

BIOLOGY

Studying biology at Baylor is a journey that will give you a new perspective on the world. You will learn from a variety of biologists; some who study life at the molecular or cellular level, and others focus on the ecological and environmental questions concerning entire communities and ecosystems.

Baylor biologists recognize that the scientific process is a tool that can be used to understand the workings of the natural world and to solve many concerns of our time. We strive to teach students to become excellent observers and to develop a creative eye for the applications of biology.

An understanding of biological science prepares you to be an investigator of living things at many levels. This translates into careers in healthcare, education, biotechnology, ecology, and many other areas.

Health Professions

Students who are interested in careers in medicine, dentistry, veterinary medicine, pharmacy, or physician assistantship are encouraged to pursue a major in biology. The requirements of each of the concentrations in biology align closely with prerequisites for professional programs, and the intensive study of biology is advantageous for success therein. Based on a close examination of the trajectory of prior students, the Department of Biology strongly suggests that only those students who earn "B" grades in either BIO 1305 Modern Concepts of Bioscience - BIO 1105 Modern Concepts of Bioscience Laboratory or BIO 1405 Investigations of Modern Biology Concepts I and either BIO 1306 Modern Concepts of Bioscience, continued - BIO 1106 Modern Concepts of Bioscience Laboratory or BIO 1406 Investigations of Modern Biology Concepts II continue to pursue professional school acceptance as a primary goal of undergraduate education. Students who perform below this level are generally not competitive applicants for professional schools. Students who are interested in graduate programs in biology are encouraged to maintain an in-major GPA at or above 3.0.

Prehealthcare students are urged to communicate regularly with the Office of PreHealth Programs.

Graduate School and Research Careers

Students who are interested in careers in wildlife biology, nature conservancy, water quality preservation, biotechnology, molecular medicine (including careers in the pharmaceutical industry, genetic counseling, and clinical laboratory science), food science, computational biology, global health advocacy, clinical trials coordination, and research science more broadly are encouraged to pursue a major in biology. Examples of research science disciplines pursued by biologists include evolutionary biology, pharmacology, cancer biology, neuroscience, genetics, genomics, bioinformatics, entomology, parasitology, virology, microbiology and antibiotic resistance, wildlife and human epidemiology, wildlife physiology, climate change biology and sustainability research, aquatic biology, marine biology, environmental science, botany, tropical disease biology, and public health. The requirements of each concentration in biology align closely with prerequisites for graduate research programs. The intensive study of biology along with an undergraduate research track record are essential for successful entry into graduate research programs. Students who are interested in careers in biology are encouraged to stay in regular contact with the College of Arts & Sciences Advisement Office, the Office of Career and Professional Development as well as faculty in the Department of Biology.

Programs

- Biology, B.S. (<https://catalog.baylor.edu/undergraduate/college-arts-sciences/academic-departments/biology/biology-bs/>)
- Biology (Biology of Global Health), B.S. (<https://catalog.baylor.edu/undergraduate/college-arts-sciences/academic-departments/biology/biology-biology-global-health-concentration-bs/>)
- Biology (Science Education), B.S. (<https://catalog.baylor.edu/undergraduate/college-arts-sciences/academic-departments/biology/biology-science-education-concentration-bs/>)
- Biology, B.A. (<https://catalog.baylor.edu/undergraduate/college-arts-sciences/academic-departments/biology/biology-ba/>)
- Biology - Secondary Major (<https://catalog.baylor.edu/undergraduate/college-arts-sciences/academic-departments/biology/biology-secondary-major/>)
- Accelerated Bachelor of Science/Master of Arts in Teaching (<https://catalog.baylor.edu/undergraduate/college-arts-sciences/academic-departments/biology/joint-bachelor-science-master-arts-teaching/>)

Program Requirements

Either BIO 1305 - BIO 1105 or BIO 1405; and either BIO 1306 - BIO 1106 or BIO 1406, all with grades of "C" or better, are prerequisites for all "2000" and above level courses in biology, with the exception of BIO 2401 and BIO 2402. Non-biology majors are held to the same prerequisite standards as biology majors. BIO 1102, BIO 1302, BIO 1401, BIO 1303, BIO 2401, and BIO 2402 cannot be used to satisfy the minimum number of semester hours required for a major in biology; BIO 1401 and BIO 1303 do not count in the minimum hours for a minor in biology. A maximum of three semester hours of BIO 3V9R and a maximum of three semester hours of BIO 4V9R may be applied toward a major or minor in biology.

