

# BIOLOGY (BIOL)

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**BIOL 1106. Biology for Science Majors I Lab. 1 Hour.**

This course provides students with hands-on exploration in the biological sciences. Content includes the process of scientific inquiry, important concepts in biochemistry and genetics, and introduction to laboratory techniques. Corequisite: BIOL 1306.

**BIOL 1107. Biology for Science Majors II Lab. 1 Hour.**

This course provides students with hands-on exploration in the biological sciences. Content includes a survey of plants, animals, and microorganisms as well as studies of basic biological processes such as digestion, circulation, and nervous system function. Corequisite: BIOL 1307.

**BIOL 1108. Biology for Non-science Majors I Lab. 1 Hour.**

This course provides students with hands-on exploration in the biological sciences. Content includes the process of scientific inquiry, important concepts in biochemistry and genetics, and introduction to laboratory techniques. Prerequisite or Corequisite: BIOL 1308.

**BIOL 1109. Biology for Non-science Majors II Lab. 1 Hour.**

This course provides students with hands-on exploration in the biological sciences. Content includes the process of scientific inquiry, important concepts in biochemistry and genetics, and introduction to laboratory techniques. Prerequisite or Corequisite: BIOL 1309.

**BIOL 1306. Biology for Science Majors I. 3 Hours.**

This course introduces the student to the nature of science and the application of science to contemporary issues. Content includes the chemistry of life, the cell, genetics, and mechanisms of evolution. Corequisite: BIOL 1106.

**BIOL 1307. Biology for Science Majors II. 3 Hours.**

This course introduces the student to the nature of science and the application of science to contemporary issues. Content includes plant form and function, animal form and function, and ecology. Prerequisite: BIOL 1306. Corequisite: BIOL 1107.

**BIOL 1308. Biology for Non-Science Majors I. 3 Hours.**

This course introduces the student to the nature of science and the application of science to contemporary issues. Content includes the chemistry of life, the cell, genetics, and mechanisms of evolution. NOTE: Lab may be required for specific majors.

**BIOL 1309. Biology for Non-Science Majors II. 3 Hours.**

This course introduces the student to the nature of science and the application of science to contemporary issues. Content includes plant form and function, animal form and function, and ecology. NOTE: Lab may be required for specific majors. Prerequisite: BIOL 1308.

**BIOL 2401. Human Anatomy and Physiology I. 4 Hours.**

This course covers basic human anatomy and physiological principles focusing on the cellular and tissue levels and their integration into the integumentary, skeletal, muscular, and nervous systems.

**BIOL 2402. Human Anatomy and Physiology II. 4 Hours.**

This course covers basic human anatomy and physiological principles focusing on the nervous, endocrine, digestive, respiratory, cardiovascular, immune, urinary, and reproductive organ systems. Prerequisite: C or better in BIOL 2401.

**BIOL 2405. Introduction to Microbiology. 4 Hours.**

This is an introductory microbiology course consisting of lecture and laboratory sessions and designed for the non-biology majors and allied health students. Topics include the morphology, physiology, and taxonomy of representative groups of pathogenic and nonpathogenic microorganisms; human-microbe interactions; public health microbiology; and host defense mechanisms. BIOL 1306 is recommended prior to BIOL 2405.

**BIOL 2406. Environmental Biology. 3 Hours.**

This course provides an introduction to the basic principles of bioenvironmental science with emphasis on scientific literacy, current events, global and international issues, historic context, and the relationship between humans and the natural world. The course will also address conservation, pollution, energy, and other contemporary environmental problems.

**BIOL 289. Independent Study. 1-4 Hours.**

This course provides individual instruction. Students may repeat the course when topics vary.

**BIOL 303. Animal Nutrition. 3 Hours.**

This is a course designed to introduce the study of animal nutrition in all aspects, and is designed for Biology majors, especially those interested in Veterinary school. Topics include the nutrition of companion animals, livestock, and exotic species. Topics will also include the anatomy, physiology and biochemistry of the gastrointestinal system, nutrient procurement and use, feed additives, growth stimulants, metabolic diseases, and diet therapy. Prerequisites: BIOL 1306, BIOL 1307, BIOL 1106, BIOL 1107 or equivalent.

**BIOL 307. General Ecology. 3 Hours.**

This course covers the principles of ecology with special reference to populations and their ecosystems, distribution, biotic communities, and environmental relationships. This course requires field trips. Prerequisite: BIOL 1306 and BIOL 1106, and BIOL 1307 and BIOL 1107.

