Department of Biology

Purpose and Goals

The curriculum of the Department of Biology is designed to provide students with a wealth of biological knowledge. The department prepares students for careers as scientists and biology educators. The department also provides the undergraduate foundation for students who plan to pursue professional studies leading to the Doctorate in Medicine, Dentistry, Veterinary Medicine, Optometry, Pharmacy, Allied Health, and other graduate studies. The department is committed to integrating instruction and research to develop our students' critical thinking skills and produce life-long learners.

Academic Standards

Students must earn a minimum grade of “C” in all classes taken in their major disciplines, a minimum grade of “C” in all classes taken in their minor disciplines and physics courses. (if applicable).

Special Emphasis Options

In addition to the degree programs listed above, students may select alternate required courses in the major in such a way as to pursue specific career options. Emphasis options are available in Biology teacher preparation, Pre-Medicine, Pre-Dentistry, Pre-Veterinary, Pre-Podiatry, Pre-Pharmacy, Pre-Physical Therapy, or other Allied health professions. Please refer to course listings on the following pages.

Optional Minor

A minor is not required for the BS Biology. However, Biology majors are required to take 20 credits of chemistry support courses for the biology degree. By completing CHEM 4303 and CHEM 4204, Biochemistry lecture and lab, a Biology major is eligible to complete the 24 SCH catalog requirement for a minor in chemistry. It is highly recommended that biology majors interested in graduate school or professional school select the chemistry minor.

Requirements for a Minor in Biology

BIOL 1501	General Biology	5
BIOL 1502	General Biology	5
BIOL 2416	Genetics	4
BIOL 3401	Human Physiology and Anatomy	4
BIOL 3402	Human Physiology and Anatomy	4
BIOL 3403	General Microbiology	4
Total Hours		**26**

Honor Societies and Clubs

Beta Beta Beta Biological Honor Society stimulates sound scholarship, promotes the dissemination of scientific knowledge, and encourages investigation in the life sciences. To be eligible for selection, candidates must have a superior scholarship record and have completed at least two courses in biology totaling not less than 10 semester hours, or the equivalent of that number. They must also have completed at least one term of the second year of a four-year curriculum or its equivalent and exemplify high ethical and moral ideals.

Beta Kappa Chi Honor Society encourages and advances scientific education through original investigation, dissemination of scientific knowledge, and stimulation of high scholarship in the pure and applied sciences. To be eligible for membership, students must be in the upper fifth of their university class and have completed at least 64 semester hours of university work. Candidates for membership in Beta Kappa Chi must have completed 17 semester hours in one of the sciences recognized by the society with a grade average of at least B.

Minority Association of Pre-health Students provides activities through partnerships with near-by chapters of Student National Medical Association (SNMA) to achieve the goal of increasing the matriculation of undergraduate students into professional health related programs by providing information, materials and mentorship opportunities. The Premedical Club exists to establish a rapport between the biology department and medical schools; to establish a better relationship between premedical students and the staff of professional schools; to provide opportunities for students to visit various health professional schools for tours, chats, and informal lectures; and to assist students in becoming competent test takers and broaden their cultural perspective. The Premedical Club is open to all students interested in a medical career.

The Pre-Veterinary Medicine Club exists to establish a rapport between the Biology Department, Veterinarians and Colleges of Veterinary Medicine; to establish student veterinary preceptor ships to provide opportunities for visits to zoos and the College of Veterinary Medicine at Texas A&M University; and to become aware of the vast differences in entry requirements for the 27 colleges of Veterinary medicine and to assist students in becoming competent test takers. The club is open to all students interested in veterinary medicine.

The Pre-Dental Club exists to establish a rapport between the biology department and dental schools; to establish a better relationship between pre-dental students and dental school staff; to provide opportunities for students to visit dental schools; and to assist students in becoming competent test takers and to strengthen skills of students interested in a dental career.

The Allied Health Club is designed to provide students with an opportunity to acquire knowledge in reference to the allied health discipline. This club enables students interested in physical therapy, pharmacy, physician's assistant, occupational therapy, optometry, dental hygiene, medical record administration, and public health an opportunity to learn about their chosen professions. Students are introduced to professionals in allied health; visit the campuses and hospitals of the various programs; and establish relationships with the faculty and other students interested in the allied health fields. The Allied Health Club is open to all students interested in a health professional career.

