

BIO-Biological Science

BIO103 - Contemporary Issues in Biology

An introduction to biology for non-science majors, with an emphasis on current socio-biological problems. Issues such as genetic engineering, health and disease, evolution, behavior, biodiversity and others will be discussed, along with their underlying biological principles. The course will address the social, political, economic and ethical impact of biology on society, with and allow individuals to be better informed about how biology affects their daily lives.

BIO112 - Biology of Sexually Transmitted Diseases

A comprehensive review of the biology of sexually transmitted diseases. The course will cover the principles of disease and epidemiology, the biology and ecology of the microbial agents that cause STDs, the host response to disease, treatments, and preventative measures.

BIO117 - Introduction to Human Biology

This course is intended as an introduction to the human body systems and the disease states associated with these systems. Students will be introduced to each of the body's systems through a description of the structures that make up the organ system followed by a rudimentary explanation of its physiology and examples of diseases associated with that system. Emphases will be placed on homeostasis and the interrelatedness of the body systems.

BIO120 - General Zoology

A comprehensive survey of the animal kingdom, the course places an emphasis on evolutionary relationships and the interrelationships of animals with their environments. Laboratory study of representative members of the major phyla is included.

BIO125 - General Botany

This course is a survey of form and function of the major plant groups as well as the bacteria, algae, water molds, slime molds and fungi within the overall framework of a modern phylogenetic system of classification.

BIO126 - Introductory Microbiology Online

This course provides a completely online lecture and laboratory introducing the study of the prokaryotic and eukaryotic world of microorganisms. The medically important concepts of microbiology including microbial control, principles of infectious disease, disease prevention and control will be presented.

BIO130 - Biological Illustration: Form and Function

An introductory course in biology and drawing with an emphasis on the relationship between form and function. Working with plants and animals, and using a combination of macroscopic and microscopic specimens, students will focus on the careful observation and interpretation of biological forms. Drawing instruction will focus on a variety of techniques commonly used in the biological sciences. Biology instruction will introduce students to basic scientific methodology, the diversity of living forms, the variety of ecological strategies related to those forms and their scientific classification.

BIO201 - Survey of Biotechnology

A survey of the scientific principles, research methods, commercial applications, societal impacts, and business environment that impact and define the operation of biotechnology and pharmaceutical companies. Students will learn how genes, proteins and cells work, how biotechnologists study and manipulate living organisms, and how those methods are used to solve problems and create products in medicine, agriculture, industry, criminal justice and the environment. Students will examine ethical, social and economic issues affecting the use of biotechnologies, and the business and regulatory environment in which biotechnology companies operate. The course gives a detailed industry overview relevant to science, engineering, computer science,

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information management, and business majors considering technical or business careers in biotechnology and pharmaceutical companies or any student interesting in biotechnology's impact on the human condition.

BIO210 - Anatomy and Physiology of Domestic Animals I

This course begins to cover the fundamentals of comparative anatomy and physiology of domestic animals. An emphasis is placed on understanding anatomical terms of position and direction, histology, the integumentary system, the nervous system, the skeletal system, and the cardiovascular system.

BIO215 - Introduction to Cellular and Molecular Biology

This course is designed to introduce the student to the basic concepts of cell chemistry and biology as well as introduce the concepts and skills of molecular biology. It will cover topics such as cellular organization in both prokaryotic and eukaryotic cells including subcellular structures, metabolism, and genome organization. It will explore Mendelian and molecular genetics and gene expression. The lab portion will consist of exercises and experiments designed to demonstrate these topics.

BIO218 - Genetics

Genetics plays an important role in all aspects of biology, acting on molecules, cells, organisms and populations. Genetic analysis also provides a powerful approach to address biological questions, and its methodologies are employed in fields as diverse as biotechnology, forensics, medicine and conservation. This course introduces students to the principles of classical and molecular genetics. Emphasis is placed on understanding the basic concepts of genetics and on using genetic analysis to study biological problems, developing analytical and problemsolving skills. BIO 218 will provide students with a strong background in genetics, which will be useful for those interested in pursuing a career in the life sciences, conservation and population biology, health sciences, biotechnology or medical professions.

BIO220 - Anatomy and Physiology of Domestic Animals II

This course covers the fundamentals of comparative anatomy and physiology of domestic animals. An emphasis is placed on understanding the circulatory system, lymphatic system, respiratory system, the basic structure of the peripheral and autonomic nervous systems, sensory receptors and special sense organs, the endocrine system, digestive system, urinary system, and reproductive system.

BIO226 - Basic Microbiology

This course provides a survey of the prokaryotic and eukaryotic world of microorganisms. The medically important concepts of microbiology including microbial control, acquisition of disease, disease prevention and control will be presented.

BIO230 - Anatomy and Physiology I

This course is a general survey of the basic anatomical terms of position and direction, relevant scientific units, chemical components of living organisms, homeostasis, animal cytology, histology, the integumentary system, rudiments of neurology, the skeletal system, and the cardiovascular system.

