

BIOLOGY

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MAJOR

Ten courses distributed as follows:

- BIOL 150 *Cell Biology*
- BIOL 160 *Organismal Biology*
- BIOL 250 *Genetics*
- BIOL 260 *Ecology and Evolution*
- CHEM 110 *General Chemistry I: Chemical Structure and Properties*
and
CHEM 120 *General Chemistry II: Chemical Analysis and Reactivity*
or
an equivalent
- four biology electives, 200-level or above, at least three of which must be 300-level or above*

All majors must take BIOL 497 *Biology Seminar*, which does not carry course credit.

* *The Biology Department strongly encourages students to design and carry out independent research for course credit. However, this credit will not count toward the four required electives.*

Senior Capstone Experience

The Senior Capstone Experience for the biology major consists of a comprehensive examination and participation in the Senior Seminar course. The comprehensive examination is the standardized Major Field Achievement Test (MFT), or the Graduate Record Examination (GRE) in biology. BIOL 497 *Senior Seminar* is a one semester, non-credit course that meets weekly. During the course each senior presents a formal seminar. The grade for the Senior Capstone Experience is based on both the standardized test score and the Senior Seminar grade.

MINOR

Any five biology courses numbered 150 or above. The Biology Department highly recommends that all students pursuing a biology minor take at least CHEM 110 and 120.

Students planning to certify to teach biology should contact their major advisors and the Education Department for a list of courses required within the major and by the professional societies for licensure.

The following are general guidelines for courses required by many graduate and professional schools. Students should refer to the Guide for Academic Planning and work closely with their academic advisors to ensure adequate course preparation for specific post-graduate programs.

Medical School, Dental School, and Veterinary Medicine

1. Preparation for qualifying examinations (MCAT, DAT, VCAT) is best achieved by completing at least BIOL 150, BIOL 160, and BIOL 250.
2. Two courses in General Chemistry and two courses in Organic Chemistry
3. At least one course in Mathematics
4. Two courses in Physics
5. Two to three courses in English

Graduate Schools

Many graduate schools in biology expect

1. Two years of Biology
2. Two years of chemistry through Organic Chemistry
3. One year of Physics
4. At least one Calculus course
5. At least one Statistics course
6. Competency in a foreign language

Experience with experimental design (such as through independent research), and in some cases, computer programming is highly desirable. Most graduate schools require a reading knowledge in at least one foreign language and/or basic programming skills.

Courses for non-science majors

The following courses are designed for non-science majors and may not be used to fulfill requirements for the biology major or minor. They will fulfill the collegiate Natural Science Inquiry learning domain requirement and may (check class schedule) fulfill the laboratory requirement.

BIOL 101 *Concepts in Biology* (NS-L)

The structure, function, heredity, evolution, and ecological interactions of living systems with emphasis on those concepts having major implications for humans and society.

BIOL 102 *Natural History* (NS-L)

The variety of organisms and ecosystems, with special emphasis on the geological and biological history of Arkansas. Field laboratories expose students to the major taxonomic groups of organisms.

BIOL 103 *Biology of the Human Body* (NS-L)

The structure and function of human organ systems, with emphasis on the maintenance and perpetuation of the living state.

BIOL 104 *Environmental Biology* (CW, NS-L)

An introduction to principles of ecology as they relate to the human concerns of overpopulation, resource management, pollution, and environmental ethics.

BIOL 105 *Plants in Human Affairs* (NS-L)

A consideration of useful and harmful plants in human cultures. Study emphasis is on plant origins, historical significance, economic importance, aesthetic uses, active ingredients, and their botanical relationships.

Biology core

The following four courses are required for all biology majors and must be completed by the end of the junior year.

BIOL 150 *Cell Biology* (NS-L)

The structure and function of cells with emphasis on evolutionary principles, basic biochemistry, and scientific epistemology. Laboratory course. This is a prerequisite for all biology courses 160 or above.

BIOL 160 *Organismal Biology* (NS-L)

Study of the evolutionary relationships of major life forms by comparing the structure and function of physiological systems. The focus will be on the diverse adaptations of organisms to their environment. Laboratory course. *Prerequisite: BIOL 150.*

BIOL 250 *Genetics*

Fundamental principles of heredity, including both Mendelian and molecular genetics. Emphasis is on those principles with the greatest implications to understanding biological systems in general, and humans in particular. Laboratory course. *Prerequisite: BIOL 160, or consent of instructor.*

BIOL 260 *Ecology and Evolution*

Study of biotic and abiotic interactions among organisms and the evolutionary processes that have shaped life. Major topics include population and community interactions, biomes, forces of genetic change, adaptation, conservation biology, and the geological and biological history of the Earth. Laboratory course. *Prerequisite: BIOL 250.*