The Pre-Optometry Club is designed to educate and prepare students for careers in optometry. The Optometry Club provides opportunities for its members to visit optometry schools and attend seminars in reference to becoming adequately prepared for entry into optometry school. Seminars are given to assist the students in becoming competent test takers for the Optometry Admissions Test. The club is open to all students interested in optometry as a profession.

The Pre-Pharmacy Club is designed to educate and prepare students for careers in pharmacy. The Pharmacy Club invites pharmacists to speak to their club to inform them about the pharmaceutical sciences. The students visit pharmacy schools and gain knowledge in reference to successful matriculation in pharmacy school. The club assists students in becoming competent test takers for the Pharmacy College Admissions Test. The club is open to all students interested in pharmacy as a profession.

Courses

BIOL 1102 Biology Seminar: 1 semester hour.
Discussion and presentations of current biological topics by students, faculty, and guest lecturers.

BIOL 1103 Biology Seminar: 1 semester hour.
Discussion and presentations of current biological topics by students, faculty, and guest lecturers.

BIOL 1108 Biology for Non-Science Major I Lab: 1 semester hour.
Introductory laboratory course for non-biology majors. Emphasis on basic biological principles and their application to human life.

BIOL 1307 General Microbiology: 3 semester hours.
Morphology and physiology of microorganisms related to health and sanitation; disinfection, growth, and control of those organisms causing common infectious diseases.

BIOL 1308 Biology for Non-Science Major I: 3 semester hours.
Introductory course for non-biology majors. Emphasis on basic biological principles and their application to human life. Contemporary biology that covers the chemical basis of life, structure and function of the cell, molecular biology and genetics.

BIOL 1309 Biology for Non-Science Majors II: 3 semester hours.
A reflection of the interdependence of plants on animals and how man's existence is depending on successful interactions between plants and animals.

BIOL 1411 Botany: 4 semester hours.
Morphology and physiology of flowering plants. Structure, method of reproduction, and biotic relationships of type representatives of lower plants.

BIOL 1501 General Biology: 5 semester hours.
Basis of life, cell theory, structure and energy transformation, reproduction, and genetic variability. Origins of diversity of organisms.

BIOL 1502 General Biology: 5 semester hours.
Structure and function of living organism systems. Ecological relationships, natural selection, evolution, and human ecology.

BIOL 2001 Anatomy and Physiology I Retrack: 0 semester hours.
An introductory course examining the organization of a human body and the mechanisms for maintaining homeostasis. Topics include chemistry of life, cell and tissue structure, metabolism, skeleton, muscular, nervous, endocrine, and integumentary system. Designed for students who will pursue a career in nursing.

BIOL 2002 Anatomy and Physiology II Retrack: 0 semester hours.
An introductory course examining the organization of a human body and the mechanisms for maintaining homeostasis. Topics include metabolism, the cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems. Designed for students who will pursue a career in nursing.

BIOL 2306 Hlthcare Minort Com: 3 semester hours.
Introduction to the major health concerns that afflict minority and underserved communities. This course will examine the infectious diseases of special concern to public health and will identify and present for discussion. The course will examine current health policy and the availability of health services as modifiable influences on the health status of minority and underserved communities.

BIOL 2401 Anatomy and Physiology I: 4 semester hours.
An introductory course examining the organization of a human body and the mechanisms for maintaining homeostasis. Topics include chemistry of life, cell and tissue structure, metabolism, skeleton, muscular, nervous, endocrine, and integumentary system. Designed for students who will pursue a career in nursing.

BIOL 2402 Anatomy and Physiology II: 4 semester hours.
An introductory course examining the organization of a human body and the mechanisms for maintaining homeostasis. Topics include metabolism, the cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems. Designed for students who will pursue a career in nursing.

BIOL 2406 Environmental Biology: 4 semester hours.
The course investigates scientific principles underlying ecosystems, biodiversity, and environmental sustainability. An introduction to structural and functional ecological systems, and the impact of humans on the environment includes the principles of population genetics, evolution, and speciation. The course reinforces biological concepts and involves techniques of fieldwork and molecular ecology.

BIOL 2416 Genetics: 4 semester hours.
Analysis of the structure, function, and transmission of genetic materials.
Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 1411 or BIOL 1034).

