cancer Biology. 3 Hours.

An introduction to the fundamentals of cancer biology. Prerequisite: BIOL 25473. (Typically offered: Fall)

BIOL 55703. Laboratory In Marine Invertebrate Development and Evolution. 3 Hours.

Provides a hands-on introduction to investigation of problems in marine invertebrate development and evolution. Emphasizes comparative molecular genetic approaches using non-traditional model organisms. The topic of research may vary from year to year; examples include, but are not limited to, the mechanisms of life cycle transition. (Typically offered: Fall)

BIOL 56173. Primate Adaptation and Evolution. 3 Hours.

Introduction to the biology of the order Primates. This course considers the comparative anatomy, behavioral ecology and paleontology of our nearest living relatives. Graduate degree credit will not be given for both BIOL 46173 and BIOL 56173. Prerequisite: BIOL 30473 or ANTH 10143. (Typically offered: Spring)
This course is cross-listed with ANTH 56203.

BIOL 56973. Forest Ecology. 3 Hours.

Introduction to the various biological, ecological and historical aspects of forest communities, with particular emphasis on the forests of the central and southeastern United States. Graduate degree credit will not be given for both BIOL 46973 and BIOL 56973. Prerequisite: BIOL 38773. (Typically offered: Irregular)

BIOL 57073. Mechanisms of Pathogenesis. 3 Hours.

A survey of events causing human disease at the molecular, cellular and genetic levels. Seeks to develop an appreciation that both the tricks pathogens use and the body's own defenses contribute to pathology. (Typically offered: Fall)

BIOL 57181. Basic Immunology Laboratory. 1 Hour.

Basic immunology laboratory. Graduate degree credit will not be given for both BIOL 47181 and BIOL 57181. Corequisite: BIOL 57183. (Typically offered: Spring)

BIOL 57183. Basic Immunology. 3 Hours.

A general overview of Immunity with emphasis on the underlying cellular, molecular and genetic events controlling immune reactions. Reading of the primary literature on disease states involving the immune system. (Typically offered: Spring)

BIOL 57273. Fish Biology. 3 Hours.

Morphology, classification, life histories, population dynamics, and natural history of fishes and fish-like vertebrates. Lecture 2 hours, laboratory 3 hours per week. Corequisite: Lab component. Prerequisite: 12 hours of biological sciences. (Typically offered: Spring Odd Years)

BIOL 57473. Herpetology. 3 Hours.

Morphology, classification and ecology of amphibians and reptiles. Lecture 2 hours, laboratory 1 hour per week. Corequisite: Lab component. (Typically offered: Spring Even Years)

BIOL 57673. Ornithology. 3 Hours.

Taxonomy, morphology, physiology, behavior, and ecology of birds. Lecture, laboratory, and field work. Corequisite: Lab component. Prerequisite: 10 hours of biological sciences. (Typically offered: Spring Even Years)

BIOL 57774. Biometry. 4 Hours.

Students learn biological statistics and experimental design by actually designing experiments and analyzing data, as well as through lecture, discussion, reading, writing, and problem solving. Lecture 3 hours, laboratory 3 hours each week. Graduate degree credit will not be given for both BIOL 47774 and BIOL 57774. Corequisite: Lab component. Prerequisite: STAT 28233 or equivalent, BIOL 38773. (Typically offered: Spring Even Years)

BIOL 57973. Introduction to Neurobiology. 3 Hours.

Exploration of the neurological underpinnings of perception, action, and experience including: how sense receptors convert information in the world into electricity, how information flows through the nervous systems, how neural wiring makes vision possible, how the nervous system changes with experience, and how the system develops. Graduate degree credit will not be given for both BIOL 47973 and BIOL 57973. Prerequisite: BIOL 25473. (Typically offered: Spring)

BIOL 5800V. Special Topics in Biological Sciences. 1-6 Hour.

Consideration of new areas of biological sciences not yet treated adequately in other courses. Prerequisite: 8 hours of biological sciences. (Typically offered: Fall, Spring and Summer) May be repeated for up to 6 hours of degree credit.

