

## Biology (BIO)

The Biology Program is a part of the Division of Mathematics and Natural Sciences. It provides a rigorous curriculum which enables students to develop an understanding of and an appreciation for the diversity of living organisms and their structure, function, and interactions. Most courses emphasize laboratory and/or field activities. The program is designed to prepare students to enter science-related fields of business, to teach biology in high school, to meet professional school entrance requirements, and for further study in graduate school.

### Biology Major

Basic program for a baccalaureate degree:

I. Core Requirements.....	52-56 hours
II. Biology Requirements .....	34 hours
BIO 151 Principles of Biology I.....	4
BIO 152 Principles of Biology II.....	4
BIO 310 Evolution and Ecology.....	3
BIO 320 Genetics .....	4
BIO 350 Microbiology.....	4
BIO 420 General Physiology.....	4
BIO 480 Seminar in Biology.....	1
<i>Select three BIO electives from the following list for a minimum of 10 hours.</i>	
<i>One of the courses must be a 4-hour course with laboratory.</i>	
BIO 313 Botany.....	4
BIO 314 Zoology.....	4
BIO 321 Invertebrate Zoology.....	4
BIO 330 Comparative Anatomy .....	4
BIO 400 Molecular Biology of the Cell .....	3
BIO 402 General Parasitology.....	4
BIO 405 Embryology.....	4
BIO 411 Ecology II.....	4
BIO 430 Immunology .....	3
BIO 440 Histology .....	4
BIO 441 Neurobiology.....	3
BIO 490 Special Topics .....	1-4
BIO 499 Directed Independent Study.....	1-4
III. Related Studies Requirements .....	29 hours
CHE 113 General Chemistry I.....	3
CHE 114 General Chemistry II .....	3
CHE 115 General Chemistry I Laboratory .....	1
CHE 116 General Chemistry II Laboratory .....	1
CHE 313 Organic Chemistry I .....	4
CHE 314 Organic Chemistry II.....	4
CHE 315 Organic Chemistry I Laboratory .....	1
CHE 316 Organic Chemistry II Laboratory.....	1
MTH 113 Precalculus Algebra or higher math course.....	3

(MTH 114 is a prerequisite for PHY 223)

PHY 223	General Physics I .....	4
PHY 224	General Physics II .....	4

IV. General electives as needed to meet the minimum requirements of 128 semester hours

**Biology Minor**

Biology Requirements ..... 21 hours  
Must include BIO 151 and BIO 152.

**Teaching Certification In Biology**

(See Education)

**Biology Course Descriptions**

**BIO 100 Introduction to Biology.....(3)**

A survey course for those not taking a biology major or minor. Three hours of lecture per week; accompanied by a lab course. *Prerequisite: MTH 098 or placement beyond. Corequisite: BIO 101 or consent of instructor.*

**BIO 101 Introduction to Biology Lab.....(1)**

Laboratory to accompany Introduction to Biology lecture. Three hours of lab per week. *Pre- or corequisite: BIO 100 or consent of the Instructor.*

**BIO 151 Principles of Biology I.....(4)**

The hypothetico-deductive nature of scientific inquiry is introduced and is used as a foundation for the exploration of cellular organization and function. Topics covered include atomic bonding, the structure and importance of water to life, macromolecules essential to life, enzyme kinetics, eukaryotic cell structure, cellular respiration, photosynthesis, cell division, an introduction to Mendelian genetics, and the structure and function of DNA. Although the course focuses on the cellular level and below, the importance of these structures and processes to the organism is continually considered. *Pre- or corequisite: MTH 111 or placement beyond. Recommended: One year of high school biology or chemistry and co-registration in CHE 113.*

**BIO 152 Principles of Biology II .....(4)**

A survey course of Earth's biodiversity, including the prokaryotic and eukaryotic domains, intended for students to gain an understanding and appreciation of organismal diversity. Taxonomy, phylogeny, and life histories of various taxonomic groups will also be discussed in order to address evolutionary relationships and morphological and physiological differences among groups. *Prerequisite: A grade of "C" or better in BIO 151.*

**BIO 171 Anatomy and Physiology I .....(4)**

Study of human body structure and function. This course provides the students with insight into the human body primarily at the cellular and tissue levels. Topics include histological tissue identification, muscle, bones, nervous system, and metabolic processes. Three hours of lecture and three hours of laboratory per week. *Prerequisites: ENG 099 and RED 099 or placement beyond. Pre- or corequisite: MTH 099 or placement beyond. Does not count towards a major in Biology.*