**BIOL 308. Invertebrate Zoology. 3 Hours.**

This course explores the diversity of invertebrate types, morphologically, embryologically, and physiologically. The course emphasizes the ecological role of invertebrates. Prerequisite: BIOL 1306 and BIOL 1106, and BIOL 1307 and BIOL 1107.

**BIOL 310. Genetics (EL). 4 Hours.**

This course deals with the principles of heredity and variation and their application to plants, lower animals and man. This course integrates the principles of experiential learning and meets the criteria for undergraduate research. Prerequisite: 8 SCH of Biology.

**BIOL 311. General Microbiology. 4 Hours.**

General Microbiology is an upper division undergraduate course on microbial biology consisting of both lectures and laboratory activities. In depth lectures cover eukaryotic and prokaryotic microbes and viruses, but emphasis is put on bacteria. This course provides a conceptual and experimental background in microbiology. This course is highly recommended for the pre-medical and pre-pharmacy students. Prerequisite: Successful completion of two semesters of Biology.

**BIOL 312. Botany. 4 Hours.**

This upper division course presents a solid core of plant biology consisting of lectures and laboratory activities. The course contents encompass the areas of plant cell and tissue structure, development, differentiation, tissue culture, genetic engineering, and dynamic processes associated with higher green plants. The course blends with an account of the interrelationships between plants and people. Prerequisite: Two semesters of biology.

**BIOL 330. Introduction to Geographic Information Systems. 3 Hours.**

Introduces the concepts and applications of computer-based spatial data handling, known as geographic information systems (GIS) technology. Illustrates the essential methods of GIS and its applications in fields including geography, natural resource management, planning and environmental science. Students gain application skills via a series of practical exercises illustrating problem-solving strategies using up-to-date GIS software packages. Lectures, laboratories, and special assignments will be utilized in this course. Pre-requisites: MATH 1314.

**BIOL 332. Molecular Pharmacology and Toxicology. 3 Hours.**

This course will provide an overview of pharmacology based on principles of drug action with emphasis on drug classes. Topics include pharmacology of the autonomic, cardiovascular, central nervous and endocrine systems. Prerequisites: BIOL 1306 & 1106, BIOL 1307 & 1107; and BIOL 2401 & 2402 or BIOL 449.

**BIOL 335. Medical Terminology. 3 Hours.**

This web-based course utilizes a systems approach to the language of medicine, including the analysis and utilization of word roots, combining forms, prefixes, suffixes, and medical terms; emphasis is on written and spoken medical vocabulary. Prerequisite: Completion of two semesters of Biology courses.

**BIOL 343. Practical Paleontology. 3 Hours.**

Designed for students with an interest in fossils and how they can be used to reconstruct ancient ecosystems. This course covers principles of fossil data collection, preparation, conservation, and management with hands-on experience collecting fossils from the Texas, Oklahoma and Arkansas area. Practice fossil preparation skills and learn to identify fossils based on published descriptions. Students will be introduced to paleontological research using the fossils they find in two brief guided research project. Prerequisite: BIOL 1307 or equivalent or instructor's permission.

**BIOL 402. Cell and Molecular Biology. 4 Hours.**

This course consists of lectures and laboratory activities and will provide a strong background in the cellular and molecular aspects of biology. Topics include: methods in cellular and molecular biology, transcription in prokaryotes and eukaryotes, posttranscriptional events, translation, DNA replication, and recombination. Prerequisite: 8 SCH of Biology.

**BIOL 415. Darwin and the Origin of Species. 3 Hours.**

This course will focus on Darwin's hypotheses and compare his ideas with modern developments in the study of biological evolution.

**BIOL 420. Global Change (EL). 3 Hours.**

This course will focus on global change. Major topics covered include climate change, sea level change/coastal inundation, ocean acidification, and permafrost and the changing Arctic. This course integrates the principles of Experiential Learning (EL) and meets the criteria for project-based research. Prerequisite: 6 SCH of Biology.

**BIOL 421. Endangered Ecosystems. 3 Hours.**

This course will focus on endangered ecosystems and organisms from around the world. Coral reefs, Brazilian rain forest destruction, amphibian crisis, and the Gulf of Mexico Dead Zone will be studied in detail. Prerequisite: 6 SCH in Biology.

**BIOL 422. Atmosphere and Biosphere. 3 Hours.**

This course will focus on how the atmosphere affects the biosphere. Stratospheric ozone, black carbon (soot), El Nino, and the environmental impact of carbon monoxide will be studied in detail. Prerequisite: 6 SCH of Biology.

