Biology

This major prepares students for graduate school in the biological sciences. It also prepares students to enter any of the professional fields related to medicine, teaching, and other areas including economic, industrial, and applied biology. Opportunities include marine biology, environmental studies, genetics, physiology, botany, zoology, microbiology, cellular biology, developmental biology, molecular biology, biochemistry, ecology, and entomology, to name a few graduate study specialties. The student has the option of graduating with a Bachelor of Science degree or with a Bachelor of Arts degree.

CMU has a chapter of Beta Beta Beta, a national honorary biological society (advisors: Dr. Paul Porneluzi and Dr. Greg Thurmon), and a chapter of Alpha Epsilon Delta, a national pre-health professions fraternity (advisor: Dr. Ashley Lough).

The following programs provide guidance to students for selecting the courses necessary for their goals.

**Biology Degrees with Certification**

**General Biology Program:** Biology is a broad and constantly changing field. This option is provided for students electing to study a set of biology courses tailored to their individual interests. Graduates will earn a bachelor's degree with a major in Biology and a minor in a field of their choice. [More Information...]

**Marine Biology Program:** The marine biology degree program at Central Methodist University is all about quality of life... not just the quality of the aquatic world. It begins with a strong interest in life sciences. The marine biology major gives CMU students an opportunity to explore life in the oceans, both in the classroom and through hands-on experiences. The major combines work on campus with summer work at Gulf Coast Research Laboratory in Ocean Springs, Miss. and other locations. [More Information...]

**Molecular Biology Program:** Students learn concepts and techniques that prepare them for careers in Biology or advanced study in a variety of fields of Biology. These fields include, but are not limited to, Biochemistry, Cell Biology, Genetics, and Microbiology. Graduates will earn a bachelor's degree with a major in Biology and a minor of their choice. [More Information...]

**Pre-Professional Health Science Program:** Students learn and practice biology and prepare for studying health professions in Medical, Dental, Pharmacy, Occupational Therapy, Physical Therapy and Veterinary Schools. Graduates will earn a bachelor's degree with a major in Biology and a minor in chemistry. [More Information...]

**Wildlife Ecology and Conservation Biology Program:** Students learn and experience the fields of Wildlife Ecology and Conservation Biology. Graduates will earn a bachelor's degree with a major in Biology and minor in Environmental Science. [More Information...]

**Biology Minors**

**Biology Minor - 18 Hours**

Introductory biology course, with lab (3-5)

Additional Courses in Biology (13-15)

**Marine Biology Minor - 18 Hours**

BI101 General Biology (3) and BI101L (1)

Marine Biology Electives (10): (These courses are offered only during the summer sessions at Gulf Coast Research Laboratory in Ocean Springs, MS. Courses from a similar marine facility will be accepted.) These courses are in addition to any Biology courses taken as a part of a Biology Major or a Biology Minor.

**Engineering Technology Minor - Partnership with Crowder College**

CMU and Crowder College also offer a certificate program/minor for CMU students in Engineering Technology. This curriculum will provide training for students to work as process operators in chemical, bio refineries, oil and gas industry, power generation, food and beverage, mining, pharmaceuticals, and pulp and paper industries. This curriculum prepares students to demonstrate technical knowledge, skills and abilities in instrument systems, process systems, process troubleshooting, quality, safety, and process industry equipment, giving them many more employment opportunities. Courses from Crowder College are available online for CMU students. In addition to taking BI101 General Biology (3) and BI101L (1), and CH111 General Chemistry (3) and CH111L (1) from CMU, students would need the following courses from Crowder:
Biology Courses

**BI101 General Biology.** 3 hours.
This introductory course is for majors only.
Topics include methods of scientific study, basics of chemistry, cell biology, membranes, enzymes, cell division, photosynthesis, metabolism, genetics on a molecular and cellular level, evolution and population biology. 3 lectures. Fall.

**BI101L General Biology Lab.** 1 hour. Lab exercises that accompany BI101. Must be taken concurrently with BI101. 2 lab hours. Fall.

**BI102 General Biology.** 3 hours. This is a continuation of the BI101 course. Focuses include a survey of animal body systems together with an introduction to ecology. Topics cover the digestive system, immune system, circulatory system, endocrine system, nervous system, reproductive system, ecology, ecosystems, and conservation. 3 lectures. Prerequisite: BI101. Spring.

**BI102L General Biology Lab.** 1 hour. Lab exercises that accompany BI102. Must be taken concurrently with BI102. 2 lab hours. Spring.

**BI104 Biology of the Dinosaurs.** 3 hours. A basic study of the dinosaurs, relationships to living animals and fossilized animals (taxonomy), feeding habits, food selection, habits, taphonomy (fossilization), external anatomy and physiology (especially metabolism, digestion and basic senses). Lecture only, with some hands-on studies. No prerequisite. Cross-listed with GL104. Normally offered in May Term.

