BIOSCIENCE

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>BIOSC 0070</td>
<td>BIOLOGY LABORATORY 1</td>
<td>1 cr.</td>
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<td></td>
<td>Various morphological aspects and physiological processes in plants and animals are investigated.</td>
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<td></td>
<td>Corequisite: BIOSC 0170.</td>
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<td>BIOSC 0080</td>
<td>BIOLOGY LABORATORY 2</td>
<td>1 cr.</td>
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<td></td>
<td>This course examines ecological, classical and molecular genetics, and evolutionary principles.</td>
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<td>Corequisite: BIOSC 0180.</td>
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<td>BIOSC 0170</td>
<td>FOUNDATIONS OF BIOLOGY 1</td>
<td>3 cr.</td>
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<td>A study of the various life-sustaining processes along with associated structures in different representative life forms.</td>
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<td></td>
<td>Prerequisite: None. Corequisite: BIOSC 0070.</td>
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<tr>
<td>BIOSC 0180</td>
<td>FOUNDATIONS OF BIOLOGY 2</td>
<td>3 cr.</td>
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<td></td>
<td>Basic principles of ecology, classical and molecular genetics, cellular reproduction, population biology, and evolution are examined as they relate to higher levels of biological organization.</td>
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<td>Prerequisites: BIOSC 0070, BIOSC 0170. Corequisite: BIOSC 0080.</td>
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<tr>
<td>BIOSC 0350</td>
<td>GENETICS</td>
<td>3 cr.</td>
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<td>This course is designed to examine in detail principles of classical and molecular genetics. The gene is viewed in terms of transmission, function, and mutation. Both eukaryotic and prokaryotic organisms are examined.</td>
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<td>Prerequisites: BIOSC 0180, BIOSC 0080.</td>
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<tr>
<td>BIOSC 0371</td>
<td>ECOLOGY</td>
<td>4 cr.</td>
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<td>This course examines interactions between organisms and the environment at the individual, population, and community levels. The structure and function of ecological systems will be emphasized. Weekly labs provide techniques and skills needed for quantifying organism-environment interactions.</td>
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<td></td>
<td>Prerequisites: BIOSC 0180, BIOSC 0080.</td>
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BIOSC 0470  
**BIOLOGY OF AGING**  
3 cr.

Phase of growth and development that starts at conception and ends at death. Provides an understanding of the gradual deterioration of body structures and functions characteristic of senescence. The various biological theories that attempt to explain the phenomenon of aging will be examined.

*Prerequisite:* None

BIOSC 0745  
**FIELD STUDIES IN ECOLOGY**  
3-6 cr.

Basic ecological (biomes, ecosystems, community ecology, population ecology, and adaptations) and environmental science (human population growth, resource use, and pollution) concepts will be taught in outdoor locations. Sites will vary and may include the Colorado Rocky Mountains and the Amazonian rainforest. All-day field trips to significant sites will be supplemented by evening lectures and talks by local experts.

*Prerequisite:* None

BIOSC 1000  
**BIOCHEMISTRY**  
3 cr.

One-term course designed for individuals who do not plan a major concentration in biochemistry. Emphasis is on the relationship between chemical structure and biological function as well as the pathways of intermediary metabolism.

*Prerequisites:* BIOSC 0180, BIOSC 0080; CHEM 0310, CHEM 0330.

BIOSC 1090  
**INTRODUCTION TO BIOPSYCHOLOGY**  
3 cr.

This course is an introduction to the physiological bases of behavior, with emphasis on central nervous system function and motivation. Includes consideration of sleep and wakefulness, hunger and thirst, specific hungers and learned aversions, recovery of function following brain damage, and various neurological and neuropsychiatric disorders.

*Prerequisite:* BIOSC 0170 or PSY 0010.

BIOSC 1110  
**HUMAN ANATOMY AND PHYSIOLOGY 1**  
3 cr.

The first course in a two-part sequence dealing with macroscopic and microscopic anatomy and physiology of the human body, with special emphasis on relationships between structure and function. Included in the two courses are cell biology, histology, embryology, bone and skeleton, muscles and contraction, the cardiovascular system and its regulation, the nervous system and nervous impulse, the urinary system and electrolyte balance, and the respiratory, digestive, endocrine, and reproductive systems.

*Prerequisites:* BIOSC 0180 and BIOSC 0080.  
*Corequisite:* BIOSC 1111.
BIOSC 1111  HUMAN ANATOMY AND PHYSIOLOGY LAB 1  1 cr.