Students interested in biology as a major can select the Biology designation upon enrollment at Baylor. However, students who have not met the criteria listed below by 60 hours in residence will not advance in the biology major and must change degree programs. To advance in the major, a student must meet the following criteria:

1. Complete with grades of "C" or better either BIO 1305 - BIO 1105 or BIO 1405; and either BIO 1306 - BIO 1106 or BIO 1406; or their equivalents. A grade of "C-" or lower is not acceptable.
2. Students may transfer credit for these courses as long as the courses were taken prior to matriculation at Baylor.
3. Students may repeat each of the introductory (BIO 1305 - BIO 1105, BIO 1405, BIO 1306 - BIO 1106, BIO 1406) courses only once if they fail to earn a "C" or better the first time they take the course. Withdrawing from the course counts as one of the two allowed attempts.
4. Current Baylor students must have a minimum 3.3 cumulative GPA and at least 12 hours in residence to request to major in Biology.

Students who have not satisfied these requirements by the time they complete 60 hours in residence will not advance in the biology major and must change degree programs.

Students majoring in biology will need to select a concentration in Biology (Integrative Biology, Cell and Molecular Biology, Science Education, or Biology of Global Health - see additional admission requirements under Biology of Global Health concentration) before completing 60 hours in residence. Students may not select their concentration until after completing the first-year sequence in biology: BIO 1305 & BIO 1105 or BIO 1405;

and BIO 1306 & BIO 1106 or BIO 1406. Therefore, it is imperative that students interested in majoring in biology complete the first-year sequence before completing 60 hours at Baylor.

Note: As with all courses that count on a biology degree, students must earn a grade of “C” or higher in these introductory courses. A grade of “C-” or below is not sufficient for any course in the biology major. Moreover, in the event that a student does not earn at least a “C” (including a “W”) in any of the first-year sequence BIO courses, only one additional attempt is allowed.

Transfer Students

Transfer students desiring to enter Baylor to major in Biology must have a minimum 3.50 external GPA.

Students who transfer credit to Baylor with credit on record for BIO 1305 - BIO 1105 or BIO 1405 and BIO 1306 - BIO 1106 or BIO 1406 will be eligible to declare biology as a major and select a concentration upon initial enrollment at Baylor provided they have earned a C or higher in these courses. Students who earn a score of 5 on the AP examination in biology will be eligible to declare biology (all concentrations) as a major upon enrollment.

Biology (BIO)

BIO 1102 Introductory Microbiology Laboratory (1)

Co-requisite(s): BIO 1302

Pre-requisite(s): Credit or concurrent enrollment in BIO 1302
Isolation, culture, morphology, and biochemical activities of microorganisms. Aseptic technique, microbiological staining, environmental sampling, and identification of unknown organisms will be covered. Does not count toward a major in Biology.

BIO 1103 Human Ecology Lab: Our Place in Nature (1)

Pre-requisite(s): Credit for or concurrent enrollment in BIO 1303
Laboratory experiments illustrating topics in human ecology such as biodiversity, population growth, and conservation.

BIO 1105 Modern Concepts of Bioscience Laboratory (1)

Pre-requisite(s): BIO 1305 or concurrent enrollment
Laboratory experiments illustrating modern concepts in the biological sciences, with emphasis on cell biology, metabolism, and genetics. A student will be granted a maximum of two attempts (where an earned grade or a “W” notation counts as an attempt) to earn a higher grade in BIO 1105 in order to fulfill a prerequisite or a course requirement for a degree, major, or minor.

BIO 1106 Modern Concepts of Bioscience Laboratory (1)

Pre-requisite(s): BIO 1306 or concurrent enrollment
Laboratory experiments illustrating modern concepts in the biological sciences, with emphasis on morphology, general physiology, and ecology. A student will be granted a maximum of two attempts (where an earned grade or a “W” notation counts as an attempt) to earn a higher grade in BIO 1106 in order to fulfill a prerequisite or a course requirement for a degree, major, or minor.