BIOL 3200 Survey of Radiobiology: 2 semester hours.
This course provides an in-depth exploration of radiobiology, focusing on the interaction of ionizing radiation with living organisms. Students will delve into the fundamental principles governing the effects of radiation on biological systems, emphasizing molecular and cellular responses, genetic implications, and broader ecological considerations. The survey will encompass both natural and artificial sources of radiation, with applications in medicine, environmental science, and industry.
Prerequisites: (BIOL 2416 or BIOL 2054) and (BIOL 3307 or BIOL 3073) and (PHYS 1301 or PHYS 2113) and (CHEM 1303 or CHEM 1033).

BIOL 3201 Genetic Genealogy: 2 semester hours.
Comprehensive genealogy studies covering biology and genetic genealogy's ethical, legal, and societal impact. Topics include the origin of life, evolution, migration, population genetics, ancestry, and genealogy applications in forensic science and law enforcement.
Prerequisites: BIOL 2416.

BIOL 3202 Genome Sciences: 2 semester hours.
The course provides a comprehensive experience in current methods of investigating genomes and gene function with hands-on training for human and non-human genomics research.
Prerequisites: BIOL 2416 or BIOL 2054.

BIOL 3307 Molecular Biology I: 3 semester hours.
The dynamics of carbohydrate, fat, protein and nucleic acid metabolism; recombinant DNA evolution, gene structure and function in specialized eukaryotic systems.
Prerequisites: (BIOL 1502 or BIOL 1025) and (CHEM 2304 or CHEM 2043).

BIOL 3308 Molecular Biology II: 3 semester hours.
Regulation of gene function in bacterial cells; the functioning of eukaryotic chromosomes; the extraordinary diversity of eukaryotic viruses.
Prerequisites: BIOL 1502 or BIOL 1025 and (CHEM 2304 or CHEM 2043).

BIOL 3313 Biological Engineering: 3 semester hours.
Introduction to the scientific basis of biological engineering and the application of life sciences, mathematics, physical sciences, and engineering principles. The course will focus on the interdisciplinary study of the implementation and application of synthetic biology to the design and construction of biological parts, devices, and systems.
Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 2416 or BIOL 2054) and (BIOL 3307 or BIOL 3073).

BIOL 3401 Human Physiology and Anatomy: 4 semester hours.
For biology and physical education majors. Human structure, physiology, organ systems, and related principles.
Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025).

BIOL 3402 Human Physiology and Anatomy: 4 semester hours.
For biology and physical education majors. Human structure, physiology, organ systems, and related principles.
Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

BIOL 3403 General Microbiology: 4 semester hours.
Morphology, physiology, classification, and cultivation of the microorganism relevant to agriculture, pre-medicine, and industry.
Prerequisites: (BIOL 1501 or BIOL 1015) and (CHEM 1303 or CHEM 1033).

BIOL 3404 Immunology: 4 semester hours.
Fundamental aspects of immunology, antigenic systems, hypersensitivity, and serology.
Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

BIOL 3405 Gross Anatomy: 4 semester hours.
Introduce the basic principles and facts relating to the gross anatomy of the human body.
Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 3401 or BIOL 3014) and (BIOL 3402 or BIOL 3042).

BIOL 3406 Animal Histology: 4 semester hours.
Microscopic study of tissues and organs of vertebrates. Relation of structure to function.
Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

BIOL 3412 Cell Biology: 4 semester hours.
A study of the ultrastructure and macro-molecular organization of cells, with emphasis on eukaryotic cells. The convergence of structure and function in life phenomena will be highlighted.
Prerequisites: BIOL 1502 or BIOL 1025 and (CHEM 2304 or CHEM 2043).

BIOL 4105 Research Methods: 1 semester hour.
The course addresses fundamental concepts in research methodology and provides the training required to conduct biological research, including research compliance and responsible conduct of research. The course includes topics covering the conceptualization of a research study, epidemiological and bio-statistical considerations in designing a research study, planning, and conducting a research study, writing a research protocol, and publication ethics.

BIOL 4106 Research: 1 semester hour.
Library and laboratory work in specific biological problems.
Prerequisites: BIOL 4105 or BIOL 4051.

BIOL 4107 Microscopy Laboratory: 1 semester hour.
A comprehensive overview of the theory and practical use of microscopes for scientific research, civil law, and criminal law. Emphasis on the theory and techniques of microscopy including the collection, processing, and analysis of biological and chemical evidence for the legal system.
Prerequisites: BIOL 1406 and (CHEM 2303 or CHEM 2033).