Laboratory exercises illustrating the anatomy and physiology of the human body.

Corequisite: BIOSC 1110.

BIOSC 1115  HUMAN ANATOMY AND PHYSIOLOGY 2  3 cr.

The second course in a two-part sequence dealing with macroscopic and microscopic anatomy and physiology of the human body, with special emphasis on relationships between structure and function. Included in the two courses are cell biology, histology, embryology, bone and skeleton, muscles and contraction, the cardiovascular system and its regulation, the nervous system and nervous impulse, the urinary system and electrolyte balance, and the respiratory, digestive, endocrine, and reproductive systems.

Corequisite: BIOSC 1116.

BIOSC 1116  HUMAN ANATOMY AND PHYSIOLOGY LAB 2  1 cr.

Laboratory exercises illustrating the anatomy and physiology of the human body.

Corequisite: BIOSC 1115.

BIOSC 1200  VERTEBRATE MORPHOLOGY  3 cr.

A comparative study of the various organ systems of representative vertebrate forms from an anatomical, embryological, and evolutionary standpoint.

Prerequisites: BIOSC 0180, BIOSC 0080. Corequisite: BIOSC 1210.

BIOSC 1210  VERTEBRATE MORPHOLOGY LABORATORY  2 cr.

Students will dissect a shark and a cat, study various skeletons (including human), and examine histology slides. Illustrates the structures discussed in the BIOSC 1200 lectures and gives the student the personal experience of learning animal structure through dissection and observation.

Corequisite: BIOSC 1200.

BIOSC 1371  ENVIRONMENTAL HEALTH  3 cr.

An introduction to the scientific study of environmental hazards that affect human health. Biological, chemical and physical factors that are found in the air, water, soil, and food will be assessed from the perspective of both the industrialized and developing worlds. Students will learn about current issues in the field of environmental health, including the assessment, correction, control, and prevention of environmental hazards and their effects on the human body.

Prerequisites: BIOSC 0070, BIOSC 0170, BIOSC 0080 and BIOSC 0180.
BIOSC 1372 ENVIRONMENTAL SCIENCE I 3 cr.
Introductory course which provides a broad overview of the environmental crisis with a focus on population, resources, and pollution. Biological and social sciences will be integrated in understanding the root causes of global as well as local issues. Critical thinking skills and group discussions will be emphasized.

Prerequisite: BIOSC 0371.

BIOSC 1377 ENVIRONMENTAL SCIENCE II: SOIL SCIENCE 4 cr.
Nature and property of soil as it relates to environmental (landfills, toxic waste, erosion, etc.) and land management issues (forestry, agriculture, urbanization, etc.). Knowledge of soils and land-use planning will be used in a variety of case studies that will implement current geographic information systems technology.

Prerequisite: BIOSC 1372.

BIOSC 1378 ENVIRONMENTAL SCIENCE III: WATER QUALITY 4 cr.
This course is a broad overview of water quality. Water pollutants will be studied in terms of their types, sources, migration in the environment, effects on humans and ecosystems, and remediation. Both surface water (lakes and streams) and groundwater contamination will be examined. It covers principles and practices of field sampling, monitoring, and analysis of water quality. Physical, chemical, and biological methods of water quality determination will be employed. Waste water treatment and drinking water treatment will also be studied. Field trips will supplement the course.

Prerequisite: BIOSC 1372.

BIOSC 1385 ECOLOGY AND ENVIRONMENT 4 cr.
This course addresses area of major environmental concerns after a foundation in selected ecological principles is established. The basic understanding of natural systems, including organism, population, community, and ecosystem ecology will be explored. Then current issues related to human population growth, natural resource use, and pollution will be examined using a global case study approach. Student discussion and writing concerning controversial issues will be stressed.

Prerequisite: Pre-Education or Early Childhood Education or Secondary Education major.

BIOSC 1480 EMBRYOLOGY 3 cr.
This course looks at the different patterns of development explaining the intricate arrangements of adult structure. The accompanying developmental changes, undergone by different vertebrates from the fertilized egg to the complete organism, are investigated. Such information is essential because any deviations from usual patterns result in malformations.

Prerequisites: BIOSC 0180, BIOSC 0080. Corequisite: BIOSC 1490.
The embryological development of the frog, chick, and pig are intensively studied in microscopic preparations emphasizing the integration of temporal and spatial events with attention to homology and adaptation.

Corequisite: BIOSC 1480.