**BIOL 425. Immunology. 4 Hours.**

This is a course designed to introduce the immune system in all its aspects and is designed for the allied health students and biology majors. Topics include innate and adaptive immunity, generation of antibody and lymphocyte diversity, signaling molecules, cellular and humoral immunity, immunological failure in disease, and manipulation of immunity.

**BIOL 430. Astrobiology. 3 Hours.**

This course will focus on the understanding that astrobiology is concerned with the origin, evolution, and distribution of life in the Universe. It investigates life in its cosmic context. Cross listed with BIOL 530. Prerequisite: Two semesters of Biology or permission of the instructor.

**BIOL 431. Genetic Engineering. 3 Hours.**

This upper-division course will give a detailed overview of methodologies and techniques of molecular biology that allow the isolation, handling, and manipulation of DNA sequences in order to obtain a genetically modified protein or structurally alter the genome of an organism. In addition, students will explore the effects of genetic engineering applications on medicine, agriculture, biology, forensics, and other areas of technology. The discussion of potential ethical concerns of genome manipulations will also be included in this course. Prerequisites: Successful completion of two semesters of biology or approval by the instructor. It is recommended to have at least one other more specialized biology course such as Genetics (BIOL 310), General Microbiology (BIOL 311) or Introduction to Biotechnology (BIOL 490).

**BIOL 437. Herpetology. 3 Hours.**

This is a course designed to introduce the study of herpetology in all aspects, and is designed for Biology and science majors. Topics include the anatomy, physiology, taxonomy, systematics, natural history, distribution, ecology, and conservation of amphibians and reptiles; primarily North America species with special emphasis on local Texas native species. Prerequisites: BIOL 1306, BIOL 1307, BIOL 1106, BIOL 1107.

**BIOL 443. Paleozoology. 3 Hours.**

This course examines the fossil record of invertebrates and vertebrates throughout the Phanerozoic. Using lectures and hands-on workshops, this course will provide a brief overview of the geological time scale with emphasis on the importance of fossils to understand biostratigraphy, evolution, speciation, paleoclimate, stratigraphy, and biogeography. The usefulness of fossils to understand past and present climate changes will be covered.

**BIOL 445. Virology. 3 Hours.**

This course will introduce students to the biology of viruses, with a particular focus on viruses of medical importance. Topics covered will include virus structure; classification, evolution, and life cycles of viruses; methods used to study viruses; their interaction with host cells; mechanisms of pathogenicity; host responses of the host to viral infection and vaccine applications; in-depth study of the life cycles of the major classes of viruses and discussion of emerging viruses. Prerequisite: Two semesters of biology and BIOL 311, or instructor permission.

**BIOL 446. Survey of Human Disease and Pathophysiology. 3 Hours.**

This course is designed to provide the structural and functional characteristics of common and important diseases as well as the principles of diagnosis and treatment.

**BIOL 447. Synthetic Biology. 3 Hours.**

This course will explore the application of synthetic biology in the biomolecular sciences, looking at a range of techniques that have been used to build useful tools from biological components. We will focus on the current use of molecular bioengineering in the area of human health. This course reinforces advanced concepts in molecular biology, and would be useful for students interested in careers in medicine or pharmaceutical research. Cross-listed with BIOL 547. Prerequisite: Two semesters of biology and one semester of microbiology or approval of instructor.

**BIOL 448. Vaccine and Antiviral Development. 3 Hours.**

This course will focus on modern approaches to combat and immunize against dangerous viruses. Students will explore current topics in vaccine and antiviral design from proof-of-concept testing in the lab to clinical trial. This course reinforces advanced concepts in immunology, virology, and molecular biology, and would be useful for students interested in careers in health care or biomedical research. Some background knowledge of virology and/or immunology are recommended but not required. Prerequisite: Two semesters of Biology and one semester of Microbiology or approval of instructor. Some background knowledge of virology and/or immunology are recommended but not required.

**BIOL 449. Vertebrate Histology. 4 Hours.**

This course is the study of the cell and fundamental tissue types to include the microscopic structure of the organ systems of representative vertebrates. Emphasis will be on the relationship between microscopic structure and function. Prerequisite: Two semesters of biology, with Anatomy and Physiology recommended but not required.

**BIOL 450. Limnology. 4 Hours.**

This course is the study of the biological, chemical, and physical characteristics of the freshwater environment. Prerequisite: Two semesters of biology.

**BIOL 456. Medical Microbiology. 3 Hours.**

This upper-division course is designed to introduce students to the microbial species that cause human disease, with a special focus on bacterial and viral infections. Students will study the basic concepts of clinical microbiology, immunology, and epidemiology. Current topics will also be discussed, such as antibiotic resistance, public health threats, and global health. Prerequisites: Successful completion of two semesters of biology or approval by the instructor. It is recommended to have at least one other more specialized biology course such as Genetics (BIOL 310), General Microbiology (BIOL 311) or Cell and Molecular Biology (BIOL 402).