BIO 1125 Biological Research Preparedness (1)

An examination of the types of biological research, including an introduction to the research faculty and facilities of the Department of Biology, experimental design, safety and ethics in research, analysis of scientific data, and writing in the sciences. A discussion of career planning is included.

BIO 1302 Introductory Microbiology (3)

Co-requisite(s): BIO 1102

Pre-requisite(s): Credit for college-level biology or chemistry course (includes AP and/or IB credit) or consent of instructor
Credit or concurrent enrollment in BIO 1102. Introduction to microbiology including the study of microbial growth, control of growth, microbial genetics, virulence factors, epidemiology, and the wide variety of contributions microbes make to quality of life. Does not count toward a major in biology.

BIO 1303 Human Ecology: Our Place in Nature (3)

Ecological issues in the media, including ecosystems and biodiversity. For non-majors.

BIO 1305 Modern Concepts of Bioscience (3)

Unifying principles common to all levels of biological organization, with emphasis on cell biology, metabolism, and genetics. A student will be granted a maximum of two attempts (where an earned grade or a “W” notation counts as an attempt) to earn a higher grade in BIO 1305 in order to fulfill a prerequisite or a course requirement for a degree, major, or minor.

BIO 1306 Modern Concepts of Bioscience, continued (3)

Pre-requisite(s): BIO 1305 and BIO 1105; or BIO 1405 all with a C or better

Continuation of the study of biological concepts with emphasis on morphology, general physiology, evolution, and ecology. A student will be granted a maximum of two attempts (where an earned grade or a “W” notation counts as an attempt) to earn a higher grade in BIO 1306 in order to fulfill a prerequisite or a course requirement for a degree, major, or minor.

BIO 1401 Current Issues in Human Biology (4)

An introductory course for non-biology majors examining biological issues in the current media, focusing primarily on the human subject.

BIO 1405 Investigations of Modern Biology Concepts I (4)

Pre-requisite(s): Consent of instructor
Biological concepts with emphasis on cell biology, metabolism, and genetics. Students will work in small groups on inquiry-based projects in the area of microbiology, genetics, molecular biology, and genomics. Credit may not be received after receiving credit in BIO 1305 and BIO 1105. A student will be granted a maximum of two attempts (where an earned grade or a “W” notation counts as an attempt) to earn a higher grade in BIO 1405 in order to fulfill a prerequisite or a course requirement for a degree, major, or minor.

BIO 1406 Investigations of Modern Biology Concepts II (4)

Pre-requisite(s): Consent of instructor
Biological concepts with emphasis on morphology, general physiology, evolution, and ecology. Includes field trips and small-group, hypothesis-based projects that will require outside class time. Credit may not be received after receiving credit in BIO 1306 and BIO 1106. A student will be granted a maximum of two attempts (where an earned grade or a “W” notation counts as an attempt) to earn a higher grade in BIO 1406 in order to fulfill a prerequisite or a course requirement for a degree, major, or minor.

BIO 1V90 Individual Topics (1-9)

Pre-requisite(s): Consent of instructor and department chair
For undergraduates who wish to study individual topics not available in formal courses of the department. Directed reading, independent study or research, supervised library, laboratory or fieldwork, or presentation of material. Open project, which must be approved by the director. May be repeated once when different topics are studied.

BIO 1V9R Research (3)

Pre-requisite(s): Consent of instructor

Undergraduate research undertaken under the supervision of a faculty member. May be taken for a maximum of 6 hours.

BIO 2106 Genetics Laboratory (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and BIO 2306 or concurrent enrollment in BIO 2306

Laboratory studies illustrating the principles of genetics in living organisms.

BIO 2301 Biology of Global Health (3)

Pre-requisite(s): BIO 1105 and 1305, or BIO 1405; and BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Explores the interdisciplinary nature of global health challenges and identifies biological principles that explain the emergence, virulence, and spread of infectious diseases.

BIO 2306 Genetics (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Basic principles of genetics including Mendelian inheritance, molecular genetics, and population genetics.