BIOSC 1500  CELL BIOLOGY  3 cr.

This course is devoted to a discussion of the current state of our understanding of cell structure and function. Eukaryotic cells will be emphasized with particular attention to animal cells. However, prokaryotic cells will be discussed for comparative purposes. It emphasizes the experimental basis for our understanding of cell biology and the relationship between structure and function. Most of the techniques to be considered will involve biochemical and molecular biological approaches used in the study of cell function. Assumes a familiarity with the principles of biochemistry covered in the prerequisites and will not repeat this material. Topics will include membranes, the nucleus, mitochondria and chloroplasts, the cytoskeleton, cell motility, growth and division, endocytosis and exocytosis, and selected topics on the cellular biological aspects of cancer and the immune system.

Prerequisites: BIOSC 0180, BIOSC 0080. Corequisite: BIOSC 1510.

BIOSC 1510  CELL BIOLOGY LABORATORY  1 cr.

Experimental methods course is designed to give upper division majors an opportunity to learn modern techniques used in cell biology research. Students will master the fundamentals of light microscopy (bright field, phase contrast, and dark field) and explore more advanced techniques such as fluorescence, confocal, video, and differential interference contrast microscopy. Students will isolate plasma membranes, mitochondria, nuclei, brush borders, and flagella and characterize these organelles by microscopy, enzyme assays and antibody labeling.

Corequisite: BIOSC 1500.

BIOSC 1535  SENSATION AND PERCEPTION  3 cr.

This course examines the physiological, psychological, and social-cognitive factors that contribute to sensation and perception. Topics include: vision, hearing, touch and pain, smell, taste, and perception of both external events or objects and internal states.

Prerequisites: BIOSC 0170 or PSY 0010.
A single topic each term is developed by student presentations of research articles from the original scientific literature, as chosen by the instructor. Possible topics might include genes encoding major developmental switch proteins, the cytoskeletal basis of morphological movements in development, or establishing and subdividing body axes in development.

*Prerequisites: BIOSC 1480 or BIOSC 1500 or BIOSC 1520.*
BIOSC 1580          BIOCHEMISTRY SEMINAR          1 cr.

A single topic each term is developed by student presentations of research articles from the original scientific literature, as chosen by the instructor. Recent topics have included biosynthesis of peptide hormones, recombinant DNA technology, processing of MMA precursors, protein folding with emphasis on the molecular biology and biochemistry of chaperonins, and protein translocation within cells.

Prerequisite: BIOSC 1000 or BIOSC 1810.

BIOSC 1760          IMMUNOLOGY          3 cr.

This course is an introduction to human immunology. Course deals with how the body recognizes and responds to foreign substances. Problems associated with the immune system are considered.

Prerequisites: BIOSC 0180, BIOSC 0080.

BIOSC 1810          MACROMOLECULAR STRUCTURE AND FUNCTION          3 cr.

This course is concerned primarily with the structure and functions of proteins and nucleic acids. These are large polymers where structure and function are determined by the sequence of monomeric units. Topics will include the physical and chemical properties of the monomer units (amino acids/nucleotides); the determination of the linear sequence of these units; the size, shape, and general properties of the biopolymers in aqueous systems; and the relation between structure and function, particularly in transport (hemoglobin) and in catalysis (enzymes).

Prerequisites: BIOSC 0180, BIOSC 0080; CHEM 0310, CHEM 0330.

BIOSC 1820          METABOLIC PATHWAYS AND REGULATION          3 cr.

The major topic will be intermediary metabolism—the pathways by which cells and organisms of all kinds synthesize and degrade carbohydrates, lipids, and nitrogenous compounds. Emphasis will be given to energetics of the reactions, descriptions of the reaction chemistry, and the means by which the reactions are regulated. Where possible, the enzymes involved will be examined in detail, particularly with respect to the nature of the active site and reaction mechanism.

Prerequisite: BIOSC 1810. Corequisite: BIOSC 1830.

BIOSC 1830          BIOCHEMISTRY LABORATORY          3 cr.

Introduces several basic experimental techniques of biochemistry including spectrophotometry, ion-exchange and gel-permeation chromatography, radio-chemical methods, gel electrophoresis, enzyme isolation, and nucleic acid purification. Lecture will concern the techniques under study.

Prerequisite: BIOSC 1810. Corequisite: BIOSC 1820.
BIOSC 1850  MICROBIOLOGY  3 cr.

