

BIO - BIOLOGY

BIO 100 Biological Sciences

Students in this course will explore the following aspects of biology: the organization of life, the development of living organisms, the transmission of traits, evolution, behavior and ecology. This course is intended for the non-science degrees. BIO 100 should not be taken in conjunction with BIO 110 or BIO 111.

Upon successful completion of this course, students should be able to:

Analyze the characteristics of life as currently understood.

Relate the life characteristics to the simplest level of existence: the single cell.

Explain various patterns of reproduction among plants and animals.

Evaluate various techniques of population control.

Explore the mechanism by which traits are transmitted from parent to offspring.

Summarize the causes and effects of various types of mutations.

Trace the history of the modern concept of evolution.

Survey the system of classification of plants and animals.

Interpret behavior as an illustration of the modern concept of evolution.

Relate the sources and the effects of pollutants to the quality of the environment.

Demonstrate an understanding of laboratory experiments as they relate to the biological concepts presented in the above competencies.

College Academic Learning Goal Designation: Scientific Reasoning (SI)

Prerequisite: Successful Placement Test Scores or (ENG 050 and REA 050) or ENG 099* or REA 075 (*may be taken concurrently).

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 102 Humans and the Environment

This course provides an introduction to the study of the design of the natural world and interactions between humans and their environment.

It includes an investigation of the impact of human activities on biodiversity, natural resources, availability of energy and contamination of the environment. The scientific, economic and social issues that contribute to environmental problems are also examined. Sustainability principles, policies, and programs are explored on the local, national and global level. This course is an elective designed for non-science majors.

Upon successful completion of this course, students should be able to:

Describe the components of the natural world and analyze their relationships with each other.

Describe the population dynamics of different species, excluding humans in the biosphere.

Explain the effects that human activities have on Earth's capacity to sustain biodiversity and natural resources.

Describe the relationship between human population dynamics and environmental change.

Analyze the energy alternatives available to meet the demands of the human population on the world's natural resources.

Identify local, national, global policies that impact the sustainability of natural resources and biodiversity.

Identify sustainable practices that can help mitigate global environmental problems.

Describe the effect of economic development and conflict on environmental impact.

Demonstrate the necessary laboratory skills to measure and analyze environmental parameters.

Demonstrate an understanding of laboratory experiments as they relate to ecological concepts.

College Academic Learning Goal Designation: Global Understanding (GU), Scientific Reasoning (SI)

Prerequisite: Successful Placement Test Scores or (ENG 050 and REA 050) or ENG 099* or REA 075 (*may be taken concurrently).

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 110 General Biology I

General Biology I is designed for majors in biology, natural science and related fields. This course introduces students to the general principles of biology, emphasizing cell structure and function, molecular biology, genetics, and evolution. Students are expected to develop skills in utilizing the scientific method as a tool for problem solving.

Upon successful completion of this course, students should be able to:

Utilize the scientific method to solve problems.

Describe the chemical structure of biological molecules.

Relate molecular structure to biological function.

Describe prokaryotic and eukaryotic cell structure.

Relate cellular structure to cell function.

Explain the processes by which living systems convert solar energy to usable chemical energy.

Identify the role of genetic material in transmission of traits from generation to generation.

Relate variability in the transmission of genetic material to biological evolution.

Critique current theories on the origin of life on Earth.

Access, interpret, and evaluate peer-reviewed primary scientific literature.

Demonstrate an ability to utilize modern biology laboratory skills.

Demonstrate an ability to apply biological concepts to one's life.

College Academic Learning Goal Designation: Scientific Reasoning (SI)

Prerequisites: MAT 050 and (REA 050 or ENG 099* or REA 075).

Successful College Placement Test Scores may be accepted. *(Courses may be taken concurrently)

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 111 General Biology II

General Biology II is designed for majors in biology, natural science, and related fields. This course focuses on the structure, function, and diversity of organisms with an emphasis on their evolutionary and ecological relationships.

Upon successful completion of this course, students should be able to:

Relate taxonomic classification to biological evolution.

Describe patterns and processes of embryological development in animals.

Relate structure to function in animal organ systems.

Relate reproductive patterns to classification of the major phyla of plants.

Characterize the features of selected organisms in the Kingdom Fungi.