**BIOL 466. Evolutionary Biology. 3 Hours.**

This course covers the basic principles, mechanisms, and patterns of evolutionary biology including a historical survey of related ideas. Prerequisite: Two semesters of biology.

**BIOL 470. Internship in Biology. 1-3 Hours.**

This is a directed internship that provides biology students with the applications of biology related knowledge in an organization. The student receives hands-on experience under the joint guidance of a professional from an organization and a faculty supervisor. 1-3 credit hours available. May be repeated up to a maximum of 3 SCH. Prerequisite: Consent of instructor.

**BIOL 472. Introduction to Forensic Science. 3 Hours.**

This course is a study of basic concepts, techniques, practices, and procedures of criminalistics, including the most current technologies in forensic analysis. Criminal investigation of actual cases will be discussed with a minimum of scientific terminology. In addition, the course will emphasize the nature of physical evidence, including the use of DNA profiling. This course is strongly recommended for Criminal Justice majors and Pre-Allied Health track students in Biology. Prerequisite: Junior or Senior standing.

**BIOL 473. Fundamentals of DNA Forensics. 4 Hours.**

Fundamentals of DNA forensics explores the current methods of DNA typing. It encompasses current forensic DNA analysis methods, as well as biology, technology, and genetic interpretation. The course will follow the path of DNA evidence starting with sample collection and the processes of DNA extraction, quantitation, amplification, and statistical interpretation. By the end of the course, students will explore the important role of DNA evidence for law enforcement. Cross-listed with BTEC 473.

**BIOL 481. Seminar in Biology. 3 Hours.**

This course requires student participation in general and specific topics in biology. May be repeated in a different topic. Usually taken during junior or senior year. The course may be offered with or without COIL (Collaborative Online International Learning) component.

**BIOL 487. Human Parasitology. 3 Hours.**

This course is designed to provide students an overview of human parasites and their diseases. Topics include morphology, taxonomy, diagnosis, treatment, modes of transmission, and control of the major parasitic organisms in humans. A large portion of the above is learned by knowing the life cycles of the parasites in question and, thus, how to break the chain of infection. Parasitology is an interdisciplinary course that encompasses the fields of pathology, immunology, ecology, entomology, epidemiology, and systematics. Therefore, you won't only learn about parasites but also gain valuable knowledge of related disciplines. Prerequisites: Successful completion of two semesters of biology or approval by instructor. It is recommended to have at least one other more specialized biology course such as General Microbiology (BIOL 311), Cell and Molecular Biology (BIOL 402) or Immunology (BIOL 425).

**BIOL 489. Independent Study in Biology. 1-4 Hours.**

This course provides individual instruction. Students may repeat the course when topics vary.

**BIOL 490. Introduction to Biotechnology. 4 Hours.**

This course will explore the principles and applications of DNA science with special reference to recombinant DNA technology. This course is highly recommended for students focusing on a career in the medical field. Prerequisite: Junior or Senior standing.

**BIOL 497. Special Topics. 1-4 Hours.**

Instructors will provide an organized class designed to cover areas of specific interest. Students may repeat the course when topics vary.

**BIOL 499. Independent Research. 1-6 Hours.**

Independent research in Biology conducted by a student under the guidance of a faculty member of his or her choice. The student is required to maintain a research journal and submit a project report by the end of the semester and potentially make an oral presentation on the project. SCH and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.

**BIOL 515. Darwin and the Origin of Species. 3 Hours.**

This course will focus on Darwin's hypotheses and compare his ideas with modern developments in the study of biological evolution.

**BIOL 520. Global Change. 3 Hours.**

This course will focus on global change. Major topics include climate change, sea-level change- and coastal inundation, ocean acidification, and permafrost and the changing Arctic. Prerequisite: Graduate student standing.

**BIOL 521. Endangered Ecosystems. 3 Hours.**

This course will focus on endangered ecosystems and organisms from around the world. Students will study coral reefs, Brazilian rainforest destruction, amphibian crisis and the Gulf of Mexico dead zone in detail. Prerequisite: Graduate student standing.

**BIOL 522. Atmosphere and Biosphere. 3 Hours.**

This course will focus on how the atmosphere affects the biosphere. Stratospheric Ozone, Black Carbon (Soot), El Nino, and Carbon Monoxide: Its Environmental Impact will be studied in detail. Prerequisite: Graduate student standing.