- BIO 172 Anatomy and Physiology II**.....(4)  
 In this course, the human body is investigated primarily at the system level. Areas of study include: respiratory, cardiovascular, urinary, digestive, and reproductive systems. Three hours of lecture and three hours of laboratory per week. *Prerequisites: ENG 099 and RED 099 or placement beyond. Pre- or corequisite: MTH 099 or placement beyond. Does not count towards a major in Biology.*
- BIO 250 Human Anatomy** .....(4)  
 A comparative study of the anatomical structure of the human body. Interrelated functions of the structure are described. Three hours of lecture and three hours of laboratory work each week. *Does not replace BIO 330.*
- BIO 251 Human Physiology**.....(4)  
 A course designed to meet the needs of allied health students. The functions of the body systems are studied with emphasis on systems' interrelationships and disease states. Three hours of lecture and three hours of laboratory work each week. *Prerequisite: A grade of "C" or better in BIO 250. Does not replace BIO 420.*
- BIO 273 Clinical Microbiology**.....(4)  
 This course is designed for allied health students in need of a broad foundation in microbiology as well as insight into the role microorganisms play in health and disease. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 171 and BIO 172. Does not replace BIO 350. Does not count towards a major in Biology.*
- BIO 310 Evolution and Ecology** .....(3)  
 A discussion of fundamental principles of evolutionary biology and ecology intended to address biology at the population level and above. Topics covered include natural selection and other mechanisms of evolutionary change, rates and mechanisms of speciation, population genetics, effects of abiotic factors on populations, growth and regulation of populations, intraspecific and interspecific interactions, energy flow through ecosystems, nutrient cycling, and ecosystem diversity. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152 and MTH 113 or placement beyond.*
- BIO 313 Botany**.....(4)  
 A study of the development, morphology, taxonomy and physiology of plants. Three hours of lecture and three hours of laboratory each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*
- BIO 314 Zoology**.....(4)  
 A study of the animal kingdom and basic concepts of evolution, genetics, and ecology desirable for a liberal education or a foundation for advanced study of biology. Three hours of lecture and three hours of laboratory each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*
- BIO 320 Genetics** .....(4)  
 An introductory study of the fundamental principles and mechanics of inheritance, including human applications. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152. Recommended: MTH 200.*

- BIO 321 Invertebrate Zoology**.....(4)  
 A comparative study of the morphology, phylogeny, and ecology of representative invertebrate animals. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*
- BIO 330 Comparative Anatomy of the Vertebrates**.....(4)  
 A comparative study of the morphology, phylogeny, and ecology of vertebrate animals based on protochordates, the dogfish, *Necturus*, and the cat. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*
- BIO 350 Microbiology**.....(4)  
 A study of the morphology, physiology, genetics, and taxonomy of bacteria and other microorganisms, and their beneficial and harmful relationships to plants and animals. Laboratory methods of cultivation, examination, and identification of bacteria will be stressed. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*
- BIO 400 Molecular Biology of the Cell**.....(3)  
 Further study of eukaryotic cell structure, function, and regulation of activity. Topics covered include the structure, activity, assembly, "death," and targeting of proteins; membrane structure and function; the structure and function of eukaryotic organelles, transmembrane signaling; the cytoskeleton; cell cycle regulation; cancer; and techniques used in cell biology. Three hours of lecture each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152, and BIO 320. Pre- or corequisites: CHE 313 and CHE 315.*
- BIO 402 General Parasitology** .....(4)  
 A study of the life cycles of the parasites of man and selected domestic animals, with emphasis on the clinical manifestations. Laboratory methods will include examination and identification of parasitic organisms. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*
- BIO 405 Embryology**.....(4)  
 A study of organismal development, with a particular emphasis on molecular events. Developmental abnormalities due to genetic defects and environmental influences will also be explored. Three hours of lecture and three hours of laboratory work each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152, and BIO 320.*
- BIO 411 Ecology II**.....(4)  
 Further study of ecological principles introduced in BIO 310. Topics will be chosen by the instructor and may include population ecology, community ecology, ecosystem ecology, or environmental ecology. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152, and BIO 310.*
- BIO 420 General Physiology**.....(4)  
 General physiological principles of the organ systems of vertebrates, with a particular emphasis on normal physiology and pathophysiology of humans, will be examined in this course. The following topics will be covered: cellular physiology, neurophysiology,

muscle physiology, cardiovascular and respiratory physiology, metabolism, renal physiology, acid/base balance, and endocrine function. Three hours of lecture and three hours of laboratory each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152, and CHE 114, and junior-level standing with at least 19 credit hours of BIO courses that count toward the major.*

**BIO 430 Immunology.....(3)**

A study of the immune system including the basic structure of the immunoglobulins, the immune response, interaction of antigen and antibody, immunity to infection, rejection mechanisms of transplantation and autoimmunity. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152, and BIO 350. Recommended: BIO 400 and CHE 425.*

**BIO 440 Histology.....(4)**

The microscopic study of the cells and tissues of the body. Different types of microscopy will be discussed, with an emphasis on light microscopy. Three hours of lecture and three hours of laboratory work. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152.*

**BIO 441 Neurobiology .....(3)**

A study of the histology, anatomy and physiology of the nervous system. Three hours of lecture each week. *Prerequisites: A grade of "C" or better in BIO 151 and BIO 152. Recommended BIO 420.*

**BIO 480 Seminar in Biology.....(1)**

Presentation of current and historical topics in biology. The course emphasizes practice in presentation of oral and written reports. As parts of the course, students will be assessed regarding their knowledge of the field of biology. *Prerequisites: At least 20 semester hours of BIO courses that count toward the major and senior standing or consent of the Instructor.*

**BIO 490 Special Topics ..... (1-4)**

A study of a selected topic of special interest. The topic may differ each time the course is offered and may be proposed by either the instructor or students. *Prerequisites: At least a junior science major and consent of the Instructor.*

**BIO 498 Lab Internship (Biology) .....(1)**

The student assists in instruction of a freshman level biology lab under the supervision of the laboratory instructor. *Prerequisite: Consent of the instructor. Recommended: CHE 147.*

**BIO 499 Directed Independent Study ..... (1-4)**

Individual research or study based on the interests and needs of the student. Credit of one to four hours each semester for a maximum of two semesters. A total of 4 credit hours may be counted toward a biology major. *Prerequisites: 18 semester hours of biology and approval of a sponsoring biology faculty member, Division Chair, and Dean of the College.*