Demonstrate the polyphyletic nature of the Kingdom Protista.

Characterize the evolutionary and ecological significance of bacteria.

Discuss the impact of viruses on organisms.

Interpret the ecological significance of organisms within various taxa.

Access, interpret, and evaluate peer-reviewed primary scientific literature.

Demonstrate an ability to utilize modern biology laboratory skills.

Prerequisites: BIO 110.

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 115 Field Ecology

Field Ecology is designed primarily for majors in biology, natural science, and related fields, yet is open to students of all majors. This course introduces students to the general principles of field ecology pertaining to terrestrial, aquatic, and marine habitats. Emphasis will be placed upon regional conservation issues, biodiversity concepts, plant and animal interactions and adaptations, effects of human disturbance on native flora and fauna, and field research techniques. Students are expected to develop and apply skills in field research and in utilizing the scientific method.

Upon successful completion of this course, students should be able to:

Apply the scientific method to test hypotheses.

Develop and apply skills used to identify, survey, and study plants and animals in a field setting.

Describe local, regional, and global trends in biodiversity.

Describe the processes and mechanisms that may affect biodiversity at local, regional, and global scales.

Develop an appreciation of the ecological and economic value of biologically diverse habitats.

Develop an appreciation of the value of diverse perspectives in a multicultural setting.

Prerequisites: MAT 050 and ((ENG 050 and REA 050) or ENG 099* or REA 075). Successful College Placement Test Scores may be accepted.

*(Courses may be taken concurrently)

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 150 Human Anatomy and Physiology I

The first course in a two-semester sequence that covers the basic structure and function of the human body using a systems approach. Major topics covered include biological chemistry, cell biology, histology, integumentary system, skeletal system, muscular system, and nervous system. Laboratory work includes dissection, microscopy, models, and experimental demonstration of concepts covered in class. Dissection of preserved animal specimens is required. This course is designed primarily for students majoring in nursing or allied health fields. NOTE: BIO 110 (Introductory Biology I) is suggested, but not required, before enrolling in Human Anatomy & Physiology I.

Upon successful completion of this course, students should be able to:
Demonstrate the correct usage of basic anatomical terminology.
Describe how the body uses feedback systems to maintain homeostasis.
Apply basic chemical concepts to the study of human physiology.
Compare the major organic molecules found in the human body and describe their functions.
Relate cell ultrastructure to the various functions performed by the cell.
Compare the major tissues found in the human body and relate their structure and location to specific functions.
Describe how the structure of the skin contributes to its function.
Describe the organization and function of the skeletal system.
Categorize joints according to their structure and function.
Analyze the ultrastructure of skeletal muscle and explain the mechanism of muscle contraction.
Demonstrate an understanding of the physiology of nerve impulse generation and propagation.
Analyze the structure and function of the spinal cord and spinal nerves.
Analyze the structure and function of the brain and cranial nerves.
Demonstrate an understanding of how the autonomic nervous system functions to maintain homeostasis.
Relate the structure and location of the various sensory receptors to the perception of specific sensations.
Demonstrate an ability to perform modern laboratory skills, including dissection and microscopy.
Collect and analyze experimental data, formulate appropriate conclusions, and compile lab reports.
Apply concepts learned in this course to one's personal health.

College Academic Learning Goal Designation: Scientific Reasoning (SI)

Prerequisite: Successful Placement Tests or MAT 050 and ENG 100*, BIO 110 recommended. *May be taken concurrently.

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 151 Human Anatomy and Physiology II

The second course in a two-semester sequence that covers the basic structure and function of the human body using a systems approach. Major topics covered include the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary, and reproductive systems along with immunity, metabolism, and fluid, electrolyte, and acid-base homeostasis. Laboratory work involves dissection, microscopy, models, and experimental demonstration of concepts covered during class. Dissection of preserved animal specimens is required. This course is designed primarily for students majoring in nursing or allied health fields.