BIO232 - Fundamentals of Biological Anthropology

A course for both majors and non-majors to introduce students to the field of biological anthropology, including the study of evolutionary theory, modern human populations, the behavior and ecology of nonhuman primates, and the primate (human and non-human) fossil record. Special emphasis will be directed toward human form and behavior as a result of the complex interplay of biology and culture acting over millions of years of evolutionary change.

BIO248 - General Ecology

Ecology presents the biology or environmental science student with a holistic approach to the study of the biological environment. Emphasis is on the natural environments of organisms, particularly as biotic assemblages of these organisms interact with their environments from the concrete levels of organization up to the regional and biome levels.

BIO260 - Anatomy and Physiology II

This course is a general survey of the basic structure of the peripheral and autonomic nervous systems, sensory receptors and special sense organs, the endocrine system, the cardiovascular system, the lymphatic system, the respiratory system, the digestive system, the urinary system, the reproductive system, human embryonic development, and metabolism.

BIO266 - Cell and Tissue Culture

The course allows students to control the conditions required for the survival and proliferation of mammalian cells. Students will perform cell culture maintenance techniques, such as enzymatic tissue dissociation, hemocytometer cell counts and viability studies. They will also learn techniques for the detection and treatment of contamination, and for the cryopreservation of cultures cells.

BIO305 - Comparative Vertebrate Anatomy

A comparative study of the vertebrate organs and organ systems of animals in the phylum chordata, this course places emphasis on evolutionary changes.

BIO306 - Human Anatomy

A study of the structure of the human body, this course includes discussion of the 11 fundamental systems.

Each system is described in terms of its gross anatomy, with some discussion of histology and physiology where appropriate.

BIO307 - Plant Anatomy

A detailed study of the form and function of the various cell and tissue types found in higher plants, this course also surveys how scientific knowledge of plant anatomy is applied within a diverse range of fields, including ecology, forensic science, archeology, climatology, the arts and engineering.

BIO320 - Molecular Biology

Molecular Biology is a field of biology that studies biological processes in cells and organisms at a molecular level. It is also a term used to describe techniques for isolating and studying biological molecules, and these approaches are widely used in research labs around the world, as well as in biotechnology, clinical analysis, and drug development. This course covers the structure, formation and function of DNA, RNA, and proteins, focusing on how genomic information is organized and maintained, and how genes are regulated and expressed.

Emphasis is placed on the techniques that are used to study biological molecules. The course provides students with hands-on experience in key molecular biology procedures, experimental design, and data analysis.

BIO322 - Methods in DNA Analysis

This course will cover the key principles of DNA analysis methods, from detecting basic sequence variation to manipulating genomes, and how these techniques are employed in fields as diverse as biotechnology, forensics, medicine, agriculture and conservation. Students will learn to apply these techniques in the laboratory to address scientific questions. Techniques covered will include nucleic acid purification, DNA restriction digestion and

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analysis, gel electrophoresis and gel-shift assays, in situ hybridization, polymerase chain reaction (PCR) and qPCR, transformation, CRISPR and DNA mutagenesis, and DNA sequencing and sequence analysis.

BIO325 - Animal Histology

This course is a study of cellular differentiations in tissue, tissue identification and special functions, especially in the mammals.

BIO326 - General Microbiology

A detailed study of bacteria and viruses, this course also places some emphasis on fungi, algae and protozoans. Special emphasis is given to medical aspects of bacteriology, immunology and virology. The cytology, physiology, microbiology and culture of microbes are pursued in the laboratory.

BIO327 - Parasitology

A comprehensive review of the biology of parasites and their interactions with their hosts and vectors. The course will cover principles of disease and epidemiology, the biology and ecology of the eukaryotic parasites causing disease in animals, the host response to infection, treatments, and preventive measures.

BIO328 - Human Physiology

The functions of the human body are covered. Basic physiological phenomena are studied with considerable emphasis on clinical and practical application.

BIO335 - Plant Physiology

This course will examine and explore the link between the form and function in plants. Plant Physiologists are people interested in learning about what plants do, and what chemical and physical factors cause plants

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to respond as they do in their environment. This course will explore several important processes which allow plants to survive in their environment and we will examine the ecological implications of the physiological processes under investigation. We will primarily examine this relationship at the whole organism level. Laboratory experiments will reinforce the lecture topics.

BIO336 - Plant Taxonomy

A study of relationships among the vascular plants, their classification and methods of identification. Plant families native to Western Pennsylvania are stressed.

BIO337 - Ornithology

The study of bird life, this course covers classification, anatomy, ecology, behavior and recognition of birds, with emphasis on local species and their relationships to people and the ecological balance with other organisms.

Please note: This course requires an earlier start time for 5 outdoor LAB trips which may begin as early as 5:30 AM.

BIO400 - Mammalogy

This course will provide an overview of the Class Mammalia. The lecture portion of the course will cover the evolution and classification of mammals, some basic physiology and behavior, and the ecology and conservation of mammals around the world. The lab portion of the class will involve a more in-depth study of mammal identification, focusing on the mammals of Pennsylvania.