BIOL 4199 Independent Study: 1 semester hour.
Readings, research, and/or field work on selected biology topics.
Prerequisites: BIOL 4105 or BIOL 4051.

BIOL 4201 Medical Terminology: 2 semester hours.
Emphasis is on understanding basic medical terms and learning how they are used in documenting and reporting patient care procedures. Practical applications are provided by exercises and medical record analyses in each chapter.

BIOL 4211 Occupational and Professional Development: 2 semester hours.
Instruction in research and communication to guide the process of professional and occupational development. The course reinforces academic instruction and prepares students for the transition to employment, graduate, and professional schools.

BIOL 4212 Internship: 2 semester hours.
The supervised internship is a capstone experience related to a STEM professional area of interest.
Prerequisites: BIOL 4105 or BIOL 4051.

BIOL 4301 Topics in Genomics: 3 semester hours.
The study of the human genome in a holistic manner. Physical mapping and large scale DNA sequencing of the human genome: gene expression and micro arrays; the application of genome data to the incidence of disease markers and gene based therapeutics.
Prerequisites: (BIOL 1501 or BIOL 1015) and (BIOL 1502 or BIOL 1025) and (BIOL 2416 or BIOL 2054) and (CHEM 2303 or CHEM 2033) and (CHEM 2304 or CHEM 2043).

BIOL 4400 Developmental Biology: 4 semester hours.
In this course, students will explore the critical roles of differential gene expression and cell signaling in animal development, examining how these processes drive the formation and differentiation of tissues and organs. Through hands-on projects and research, students will delve into the molecular and genetic underpinnings of developmental mechanisms, gaining practical experience and a deeper understanding of developmental biology principles.

Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025) and (BIOL 2416 or BIOL 2054).

BIOL 4401 Vertebrate Embryology: 4 semester hours.
Structure, principles, and progress in vertebrate development. Chickens and pigs as principle laboratory materials.
Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

BIOL 4402 Comparative Anatomy: 4 semester hours.
Anatomy of organs and organ systems, their function and evolution in major vertebrate types.
Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025).

BIOL 4403 Practicum in Biology: 4 semester hours.
Recent advances in biology. Emphasis placed on investigation and inquiry as a means of acquiring knowledge in biology.

BIOL 4404 Computational Biology: 4 semester hours.
A study of computational methods for analyzing nucleic acid sequences (RNA and DNA) and the molecular structures of proteins.
Prerequisites: BIOL 1407 and (CHEM 1304 or CHEM 1043).

BIOL 4405 Neurobiology: 4 semester hours.
This project-based course is designed to delve into the intricate functions of the nervous system. Structured around hands-on projects, this course offers students an immersive experience into the world of neurobiology, exploring its various functions through a combination of lectures, lab work, and independent research. Each unit of the course focuses on a different aspect of the nervous system, providing a comprehensive understanding of its complexity and significance.
Prerequisites: BIOL 1501 or BIOL 1015 and (BIOL 1502 or BIOL 1025) and (CHEM 1303 or CHEM 1033) and (CHEM 1304 or CHEM 1043) and (BIOL 3401 or BIOL 3014) and (BIOL 3402 or BIOL 3024).

BIOL 5301 Genomics: 3 semester hours.
The study of the genomes on a holistic manner, thus providing information on the uses and shortcomings of genetic information. The application of genomic data to determine the incidences of disease; to identify disease markers and develop gene based therapeutics.

BIOL 5306 Micro Activ Toxico: 3 semester hours.
Survey of microbial actions in the field of environmental toxicology. Toxigenic microorganisms, major microbial toxins and use of microbial systems in toxicological studies. Microbial alterations of environmental contaminants.

BIOL 5312 Cell Biology: 3 semester hours.
An in-depth study of the morphological and functional aspects of the cell. Emphasis will be placed on the current understanding of cell structure and how this relates to physiological and biochemical processes.
Prerequisites: CHEM 2303 or CHEM 2033 and (CHEM 2304 or CHEM 2043).

BIOL 5399 Independent Study: 1-3 semester hour.
Reading, research and/or field work on selected topics in Biology. Prerequisite: Consent of advisor. Students may register for this course each semester. Only six credit hours may be earned.

BIOL 5402 Microscopic Anatomy: 4 semester hours.
Microscopic study of tissues and organ of vertebrates; relation of structure to function.