Upon successful completion of this course, students should be able to:
Evaluate the role of hormones in regulating body functions.
Categorize the components of the blood and describe their functions.
Demonstrate an understanding of cardiac anatomy and physiology.
Relate the structure of the blood vessels to the hemodynamics of blood flow.
Examine the structure and function of the lymphatic system.
Analyze how the immune system functions to defend the body against disease.
Demonstrate an understanding of respiratory anatomy and physiology.
Demonstrate an understanding of digestive anatomy and physiology.
Analyze how major metabolic pathways are used by the body.
Examine the role of the urinary system in maintaining homeostasis.
Assess the body's ability to maintain fluid, electrolyte, and acid-base homeostasis.
Relate the structure of the male reproductive system to its function.
Relate the structure of the female reproductive system to its function.
Demonstrate an understanding of conception, pregnancy, embryonic and fetal development, including an introduction to human inheritance.
Demonstrate an ability to perform modern laboratory skills, including dissection and microscopy.
Collect and analyze experimental data, formulate appropriate conclusions, and compile lab reports.
Prerequisites: BIO 150 with grade of C or better.

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 200 General Zoology

A hands on survey of the animal kingdom, with emphasis on evolutionary relationships, form and function, and interactions of animals with their environments. NOTE Pre-Req BIO 111 is recommended but not required.

Upon successful completion of this course, students should be able to:
Integrate evolutionary theory into the study of the phylogeny of animals.
Distinguish, by comparative biology, the major groups of animals.
List and describe the distinguishing characteristics of the Kingdom Animalia, including a comparison of the phyla Porifera, Cnidaria, Platyhelminthes, Nematoda, Mollusca, Annelida, Arthropoda, Echinodermata, and Chordata.
Describe the characteristics, comparative biology, and evolutionary relationships of extant vertebrate classes.
Describe the physiology of organisms in each of the major phyletic groups.
Demonstrate the skills required of microscopic examination of animal tissues/specimens and gross animal dissection.
Access, interpret, and evaluate peer-reviewed, primary literature in the zoological sciences.

Prerequisites: BIO 110; BIO 111 recommended.

4 Credits3 Weekly Lecture Hours

2 Weekly Lab Hours

BIO 210 General Botany

A survey of the major plant groups with an emphasis on basic structure, function, reproductive patterns, biological contributions, development and evolutionary relationships within each group. NOTE Pre-Req BIO 111 is recommended but not required.

Upon successful completion of this course, students should be able to:

Describe basic comparative plant anatomy, morphology, and physiology.

Describe and recognize the distinguishing characteristics of diverse groups within the Plant Kingdom including bryophytes, ferns and fern allies, gymnosperms, and angiosperms.

Discuss the major evolutionary advances in plant form and function.

Describe life cycles of representative algae, bryophytes, ferns and fern allies, gymnosperms and angiosperms and relate to major evolutionary advances in plants and related organisms.

Explain the importance of botany as a past, present, and future science.

Describe concepts and theory pertaining to modern plant ecology.

Demonstrate laboratory and field skills required of examination and identification of plant tissues and specimens.

Access, interpret and evaluate peer-reviewed, primary scientific literature.

Prerequisites: BIO 110; BIO 111 recommended.

4 Credits3 Weekly Lecture Hours**2 Weekly Lab Hours****BIO 220 Nutrition and Well Being**

This is a one semester course covering the basic principles of human nutrition and their application to the maintenance of lifelong health and well-being. It is designed to fulfill the requirements of certain allied health and nursing programs, and so is taught by a dietitian/nutritionist licensed by the Commonwealth of Pennsylvania. Essential dietary requirements are introduced along with digestive anatomy and physiology. Food sources, chemistry, and digestion of proteins, carbohydrates and fats are discussed. Recommended vitamin and mineral intakes are covered, including the detrimental effects of deficient or toxic intakes. Energy balance issues and clinical problems associated with poor nutrition are considered. Students are required to complete an online nutritional assessment of their daily nutrient intake.

Upon successful completion of this course, students should be able to:

Analyze the nutrient requirements for a healthy, balanced nutrition style.

Perform and interpret an electronic nutritional analysis.

Relate basic nutrients to various established dietary guidelines.

Interpret the effects of nutrient deficiencies and megadoses.

Demonstrate understanding of energy balance and problems associated with energy balance.

Recognize conditions and diseases which can place patients/clients at nutrition risks.

Prerequisites: BIO 111 or BIO 151.