BIO 2401 Human Anatomy and Physiology of Motion and Innervation (4)

Pre-requisite(s): CHE 1300 or 1301; or consent of instructor

The organization and movement of the human body and mechanisms for maintaining homeostasis via innervation. Topics include the integumentary, skeletal, muscular, and nervous systems. Emphasis is placed on the integration of systems as they relate to normal health. Designed for students who will pursue a career in nursing, nutrition science, and other health fields. Will not apply toward requirements for a major in biology.

BIO 2402 Human Anatomy and Physiology of Metabolism and Processing (4)

Pre-requisite(s): CHE 1300 or 1301 and credit for college-level BIO course (includes AP and/or IB credit)

The organization of the human body as related to metabolic processes and reproduction. Topics include the endocrine, cardiovascular, lymphatic, immune, respiratory, digestive, urinary, and reproductive systems. Aspects of development and inheritance are also covered. Will not apply toward requirements for a major in biology.

BIO 2V9R Research (3)

Pre-requisite(s): Consent of instructor

Undergraduate research undertaken under the supervision of a faculty member. May be taken for a maximum of 6 hours.

BIO 3100 Seminar in Biology (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and junior or senior level standing or consent of instructor

Contemporary topics in biological sciences. Requirements may include directed readings and discussions of advanced topics in biology, attendance at public seminars, presentations, and preparation of a research paper.

BIO 3103 Ecology Laboratory (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 3303 or concurrent enrollment in BIO 3303

Field and laboratory experiences in ecological investigations.

BIO 3110 Biology Education Theory (1)

Co-requisite(s): BIO 3111

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of B or better
Instructor approval required. Must also enroll in BIO 3111. Pedagogy course that integrates current learning theory and evidence-based teaching for the Learning Assistant Program.

BIO 3111 Learning Assistant Planning and Practice (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of B or better
Credit or concurrent enrollment in BIO 3110. Instructor approval required. Application of pedagogical techniques developed in BIO 3110 through the design of active learning content and the practice of student engagement in a classroom setting. May be repeated once for credit.

BIO 3122 Human Physiology Lab (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and credit or concurrent enrollment in BIO 3322

Laboratory applies conceptual ideas through the collection and analysis of real time human data, including reaction times, electrocardiograms, electromyograms, spirometry and urinalysis.

BIO 3124 Laboratory for Entomology (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and credit or concurrent enrollment in BIO 3324; upper-level standing, and consent of instructor

Collection, preservation, identification of insects. Collection required.

BIO 3300 Advanced Topics in Biology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better
Advanced topics in biology not covered in other biology courses. Can be repeated once for credit if topic is different.

BIO 3303 Ecology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better
Lectures and discussions that illustrate the basic concepts in evolutionary, behavioral population, community, ecosystem, and conservation ecology.

BIO 3315 Introduction to Environmental Health (3)

Cross-listed as ENV 3314

See ENV 3314 for course information.

BIO 3320 Climate Change Biology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better
Biological and conservation responses to human-induced climate change, emphasizing the climate system, past climate influences, range shifts, phenological changes, extinction, predictive modeling, connectivity and landscape management, reduction of greenhouse gas emissions, and extinction risk from climate change solutions.

BIO 3322 Human Physiology (3)

Pre-requisite(s): Overall GPA of 3.0 or better

Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better. Basic physiologic principles and concepts associated with the normal function of human cells, tissues, organs, and organ systems. This course is intended for the pre-profession student who requires a complex survey of human physiology.

BIO 3324 Entomology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and upper-level standing or consent of instructor

Taxonomy, morphology, physiology, and behavior of insects.

BIO 3330 Medical Genetics (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 2106 and 2306; all with grades of C or better

Study of Mendelian principles applied to humans, genetic defects, chromosomal aberrations, biochemical disorders, pedigrees, and probability. Genetic diagnostic techniques, gene therapy, genetic engineering, genetic counseling and the social, ethical, and legal problems associated with recent advances in genetics will be addressed.

BIO 3341 Marine Field Studies (3)

Cross-listed as GEO 3341

See GEO 3341 for course information.

BIO 3342 Molecular Cell Biology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 2306 all with grades of C or better

Students who already have credit for BIO 4307, BIO 4308, or CHE 4341 are not eligible to enroll in BIO 3342. Cell structure and function at the cellular and molecular levels. Topics include molecular components of cell membranes, membrane-bound organelles, cytoskeleton, cell division, gene regulation, and principles of bioenergetics.

