

Biology (BIO) Courses

BIO1011 General Biology - Cellular

This course provides an introduction to the structure, function and genetics of living organisms. It is designed to be a first course for biology majors and to provide a foundation for more advanced courses in the biological sciences. Topics include the chemistry of biological molecules, cell structure and function, photosynthesis and cellular respiration, the cell cycle, mitosis, meiosis and sexual reproduction, and genetics. This course is taken concurrently with General Biology Laboratory - Cellular.

Prerequisite(s): Corequisite: BIO1016.

Offered at Charlotte, Providence, Providence CE

3 Semester Credits

BIO1016 General Biology Laboratory - Cellular

This is a laboratory companion course coordinated with BIO1011 that introduces students to techniques and equipment used in experimental biology. Students take an inquiry-based, self-guided learning approach to the discovery of cell structure and function, photosynthesis and cellular respiration, the cell cycle, and genetics. Additionally, this laboratory course provides students with the opportunity to practice laboratory safety, design experimental procedures, collect data, analyze results and discuss conclusions.

Prerequisite(s): Corequisite: BIO1011.

Offered at Charlotte, Providence, Providence CE

1 Semester Credit

BIO1022 General Biology - Organismal

This course provides an introduction to evolution, the diversity of life on earth, plant and animal form, function, growth, development and reproduction, ecology and ecosystems. This course is taken concurrently with General Biology Laboratory - Organismal.

Prerequisite(s): Corequisite: BIO1026.

Offered at Charlotte, Providence, Providence CE

3 Semester Credits

BIO1026 General Biology Laboratory - Organismal

This is a laboratory companion course coordinated with BIO1022 that introduces students to techniques and equipment used in experimental biology. Students take an inquiry-based, self-guided learning approach to the discovery of the mechanisms of evolution, plant and animal development, and growth, ecology and ecosystems. Additionally, this laboratory course provides students with the opportunity to practice laboratory safety, design experimental procedures, collect data, analyze results and discuss conclusions.

Prerequisite(s): Corequisite: BIO1022.

Offered at Charlotte, Providence, Providence CE

1 Semester Credit

BIO2001 Genetics

This course provides students with the knowledge and analytical skills necessary to understand the principles of modern genetics. The nature of genes, genomes and chromosomes; mechanisms of recombination and mutation; Mendelian inheritance patterns; and genetic mechanisms underlying evolution are studied. Genetic studies performed on model organisms (such as bacteria, yeast and mold) are discussed to illustrate and reinforce genetic principles relating to human genetics and diseases.

Prerequisite(s): BIO1011, BIO1016, BIO1022, BIO1026.

Offered at Providence, Providence CE

3 Semester Credits

BIO2021 Functional Human Anatomy

This course studies the functional anatomy of the human organism organized by body systems. The lecture portion explores structural and functional relationships in the human body. The microscopic and macroscopic structure of human tissues, organs and organ systems are examined with applications to health, wellness and disease states. Functional Human Anatomy (lecture and laboratory) is designed to meet prerequisites for graduate programs in the health sciences.

Prerequisite(s): BIO1022 and BIO1026, or SCI1015, Corequisite: BIO2026.

Offered at Charlotte, Providence, Providence CE

3 Semester Credits

BIO2026 Functional Human Anatomy Laboratory

This course explores the anatomical structure of the human body through the use of anatomical models, dissection of mammalian specimens and examination of prosected human cadavers. A regional/functional perspective is combined with a systemic overview of body systems. Functional Human Anatomy (lecture and laboratory) is designed to meet prerequisites for graduate programs in the health sciences.

Prerequisite(s): BIO1022 and BIO1026, or SCI1015, Corequisite: BIO2021.

Offered at Charlotte, Providence, Providence CE

1 Semester Credit

BIO2041 Human Physiology

This course examines the molecular, cellular and tissue-level processes involved in the function of human organ systems. Emphasis is on maintenance of internal homeostasis, organ system integration and components of human disease. Concurrent enrollment in BIO2046 Human Physiology Laboratory is required. Human Physiology (lecture and laboratory) is designed to meet prerequisites for graduate programs in the health sciences.

Prerequisite(s): BIO1011 and BIO1016, or SCI1015, CHM1022 and CHM1026 or CHM1000 and CHM1006, Corequisite: BIO2046.

Offered at Charlotte, Providence, Providence CE

3 Semester Credits

BIO2046 Human Physiology Laboratory

This laboratory course allows students to collect, analyze and apply data to examine and understand human physiologic processes. Activities include experiments, computer simulations and measurement of physiologic activity in human subjects. Equipment commonly found in a medical setting is used. Human Physiology (lecture and laboratory) is designed to meet prerequisites for graduate programs in the health sciences.