BIO407 - Mycology

A detailed examination of mushrooms, molds, and human mycoses, including an introduction to fungal ecology and assessment of fungal classification, as well as molecular systematics and an overview of medical significance. The course utilizes hands-on, student-driven, inquiry-based practices. Students will use scientific

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processes and procedures, data analysis, and research tools to investigate fungal morphogenesis, molecular diagnostics, culture techniques, ecological relationships, and human pathogenesis.

BIO410 - Developmental Biology

This course provides an introduction to developmental biology. It will explore different modes of embryogenesis in invertebrates and vertebrates and examine the cellular and molecular mechanisms of animal development using a variety of model organisms and experimental techniques. Emphasis will be placed on the connection between development and disease, between developmental biology and evolution, and on the experimental approaches that have been used to shed light on developmental mechanisms. Current issues surrounding developmental biology, such as stem cells and reproductive technology, will also be discussed.

BIO414 - Plant Ecology

A consideration of the plant communities (and associated populations) which are influenced by both biotic and physical factors. The emphasis in this course is on the vegetation of Pennsylvania and the broader region.

Laboratory work provides the student with the opportunity to become familiar with modern methods of vegetation analysis and community sampling.

BIO418 - Biological Research Investigations

This course is intended for advanced undergraduate students who wish to develop an independent research project within the biological and environmental sciences. Emphasis is placed on the use of various scientific instruments and biological procedures necessary for research investigations. Each research project is unique, and the data collected should ultimately be presented and or published.

BIO425 - Neurobiology

An examination of the structure and function of the nervous system. The course is designed to develop a detailed understanding of the nervous system structure and function from the molecular level to the level of complex circuits such as learning and memory. While the primary emphasis is the human nervous system, a central theme is the comparison of the neurological circuits across phyla to identify basic organizational principles.

BIO433 - Herpetology

A consideration of the amphibia and reptilia from taxonomical, morphological, evolutionary, behavioral and physiological viewpoints, this course emphasizes ecological relationships.

BIO435 - Ichthyology

An introduction to the morphology, taxonomy, ecology and distribution of the major groups of freshwater fishes, this course emphasizes the northeastern U.S. fauna.

BIO441 - Ethology

Ethology examines animal behavior within the framework of evolutionary biology, using the comparative methods (in both lecture and the laboratory) to examine similarities and differences in ecology, anatomy and physiology, genetics, and development patterns.

BIO442 - Forest Ecology & Dendrology

A study of the forest and its ecology and management, this course includes the identification of the major woody plants, their growth, structure and natural history. An emphasis is given to the forest communities and tree and shrub species common to the eastern United States.

BIO445 - Entomology

A specialized study of insects, this course covers identification and classification, development phases, physiological characteristics, economic importance, and disease vectors.

BIO450 - Immunology

A detailed study of the immune system of animals, this course covers nonspecific and specific host responses to foreign materials, the interaction between cells of the specific immune response, the nature and diversity of the immune response, the practical applications of the immune response, and disorders associated with the immune response.

BIO455 - Biology of Cancer

This course encompasses the cellular and molecular biology of cancer, providing a fundamental understanding of contemporary cancer research on the characterization, prevention and treatment of the disease.

BIO460 - Pathophysiology

This course introduces students to understanding how the body responds to diseases resulting from homeostatic imbalances. After completing this course, students will understand how a loss of homeostasis results in pathologies, how pathophysiological changes in the body progress, and how the body responds to those changes both at a local and systemic level. Topics include diseases and disorders related to cells and cell proliferation, as well as the nervous, endocrine, cardiovascular, respiratory, digestive, urogenital, and muscular systems.

BIO478 - Evolution

An advanced, writing intensive course, that examines the mechanisms resulting in biological evolution. Emphasis is placed on how these mechanisms operate at a variety of levels, from individual genes to distantly related

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species, and thereby produce the diversity of life observed on earth. The origin of life, speciation and hominid evolution are also studied in detail.

BIO480 - Cell Biology

This course studies the biology of the cell, with emphasis on the relationship of structure and function within the cell. It is a study of cell organelles, growth, division, macromolecules, membranes, synthesis and regulation.

BIO486 - Comparative Animal Physiology

A comparative approach to the study of physiological systems in the kingdom Animalia. Emphasis is on vertebrate organisms, but invertebrate examples are used where appropriate.

BIO488 - Water Pollution Biology

The purpose of this course is to convey a broad understanding of our freshwater aquatic ecosystems and the effects of the various types of environmental pollutants on these systems. We will review the basic concepts of limnology, freshwater ecology and freshwater biology covering both lotic and lentic systems with application to water quality, pollution, and aquatic system management and restoration. Aquatic system response will be analyzed in a lecture/laboratory format.

BIO492 - Biological and Environmental Science Internship

Student interns are placed with an organization or institution which most nearly approximates their goals for employment. The intent of the internship is to provide students with practical work experience in an environment in which they will be dealing with practical problems requiring real solutions in a relatively short time frame.