**BIOL 530. Astrobiology. 3 Hours.**

This course will focus on the understanding that astrobiology is concerned with the origin, evolution, and distribution of life in the Universe. It investigates life in its cosmic context. As a graduate course, it will also include an intensive 5,000 word term paper. Cross listed with BIOL 430. Prerequisite: Two semesters of Biology or permission of the instructor.

**BIOL 531. Genetic Engineering. 3 Hours.**

This upper-division course will give a detailed overview of methodologies and techniques of molecular biology that allow the isolation, handling, and manipulation of DNA sequences in order to obtain a genetically modified protein or structurally alter the genome of an organism. In addition, students will explore the effects of genetic engineering applications on medicine, agriculture, biology, forensics, and other areas of technology. The discussion of potential ethical concerns of genome manipulations will also be included in this course. Prerequisites: Successful completion of two semesters of biology or approval by the instructor. It is recommended to have at least one other more specialized biology course such as Genetics (BIOL 310), General Microbiology (BIOL 311) or Introduction to Biotechnology (BIOL 490).

**BIOL 543. Paleozoology. 3 Hours.**

This course looks at the evolution of modern animals by bringing together recent advances in genetics with the fossil record. This course will provide an evolutionary perspective on the origins of important groups of animals from single-celled organisms to modern humans through lectures, discussions, and hands-on workshops with fossils. Prerequisite: BIOL 308 or instructor permission.

**BIOL 545. Virology. 3 Hours.**

This course will introduce students to the biology of viruses, with a particular focus on viruses of medical importance. Topics covered will include virus structure; classification, evolution, and life cycles of viruses; methods used to study viruses; their interaction with host cells; mechanisms of pathogenicity; host responses of the host to viral infection and vaccine applications; in-depth study of the life cycles of the major classes of viruses and discussion of emerging viruses. Prerequisite: Two semesters of biology and BIOL 311, or instructor permission.

**BIOL 546. Survey of Human Disease and Pathophysiology. 3 Hours.**

This course is designed to provide the structural and functional characteristics of common and important diseases as well as the principles of diagnosis and treatment.

**BIOL 547. Synthetic Biology. 3 Hours.**

This course will explore the application of synthetic biology in the biomolecular sciences, looking at a range of techniques that have been used to build useful tools from biological components. We will focus on the current use of molecular bioengineering in the area of human health. This course reinforces advanced concepts in molecular biology, and would be useful for students interested in careers in medicine or pharmaceutical research. Cross-listed with BIOL 447. Prerequisite: Two semesters of biology and one semester of microbiology or approval of instructor.

**BIOL 548. Vaccine and Antiviral Development. 3 Hours.****BIOL 556. Medical Microbiology. 3 Hours.**

This upper-division course is designed to introduce students to the microbial species that cause human disease, with a special focus on bacterial and viral infections. Students will study the basic concepts of clinical microbiology, immunology, and epidemiology. Current topics will also be discussed, such as antibiotic resistance, public health threats, and global health. Prerequisites: Successful completion of two semesters of biology or approval by the instructor. It is recommended to have at least one other more specialized biology course such as Genetics (BIOL 310), General Microbiology (BIOL 311) or Cell and Molecular Biology (BIOL 402).

**BIOL 587. Human Parasitology. 3 Hours.**

This course is designed to provide students an overview of human parasites and their diseases. Topics include morphology, taxonomy, diagnosis, treatment, modes of transmission, and control of the major parasitic organisms in humans. A large portion of the above is learned by knowing the life cycles of the parasites in question and, thus, how to break the chain of infection. Parasitology is an interdisciplinary course that encompasses the fields of pathology, immunology, ecology, entomology, epidemiology, and systematics. Therefore, you won't only learn about parasites but also gain valuable knowledge of related disciplines. Prerequisites: Successful completion of two semesters of biology or approval by instructor. It is recommended to have at least one other more specialized biology course such as General Microbiology (BIOL 311), Cell and Molecular Biology (BIOL 402) or Immunology (BIOL 425).

**BIOL 589. Independent Study. 3 Hours.**

This course provides individual instruction. Students may repeat the course when topics vary.

**BIOL 597. Special Topics in Biology. 3 Hours.**

Instructors will provide an organized class designed to cover areas of specific interest. Students may repeat the course when topics vary.

**BIOL 599. Independent Research. 1-6 Hours.**

Independent research in Biology conducted by a student under the guidance of a faculty member of his or her choice. Credits and hours are by arrangement and, with a change in content, this course may be repeated for credit. Prerequisite: Consent of instructor.