3 Credits3 Weekly Lecture Hours**BIO 230 Introduction to Microbiology**

Introduction to Microbiology is designed to examine the biology of microorganisms and their significance to human existence. Cellular structures, metabolic pathways and life strategies will be studied. The roles of microorganisms in disease, genetic engineering, and the environment will also be covered. The course is designed for students in the Science for the Health Professions curriculum.

Upon successful completion of this course, students should be able to:

Examine the evolutionary relationships between microorganisms and macroorganisms.

Describe the cellular biology of single-celled organisms.

Analyze the impact of microorganisms on humans.

Analyze the life strategies of various bacterial cells.

Apply the standard techniques for the study of microorganisms in the laboratory.

Apply the standard laboratory skills to identify unknown bacteria.

Describe the properties of the genetic material in bacteria and viruses.

Explain the role of microorganisms in genetic engineering.

Examine the role of microorganisms in disease.

Describe the various strategies used for control of infectious disease.

Prerequisites: (BIO 110 and CHE 110) or (BIO 150 and BIO 151).

4 Credits3 Weekly Lecture Hours**2 Weekly Lab Hours****BIO 240 General Microbiology**

General Microbiology is intended for Mathematics, Natural Science majors. This course will provide an introduction to the basic concept of microbial evolution, physiology, ecology, genetics and pathogenesis. This course meets the competencies outlined in the Pennsylvania state-wide articulation agreement for preparation in Microbiology.

Upon successful completion of this course, students should be able to:

Describe the characteristics and classifications of various groups of microbes, including bacteria, archaea, protists, fungi, helminthes, prions, viruses and vitoids.

Describe the structure and function of the cellular structure of prokaryotes and eukaryotes.

Describe the metabolic pathways utilized by prokaryotes including glycolytic pathways, fermentation, respiration, and photosynthesis.

Describe methods of prokaryotic reproduction and interpret a bacterial growth curve.

Describe gene expression, regulation and transfer in prokaryotes.

Explain strategies of viral infection and replication.

Explain the major steps in the evolution of life on Earth.

Describe the symbiotic relationships the microbes have with other organisms, including mutualism, parasitism and commensalism.

Explain the role of microbes in biogeochemical cycles and the production of commercially and medically important materials.

Examine the role of microorganisms in disease.

Access, interpret and evaluate peer-reviewed primary scientific literature.

Demonstrate safe laboratory practices and competency in the use of aseptic procedures for the safe handling of live microbes.

Use laboratory techniques to identify an "unknown" organism.

Apply standard techniques used for the study of microorganisms in the laboratory.

Prerequisites: BIO 110 and CHE 110.

4 Credits3 Weekly Lecture Hours**3 Weekly Lab Hours**

BIO 250 Genetics

Genetics examines how molecular information relates to the appearance and behavior of living things and how this information is transferred from one organism to another. Course topics include Mendelian genetics, DNA replication, gene expression, chromosomal structure, population genetics, evolution, and current laboratory techniques used to study genetic material and heredity in living organisms. This course meets the competencies outlined in the Pennsylvania Statewide Program-to-Program Articulation Agreement in Biology for preparation in Genetics and is designed for Mathematics-Natural Sciences (MNS) students.

Upon successful completion of this course, students should be able to:

Relate the principles of Mendelian genetics to the underlying molecular mechanisms of inheritance.

Apply the principles of Mendelian genetics to genetic crosses.

Describe how the nucleic acid sequences (genotype) relates to the physical characteristics and abilities of an organism (phenotype).

Examine the processes of DNA replication, mitosis, and meiosis and how these processes result in genetic variation between organisms.

Describe the structure of chromosomes and how genetic information of organisms is packaged.

Relate genetic principles to the process of evolution.

Describe and apply current genetic models of inheritance in populations.

Examine modern genetic and genomic techniques, analysis, and manipulation.

Apply standard laboratory techniques used in genetics, including production and analysis of genetic crosses, microscopic study of chromosomes, DNA isolation, electrophoresis, handling and genetic analysis of microbes, restriction digests, and bacterial transformation.

Design, conduct, and evaluate a genetic cross.

Prerequisites: BIO 110 and CHE 110 and (MAT 151 or MAT 152 or MAT 160 or MAT 161 or MAT 200 or MAT 210 or MAT 230 or MAT 260 or MAT 261).

4 Credits3 Weekly Lecture Hours

3 Weekly Lab Hours