**BI106 Human Biology.** 3 hours. This introductory course is primarily aimed at non-pre-health professions majors. This is a study of Biology with a focus on human Biology and will cover the systems of the human body involved in maintenance, support, movement, coordination, and reproduction. The course also will cover the basics of human genetics, evolution, and ecology. 3 lectures.

**BI106L Human Biology Lab.** 1 hour. Lab exercises that accompany BI106. Must be taken concurrently with BI106. 2 lab hours.

**BI107 Human Anatomy.** 4 hours. Introduction to the basic components of the human anatomical systems. 3 lectures. Fall.

**BI107L Human Anatomy Lab.** 1 hour. Lab exercises that accompany BI107. Must be taken concurrently with BI107. 2 lab hours. Fall.

**BI108 Biodiversity.** 3 hours. This course is an introduction to the science of Biology, within the topic of biological diversity. It includes the study of the classification and evolution of all major groups of living organisms. Students will become familiar with the major groups of viruses, bacteria, protists, fungi, plants, and animals. The course includes a lab focusing on the observation and classification of living organisms. This introductory course is required for Biology majors and is appropriate for non-Biology majors. 3 lectures. Spring.

**BI108L Biodiversity Lab.** 1 hour. Lab exercises that accompany BI108. Must be taken concurrently with BI108. 2 lab hours. Spring.

**BI109 Human Anatomy and Physiology.** 5 hours (4 lecture/2 lab) This will be a one semester course that will cover both human anatomy and human physiology. The intent of the course is to cover the information that will be needed as background for the
OTA and PTA programs. Special emphasis will be given to the nervous, muscular, skeletal, and urinary systems. The labs will be in coordination with the lectures and will be both anatomy and physiology in nature. Offered in the fall.

**BI109L Human Anatomy and Physiology Lab.** 2 hours. Lab exercises that accompany BI109. Must be taken concurrently with BI109. 2 lab hours. Fall.

**BI110 Introduction to Biotechnology.** 3 hours (3 lecture hours). This introductory course is primarily aimed at non-majors. This is a study of biotechnology, including the science behind it, how it is regulated, the impact on society, and ethical concerns raised by new advances in biological sciences. Spring.

**BI190 Special Topics.** 1-3 hours.

**BI205 General Physiology.** 4 hours. General physiological process with emphasis on the organs and systems of man and their inter-relationship. Prerequisites: BI101-102 and one year of college Chemistry or by permission of instructor and division chair. 4 lectures. Spring.

**BI205L General Physiology Lab.** 1 hour. Lab exercises that accompany BI205. Must be taken concurrently with BI205. 2 lab hours. Spring.

**BI206 Invertebrate Zoology/Parasitology.** 3 hours. Anatomy, development and taxonomy of animals without backbones. 3 lectures. Prerequisites: BI101-102. Spring.

**BI206L Invertebrate Zoology/Parasitology Lab.** 1 hour. Lab exercises that accompany BI206. Must be taken concurrently with BI206. 2 lab hours. Spring.

**BI300 Ornithology.** 3 hours. This course is about the biology of birds. Topics include avian ecology, evolution, behavior and identification. Students will learn to identify the birds of Missouri by sight and by sound. Includes a survey of the orders of birds of the world and field trips to view and study local birds. 3 lectures. Prerequisite: BI101. Even-numbered Springs.

**BI300L Ornithology Lab.** 1 hour. Lab exercises that accompany BI300. Must be taken concurrently with BI300. 2 lab hours. Even-numbered Springs.

**BI301 Ecology.** 3 hours. Study of interactions and interrelations between organisms and the environment. Topics include natural history, evolution, adaptation to the environment, population ecology, species interactions, communities, ecosystems, landscape and global ecology. 3 lectures. Cross-listed with ES301. Prerequisite: BI101. Fall.

**BI301L Ecology Lab.** 1 hour. Lab exercises that accompany BI301. Must be taken concurrently with BI301. 2 lab hours. Fall.

**BI302 Botany.** 2 hours. Study of basic plant morphology, physiology and taxonomy. 2 lectures. Prerequisites: BI101-102. Spring.

**BI302L Botany Lab.** 1 hour. Lab exercises that accompany BI302. Must be taken concurrently with BI302. 2 lab hours. Spring.

**BI303 Early Vertebrates.** 3 hours. This course will explain the origin of the vertebrates from the chordates. It will cover a diverse range of topics to include: anatomy, physiology, phylogeny, behaviors and ecology for the: jawless fishes, sharks, skates and rays as well as bony fish, amphibians and reptiles. It will show the evolutionary relationships between the vertebrates and the relationships with these groups and the other members of the animal kingdom. 3 lectures. Prerequisite: BI101 & 102.

**BI303L Early Vertebrates Lab.** 1 hour. Lab exercises that accompany BI303. Must be taken concurrently with BI303. 2 lab hours.