Biology electives

BIOL 210 *Botany*

Survey of algae, nonvascular, and vascular plants, with emphasis on the origin, structure, development, and physiology of flowering vascular plants. Laboratory course. *Prerequisite: BIOL 160.*

BIOL 220 *General Zoology*

A survey of the major phyla, classes, and orders of animals, with emphasis on basic body plans and organization, development, phylogenetic relationships, and the structure and function of representative organ systems. Laboratory course. *Prerequisite: BIOL 160.*

BIOL 300 *Comparative Animal Behavior* (W2)

Study of the genetic, developmental, physiological, ecological, and evolutionary bases of adaptive behavior of animals, including humans. Laboratory course. *Prerequisite: BIOL 160 or both PSYC 295 and BIOL 101. Cross-listed as PSYC 300.*

BIOL 310 *Developmental Biology* (W2)

A survey of the development of a variety of animals with emphasis on the molecular processes involved. The embryology of vertebrates is stressed. Laboratory course. *Prerequisite: BIOL 250.*

BIOL 320 *Animal Physiology* (W2)

Study of the mechanisms of homeostatic regulation in animals with an emphasis on mammalian and other vertebrate organ systems. Laboratory course. *Prerequisite: BIOL 160.*

BIOL 340 *Microbiology*

Biology of bacteria and viruses. Laboratory includes culturing, identification, isolation from environment, and experimentation. Laboratory course. *Prerequisite: BIOL 250.*

BIOL 360 *Biology of Algae and Fungi*

Comparative ecology, physiology, and morphology of algae and fungi. Laboratory course. *Prerequisite: BIOL 260.*

BIOL 370 *Plant Physiology* (W2)

Study of the essential plant processes with emphasis on mineral nutrition, water relations, photosynthesis, hormones, and the influence of external factors. Laboratory course. *Prerequisite: BIOL 160.*

BIOL 430 *Immunology* (W2)

Principles of immunology with an emphasis on the role of experimentation in the development of current immunological concepts. The laboratory will include experiments to demonstrate principles and the use of immunological techniques for scientific investigation. Laboratory course. *Prerequisites: junior or senior standing and completion of BIOL 150 and one course in chemistry.*

BIOL 440 *Comparative Vertebrate Anatomy*

Phylogenetic relationships and anatomical systems of vertebrates with emphasis on cartilaginous fishes and mammals. Laboratory course. *Prerequisite: BIOL 160.*

BIOL 450 *Advanced Cell Biology*

An examination of current models of intracellular processes such as membrane and cytoskeleton structure, compartmentalization, transport, signaling, and the control of cell division. Emphasis on current research and theory. Laboratory course. *Prerequisite: BIOL 250.*

BIOL 460 *Evolution* (W2)

The mechanisms of evolution, principles of population genetics, selection and adaptation, and the history of life on Earth. Biological diversity and evolutionary issues for conservation and medicine are also covered. Laboratory course. *Prerequisite: BIOL 260.*

BIOL 470 *Advanced Genetics*

Current research and paradigms in molecular genetics with emphasis on adaptive and developmental gene regulation, molecular evolution, manipulation for gene engineering, genomics, proteomics, and their implications. Laboratory course. *Prerequisite: BIOL 250.*

BIOL 480 *Field Ecology (W2)*

Studies of ecological patterns and processes in Arkansas ecosystems followed by comparative studies in non-Arkansas field sites. Comparative field study sites will alternate each year between Costa Rica and a US ecosystem such as the American Southwest or the Everglades. These comparative field studies entail an additional cost to the student. Laboratory course. *Prerequisite: BIOL 260.*

BIOL 490 *Advanced Topics*

Texts, review papers, and or original literature will be used to provide extended or integrated coverage of selected areas of biology. *Prerequisite: junior or senior standing; check course announcements for specific prerequisites.*

BIOL 497 *Biology Seminar*

Reviews of current literature and oral presentations by students based on library or original research. Non-credit, graduation requirement for all biology majors. *Prerequisite: BIOL 260 and senior standing.*

BIOL 499 *Independent Research*

Original research using scientific methodology of hypothesis testing, data collection, and analysis. Requirements include a formal research proposal, a final written report in conventional scientific format, and an oral presentation. Students must select an advisor within the Biology Department to oversee and evaluate the study. Specific requirements and options (such as off-campus projects or summer research) can be obtained from the Biology Department. *Prerequisite: junior or senior standing and consent of the Department.*