BIO 3350 Genomics and Bioinformatics (3)

Cross-listed as BINF 3350

See BINF 3350 for course information.

BIO 3366 Foundations of Evolutionary Biology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 2306 all with grades of C or better

Comprehensive survey of evolutionary biology, including a fundamental framework to address causative issues in the biological sciences, and an understanding of the basic processes contributing to biological diversification.

BIO 3429 Comparative Chordate Anatomy (4)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Structural, functional, and evolutionary relationships of the chordates, particularly vertebrates.

BIO 3435 Invertebrate Paleontology (4)

Cross-listed as GEO 3435

See GEO 3435 for course information.

BIO 3V90 Individual Topics (1-6)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and consent of instructor and department chair

Individual topics not available in formal courses of the department. May include independent study or research, directed reading, supervised library, laboratory, or fieldwork, or presentation of material. Open to all undergraduates. Prior to registration the student will choose a project that must be approved by the director. May be repeated when different topics are studied. A maximum of 3 semester hours of Individual Topics may apply toward a major in biology.

BIO 3V9R Research (3)

Pre-requisite(s): Consent of instructor

Undergraduate research undertaken under the supervision of a faculty member. May be taken for a maximum of 6 hours.

BIO 4001 Achievement Test (0)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and senior standing or consent of instructor

Biology achievement test for seniors given during fall and spring semesters. A minimum score is required to receive credit.

BIO 4102 General Microbiology Lab (1)

Co-requisite(s): BIO 4302

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Laboratory experiments and techniques to culture microorganisms. Analyses of biochemical tests, quantitative and qualitative procedures, and identification of unknown organisms.

BIO 4104 Medical Entomology Laboratory (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; upper-level standing and credit or concurrent enrollment in BIO 4304, or consent of instructor

Collection, preservation, identification, taxonomy and biology of medically important arthropods, especially insects. Survey collection required for graduate credit.

BIO 4105 Aquatic Ecosystems Laboratory (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 3303; all with grades of C or better; and credit or concurrent enrollment in BIO 4305

Laboratory experience in basic field and laboratory methodologies for the study of aquatic ecosystems. Overview of collection, analysis and interpretation of physical, chemical and biological variables commonly used in the field.

BIO 4106 Molecular Genetics and Genomics Laboratory (1)

Co-requisite(s): BIO 4306

Pre-requisite(s): Either BIO 2306 or CHE 4341; each with a grade of C or better Individual and group projects in computational genomic and genetic analysis using supplied datasets

BIO 4108 Genes and Development Laboratory (1)

Co-requisite(s): BIO 4308

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and BIO 2306

Modern experimental techniques of developmental biology.

BIO 4109 Advanced Study of Genes and Development (1)

Pre-requisite(s): BIO 4108; consent of instructor required

Experimental techniques of genetics and developmental biology such as genome editing and genotyping taught through laboratory exercises. Includes an independent research project resulting in a publishable manuscript.

BIO 4117 Plant Physiology Lab (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and BIO 1306, or BIO 1406; all with grades of C or better; and credit or concurrent enrollment in BIO 4317

Laboratory experiments illustrating modern concepts in plant physiological research, with emphases on form, function relationships, technological innovations, and organismal adaptation.

BIO 4123 Laboratory for Parasitology (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; credit or concurrent enrollment in BIO 4323 and consent of instructor; and upper-level or graduate standing

Detection and identification of human parasite diagnostic forms. Power Point presentation required for graduate credit.

BIO 4199 Scientific Communication (1)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Examination of various methods of scientific communication with critical analysis and evaluation of scientific presentations and the current scientific literature.

BIO 4301 Immunology (3)

Pre-requisite(s): BIO 2306 and one of the following: BIO 3342, 4302, 4306, 4308, or CHE 4341 all with grades of C or better

Basic principles of resistance to disease, host-antigen interactions, immunologic response mechanisms, immunologic techniques, and correlations of disease and the immune response.

BIO 4302 General Microbiology (3)

Co-requisite(s): BIO 4102

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

An introduction to the major areas of microbiology, including microbial morphology, metabolism, genetics, evolution, taxonomy, ecology, and disease.