**BI304 Mammalogy.** 3 hours. This course is about the biology of mammals. Topics include mammalian ecology, evolution, behavior and identification. Students will learn to identify the mammals of Missouri. This course includes a survey of the orders of mammals of the world. Field trips to capture, view and study local mammals will be included. 3 lectures. Prerequisite: BI101. Fall.

**BI304L Mammalogy Lab.** 1 hour. Lab exercises that accompany BI304. Must be taken concurrently with BI304. 2 lab hours. Fall.

**BI305 Microbiology.** 3 hours. The role of bacteria and other micro-organisms in nature. The principles of the subject as related particularly to agriculture, domestic science, sanitation, public health, nursing, and medicine. 3 lectures. Prerequisites: BI101-102 and one year of college Chemistry or BI205. Spring.

**BI305L Microbiology Lab.** 1 hour. Lab exercises that accompany BI305. Must be taken concurrently with BI305. 2 lab hours. Spring.
BI306 Genetics. 3 hours. The molecular, biochemical and cytological basis for inheritance; the cellular mechanisms and laws of transfer between generations, and their practical applications as related to human welfare. Special attention is paid to the impact of genomics. 3 lectures. Prerequisites: BI101 and BI102. Junior or Senior standing preferred. Fall.

BI306L Genetics Lab. 1 hour. Lab exercises that accompany BI306. Must be taken concurrently with BI306. 2 lab hours. Fall.

BI307 Comparative Animal Behavior. 3 hours. A study of behavior across the animal kingdom, emphasizing instinctive behavior, but also considering learning and cognition. The behavior of vertebrates and invertebrates will be studied from evolutionary, ecological, and physiological perspectives. 3 lectures. Prerequisites: BI101 and BI102 or instructor's permission. Fall.

BI307L Comparative Animal Behavior Lab. 1 hour. Lab exercises that accompany BI307. Must be taken concurrently with BI307. 2 lab hours. Fall.

BI309 Histology. 2 hours. The study of microscopic anatomy of vertebrate tissues and organ systems. 2 lectures. Prerequisites: BI101-102. Alternating Falls.

BI309L Histology Lab. 2 hours. Lab exercises that accompany BI309. Must be taken concurrently with BI309. 4 lab hours. Alternating Falls.

BI311 Conservation Biology and Natural Resource Management. 3 hours. An exploration of the science of conservation biology, which is an applied field that combines the principles of ecology, population genetics, biogeography, economics sociology, political science, philosophy and other fields to solve problems associated with conserving the world's biodiversity. The course will also investigate issues of natural resource management, including endangered species management, reserve design, and restoration ecology. Cross-listed with ES311. Prerequisites: BI101 or instructor's permission. Spring.

BI314 Pathophysiology. 3 hours. This course will examine altered physiologic functions and their effects on adaptation. The roles of heredity and the changing environment on physical function are emphasized. Cross-listed with AH314. Prerequisites: BI107, BI205, and BI305. Spring.

BI315 Immunology. 3 hours. Concepts and characteristics of the immune system in health and disease. The course addresses issues and questions relevant to human behavior, public health, medicine, the environment and ethics. Prerequisites: BI101 and BI102. Fall.

BI317 Biochemistry and Cellular Physiology. 3 hours. The chemistry of biological systems, with emphasis on the biosynthesis, catalysis, and the metabolic role of proteins, carbohydrates, lipids, nucleic acids, vitamins, hormones and other substances related to life processes. 3 lectures. Prerequisites: 2 semesters of Biology including BI205 and CH341 or permission of instructor and division chair.

BI317L Biochemistry and Cellular Physiology Lab. 2 hours. Lab exercises that accompany BI317. Must be taken concurrently with BI317. 4 lab hours.

BI318 Toxicology and Environmental Medicine. 3 hours. A discussion of corrosive and toxic substances that affect the environment. Topics include fundamentals of sample collection, reliability of measurements, methods of detection, chemical composition of cells, chemical processes of life, the effects of toxic substances on cells and organisms, and risk assessment. Cross-listed with ES318. Prerequisites: BI101 and CH/ES202.

BI320 Molecular and Cellular Biology. 3 hours. A study of the cell structure and function with an emphasis upon eukaryotes. Topics include organelle structure and function, protein structure, receptor structure and signal transduction, movement of materials into and throughout the cell, and cancer. Labs will focus on current molecular biology techniques. 3 lecture hours. Prerequisites: BI102 and CH114. Spring.

BI320L Molecular and Cellular Biology Lab. 2 hours. Lab exercises that accompany BI320. Must be taken concurrently with BI320. 4 lab hours. Spring.

BI380 Major Readings. 3 hours. Study of the current principles of biology, current biological journal readings and current books in the field. Open only to Juniors and Seniors majoring in Biology. Spring.

BI460 Special Problems. 1-5 hours.