BIOL 58273. Science Communication. 3 Hours.

Covers the foundations of writing strategies, how to communicate with discipline-specific versus broad audiences, elements of an effective presentation, and the manuscript and proposal review process. (Typically offered: Fall)

BIOL 58373. Animal Behavior. 3 Hours.

Organization, regulation, and phylogeny of animal behavior, emphasizing diversity across animal taxa. Lecture, laboratory, and field work. Corequisite: Lab component. (Typically offered: Spring)

BIOL 58464. Community Ecology. 4 Hours.

Survey of theoretical and applied aspects of community processes stressing structure, trophic dynamics, community interactions, and major community types. Corequisite: Lab component. Prerequisite: BIOL 38773. (Typically offered: Fall Odd Years)

BIOL 58473. Conservation Biology. 3 Hours.

The study of direct and indirect factors by which biodiversity is impacted by human activity. It is a synthetic field of study that incorporates principles of ecology, biogeography, population genetics, economics, sociology, anthropology, philosophy, geology, and geography. Prerequisite: BIOL 38773. (Typically offered: Irregular)

BIOL 58673. Analysis of Animal Populations. 3 Hours.

Basic principles of design and analysis for population studies of fish and wildlife species. Students will be instructed in the use of the latest software for estimating population parameters. Focus will be on both concepts and applications. Management applications of estimated parameters will be emphasized. Lecture 2 hours, laboratory 3 hours per week. Graduate degree credit will not be given for both BIOL 48673 and BIOL 58673. Corequisite: Lab component. Prerequisite: BIOL 38773. (Typically offered: Spring Even Years)

BIOL 58773. Microbial Molecular Genetics and Informatics. 3 Hours.

Fundamentals of microbial genomics and bioinformatics. Course covers microbial genetics, genetic structure, genome organization, proteome organization, approaches for the analysis of DNA, RNA, and proteins, cellular metabolic pathways, genetic regulation, small RNA molecules, functional genomics, metagenomics, and bioinformatics approaches for analysis of microbial genomes. Prerequisite: Graduate status. (Typically offered: Fall)

BIOL 58873. Mammalian Evolution and Osteology. 3 Hours.

Focuses on describing the evolutionary history of mammals, a group of vertebrates that include over 5,000 species in 29 orders, and will provide an overview of living species and their identifying features. Credit will not be given for both ANTH 47003 and ANTH 57003. Prerequisite: Instructor consent. (Typically offered: Fall Even Years)

This course is cross-listed with ANTH 57003.

BIOL 59174. Stream Ecology. 4 Hours.

Current concepts and research in lotic ecosystem dynamics. Lecture, laboratory, field work and individual research projects required. Corequisite: Lab component. Prerequisite: 3 hours of ecology-related coursework. (Typically offered: Fall Even Years)

BIOL 59373. Global Biogeochemistry: Elemental Cycles and Environmental Change. 3 Hours.

This course explores the chemical, biological, and geological processes occurring within ecosystems. An understanding of these processes is used to investigate how they form the global biogeochemical cycles that provide energy and nutrients necessary for life. Class discussions focus on global change and the effects of more recent anthropogenic influences. Prerequisite: 3 hours of chemistry or biochemistry and ecology. (Typically offered: Spring Odd Years)

BIOL 5967V. Culture and Environment: Field Studies. 1-6 Hour.

May be taken by students participating in overseas study programs or other domestic field study programs approved by the department. Graduate degree credit will not be given for both BIOL 4967V and BIOL 5967V. (Typically offered: Irregular) May be repeated for up to 12 hours of degree credit.

BIOL 6007V. Master's Thesis. 1-6 Hour.

Master's Thesis. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.

BIOL 7007V. Doctoral Dissertation. 1-18 Hour.

Doctoral Dissertation. Prerequisite: Graduate standing. (Typically offered: Fall, Spring and Summer) May be repeated for degree credit.