BIO 4304 Medical Entomology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; upper-level standing or consent of instructor

Identification, biology, and management of arthropod pests, especially insects, transmitting diseases affecting man, livestock and wildlife.

BIO 4305 Aquatic Ecosystems (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 3303; all with grades of C or better

Major aquatic ecosystems including oceans, estuaries, rivers, streams, lakes, reservoirs, ponds and wetlands. Addresses the fundamental physical, chemical and ecological factors that govern the structure and function of each ecosystem.

BIO 4306 Molecular Genetics and Genomics (3)

Co-requisite(s): BIO 4106

Pre-requisite(s): Either BIO 2306 or CHE 4341, each with a grade of C or better

Techniques and strategies central to the analysis of genomic and genetic experimental data with emphasis on experimental design. Training in computational methods such as R and Unix; no previous computing experience is required.

BIO 4307 Biochemistry and Physiology of the Cell (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and CHE 3331 or consent of instructor; and credit or concurrent enrollment in BIO 2306

The roles of biologically important molecules in cellular structure and function, emphasizing an integrated understanding of the characteristic of the four major classes of biological molecules and the chemical interactions that support living systems. May not receive credit for both BIO 4307 and CHE 4341.

BIO 4308 Genes and Development (3)

Co-requisite(s): BIO 4108

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 2306; all with grades of C or better

Examination of mechanisms that regulate the development of multicellular organisms using biochemical genetic and cell biological approaches. Investigates the role that gene regulation, cell-cell communication, cell adhesion, cell motility, signal transduction, and intracellular trafficking play in the commitment, differentiation and assembly of stem cells into specialized cell types and organs.

BIO 4310 Biogeography (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Patterns of geographic distributions of animals and plants, and the physical and biological factors, and processes affecting geographic distributions.

BIO 4312 Viruses and Global Health (3)

Pre-requisite(s): Either BIO 1105 and 1305 or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 2306; all with grades of C or better

Examines virus classification, host cell infection and defenses, and how viruses cause disease in humans and animals. Emphasis placed on how viral epidemics influences history and religion, viral emergence and re-emergence in new locations, zoonotic viruses, the development of antivirals and vaccines, as well as the impact on public health and agriculture.

BIO 4316 Plant Anatomy (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Anatomy of seed plants, with emphasis on structure-function relationships that occur during growth and development.

BIO 4317 Plant Physiology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Experimental studies of important physical and chemical processes related to plant function.

BIO 4320 Pathophysiology (3)

Pre-requisite(s): BIO 3322 with a grade of B or better

Pathophysiology of disease with emphasis on immunology, communicable disease, neoplasia, heredity, congenital problems, and degeneration as expressed in each organ system.

BIO 4323 Parasitology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; upper-level or graduate standing or consent of instructor

Introduction to study of parasites and vectors, emphasizing life cycles and control of those affecting humans. Research paper required for graduate credit.

BIO 4327 Biology of Mammals (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

An introduction to the biology of mammals, emphasizing recognition and classification of modern taxa, adaptations to diverse lifestyles, and importance to humans in context of diseases, domestication and conservation.

BIO 4331 Science Leadership: Community-Based Research (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and upper-level standing and consent of instructor

Development of science leadership skills through community-based research problems.

BIO 4332 Comparative Vertebrate Physiology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and upper-level standing; or consent of instructor

Vertebrate physiology in a comparative evolutionary context. Emphasis on general principles, with unique examples supplied from all major vertebrate taxa.

BIO 4333 Science Leadership: Improvement of Science Education (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and upper-level standing and consent of instructor

Development of science leadership skills through community-based research on improvement of science education.

BIO 4335 Biology of the Vertebrates (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

An introduction to the biology of the vertebrates, emphasizing recognition and classification of modern taxa, adaptations to diverse lifestyles, and importance to humans in context of diseases, domestication and conservation.

BIO 4339 Advanced Marine Field Studies (3)

Cross-listed as GEO 4339

See GEO 4339 for course information.

BIO 4344 Fundamentals of Toxicology (3)

Cross-listed as ENV 4344

See ENV 4344 for course information.