Microorganisms are examined with respect to the structures they possess and functions they perform. In addition, both the beneficial and harmful effects that these micro–organisms have on humans, as well as, the clinical properties and commercial uses are covered.

Prerequisites: BIOSC 0180, BIOSC 0080. Corequisite: BIOSC 1860.

BIOSC 1860  MICROBIOLOGY LABORATORY  2 cr.

A large number of tests are used to isolate, characterize, and identify various strains of microorganisms. In addition, commercial uses of microorganisms are demonstrated, as well as the clinical properties of various microbial strains.

Corequisite: BIOSC 1850.

BIOSC 1870  ANIMAL PHYSIOLOGY  3 cr.

This course is a comprehensive study of the various physiological mechanisms employed by different animal groups in adapting to their environment.

Prerequisites: BIOSC 0180, BIOSC 0080. Corequisite: BIOSC 1875.

BIOSC 1875  ANIMAL PHYSIOLOGY LABORATORY  2 cr.

This course is a comprehensive study of the various physiological mechanisms employed by different animal groups in adapting to their environment.

Corequisite: BIOSC 1870.

BIOSC 1901  INDEPENDENT STUDY  1-6 cr.

Program of independent reading with individual tutorials on a topic chosen in consultation with the BIOSC faculty member who will supervise the program.

Note: Department Consent Required.

BIOSC 1902  DIRECTED STUDY  1-6 cr.

Directed study in a specific area of biological science.

Note: Department Consent Required.
BIOSC 1910  INTERNSHIP  1-6 cr.
Internship in the area of Biological Sciences.

   Note: Department Consent Required.

BIOSC 1915  LABORATORY INTERNSHIP 1  2 cr.
Currently offered as a laboratory assistantship for BIOSC 0070 and 0080. Primarily includes laboratory preparation, assisting students in laboratory, and some lecturing under supervision of laboratory instructor.

   Prerequisites: BIOSC 0180, BIOSC 0080. Note: Instructor Consent Required.

BIOSC 1916  LABORATORY INTERNSHIP 2  2 cr.
Continuation of the two-term laboratory internship. Primarily includes laboratory preparation, assisting students in laboratory, and some lecturing under supervision of the instructor.

   Prerequisites: BIOSC 0180, BIOSC 0080. Note: Instructor Consent Required.

BIOSC 1940  MOLECULAR BIOLOGY  3 cr.
Examines the molecular basis of life processes, with a primary emphasis on genes (what they are, what they do, how they determine the properties of an organism). Topics covered will include replication of DNA, transcription of DNA into RNA, and translation of RNA into protein. Much of the course will be concerned with how these processes are regulated in response to changes in the environment and how this regulation relates to the observed properties and behavior of the organism.


BIOSC 1950  MOLECULAR GENETICS LABORATORY  2 cr.
Discusses the theories and methodologies that have recently emerged as the central theme of modern molecular genetics. Lectures will emphasize descriptions and applications of techniques such as molecular cloning, restriction site mapping, in vitro mutagenesis, the polymerase chain reaction and DNA sequence analysis that have led to the recent explosion in knowledge about chromosome organization, gene structure, and the regulation of gene expression. Laboratory sessions will emphasize polymerase chain reaction, agarose gel electrophoresis, cloning DNA fragments, bacterial transformation, restriction analysis, and the Sanger method of sequencing DNA.

   Corequisite: BIOSC 1940.
BIOSC 1962  UNDERGRADUATE RESEARCH  3 cr.

Topics covered in this class include preparing a research paper, preliminary and final drafts of a research paper, and presenting a research paper.

Prerequisites: 2nd semester Junior; PLAN: Biological Science major.

BIOSC 1963  INDEPENDENT STUDY  3 cr.

This course will focus on projects that fall within the research interest of the supervising faculty member. Literature searching and review, solution preparation, laboratory safety training and experimental activity (including a final research report and presentation) will be contained in this course, which is offered as a two-term, individually-advised course.

Prerequisites: 2nd semester Junior with an overall GPA of at least 3.0; PLAN: Biological Science Major. Note: Instructor Consent Required.

BIOSC 1999  MEDICAL MICROBIOLOGY  3 cr.

This is an advanced level lecture course educating students in the microbial aspects of human infectious diseases. Students will learn about the microbial basis of infection, the host response, and the nature of specific infections within the human body. The course also will present approaches for the diagnosis of infections and strategies for disease control. The topics of medical microbiology will be presented in a system-based rather than an organism-based approach.

Prerequisite: BIOSC 1850.