BIO 4350 Pathogenic Microbiology (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and BIO 4401

Introduction to medically relevant pathogens with an emphasis on bacterial pathogenesis.

BIO 4354 Neglected Tropical Diseases (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Core principles in genetics and cellular and molecular biology to understand the causation, pathogenesis, and control of the major neglected tropical diseases, defined as a group of poverty-promoting chronic infectious diseases.

BIO 4365 Topics in Evolution (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and BIO 2306 or consent of instructor

Processes which establish or eliminate variation in populations and how these mechanisms affect biological diversity.

BIO 4381 Restoration Ecology (3)

Cross-listed as ENV 4380

See ENV 4380 for course information.

BIO 4386 Remote Sensing (3)

Cross-listed as AVS 4386, ENV 4386, GEO 4386

See GEO 4386 for course information.

BIO 4390 Microbiomes in Humans and the Environment (3)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; and BIO 4302; all with grades of C or better

Explores topics in molecular microbiology, microbial diversity, and microbial biochemistry to better understand the roles of microbes in ecosystems. Emphasis on gut microbial contributions to human physiology in states of health and disease.

BIO 4405 Limnology (4)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Lecture, laboratory, and field studies of lakes and streams. Emphasis on analysis and interpretation of physical, chemical, and biological factors relating to metabolism and production of aquatic communities. Overnight trips may be required.

BIO 4406 Aquatic Biology (4)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Laboratory and field studies of lakes, streams, and estuaries. Primarily for advanced students of zoology and botany who are interested in aquatic organisms and their ecology. Emphasis is on collection, preservation, and identification of all aquatic biota except fishes. Overnight trips may be required.

BIO 4415 Human Evolutionary Anatomy (4)

Cross-listed as ANT 4416

See ANT 4416 for course description.

BIO 4418 Biology of Wetland and Aquatic Vascular Plants (4)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and any

taxonomic course

Taxonomy, ecology, structure, distribution, and economic significance of aquatic vascular plants.

BIO 4422 Ichthyology (4)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Fish fauna of the area with emphasis on morphology, ecology, economics, and systematics. Overnight trips may be required.

BIO 4426 Vertebrate Histology (4)

Pre-requisite(s): BIO 3322 with a grade of C or better

Microscopic structure of vertebrate tissues and organs.

BIO 4428 Ornithology (4)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better

Evolution, morphology, physiology, behavior, reproduction, ecology, geography, and migration of birds of the world. Includes field identification of Central Texas species.

BIO 4430 Vertebrate Paleontology (4)

Cross-listed as GEO 4430

Pre-requisite(s): Consent of instructor

Evolutionary history and biogeography of vertebrate animals, based primarily on fossil evidence. Laboratory activities include study of fossil material, field excavations, and visits to museums.

BIO 4432 General Human Anatomy (4)

Pre-requisite(s): Overall GPA of 3.0 or better

Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better. The organs and systems of the human body emphasizing relationships between structure, function, development and microscopic anatomy.

BIO 4V04 Biology Field Studies (1-9)

Pre-requisite(s): Either BIO 1105 and 1305, or BIO 1405; and either BIO 1106 and 1306, or BIO 1406; all with grades of C or better; and consent of instructor

Organisms, environments, and methods of field study. Available for one to four hours of credit, with each hour of credit corresponding to one week of study in field. Four hours required to satisfy field course requirement.

BIO 4V75 Clinical Laboratory Science Internship (6-12)

Pre-requisite(s): Consent of instructor; for Clinical Laboratory Science majors only

Highly intensive clinical training at an affiliated institution in preparation for national certification as a clinical laboratory scientist. A grade of "C-" or better is required for course credit. Can be taken for 6 to 12 hours per semester for a maximum of 4 times with a total of no more than 42 hours.

BIO 4V90 Advanced Research Project (1-3)

Pre-requisite(s): 3 hours of BIO 3V90, upper-level standing, consent of instructor and department chair

Independent research project conducted under the supervision of a faculty member. May be repeated for a total of 3 hours. Presentation of the project required at the end of each semester. Presentation and defense of thesis required for third semester hour.

BIO 4V9R Research (3)

Pre-requisite(s): Consent of instructor

Undergraduate research undertaken under the supervision of a faculty member. May be taken for a maximum of 6 hours.