Prerequisite(s): BIO1011 and BIO1016, or SCI1015, CHM1022 and CHM1026 or CHM1000 and CHM1006, Corequisite: BIO2041.

Offered at Charlotte, Providence, Providence CE

1 Semester Credit

BIO2201 General Microbiology

This course introduces the basic morphological, physiological and genetic aspects of various microbes, and explores the application of this information in medical, agricultural and industrial settings. Key topics include structure/function relationships, factors affecting the growth and control of microorganisms, microbial genetics and evolutionary mechanisms, host-microbe interactions, microbial ecosystems, and applied microbiology. Emphasis is on the relationship between developments in the field of microbiology and various aspects of modern society.

Prerequisite(s): (BIO1011/BIO1016 or SCI1015) and (CHM1000/CHM1006 or CHM1022/CHM1026 or CHM2040), Corequisite: BIO2206.

Offered at Charlotte, Providence, Providence CE

3 Semester Credits

BIO2206 General Microbiology Laboratory

This is a laboratory companion course to be taken concurrently with General Microbiology. Students examine the properties of various microbes and factors affecting the growth and control of microbial agents. Throughout the term, students gain experience in light microscopy, pure culture and enrichment techniques, microbial identification, and enumeration. Emphasis is on appropriate and safe use of standard microbiological and molecular lab equipment and methods, as well as the ability to apply the scientific process.

Prerequisite(s): (BIO1011/BIO1016 or SCI1015) and (CHM1000/CHM1006 or CHM1022/CHM1026 or CHM2040), Corequisite: BIO2201.

Offered at Charlotte, Providence, Providence CE

1 Semester Credit

BIO2510 Plant Cultivation I: Soil, Soil Substitutes, and Disease Management

This course provides an overview of the cultivation of select species of plants, from seeds to mature reproductive plants. This course introduces concepts related to the organization of the plant body at the tissue, organ and system level and the related abiotic factors necessary for plant cultivation. Students study the structure and function of the root and shoot systems with an emphasis on environmental, physical and cellular physiological factors required for successful plant cultivation, and disease and pest management. This course is taken concurrently with Plant Cultivation I: Soil, Soil Substitutes, and Disease Management Laboratory.

Prerequisite(s): BIO1022 and BIO1026, Co-requisite: BIO2516.

Offered at Providence

3 Semester Credits

BIO2516 Plant Cultivation I: Soil, Soil Substitutes, and Disease Management Laboratory

This laboratory course provides an overview of the cultivation of select species of plants, from seeds to mature reproductive plants. This course introduces concepts related to the organization of the plant body at the tissue, organ and system level and the related abiotic factors necessary for plant cultivation in soil and soil substitute growing medium. Students study the structure and function of the root and shoot systems with an emphasis on environmental, physical and cellular physiological factors required for successful plant cultivation, and disease and pest management. This course is taken concurrently with Plant Cultivation I: Soil, Soil Substitutes, and Disease Management Lecture.

Prerequisite(s): BIO1022 and BIO1026, Co-requisite: BIO2510.

Offered at Providence

1 Semester Credit

BIO3010 Principles of Biochemistry

Biochemistry applies the knowledge gained in general and organic chemistry to biological systems. Students gain an understanding of metabolic pathways, energy production, and metabolic regulatory mechanism in eukaryotes and prokaryotes. Students analyze primary journal articles that focus on the application of biochemistry in the health sciences, such as cancer screening, vaccine production, and Alzheimer's prevention. Additionally, students research fundamental biochemical techniques such as protein purification and enzyme kinetics.

Prerequisite(s): CHM2011, CHM2016.

Offered at Providence, Providence CE

3 Semester Credits

BIO3040 Molecular Biology

This course provides students with the opportunity to study current topics related to DNA replication, mutation, recombination and gene expression in prokaryotes, eukaryotes and their viruses. Students analyze primary journal articles that focus on the application of molecular biology in the health sciences, such as nutrigenomics, RNAi and epigenetic regulation. Additionally, students debate the ethics behind cloning and the genetic modification of organisms.

Prerequisite(s): BIO2001.

Offered at Providence

3 Semester Credits

BIO3046 Molecular Biology Laboratory

This course uses select technologies to probe the central dogma of biology: DNA-->RNA-->Protein. Students carry out experiments to extract, purify and modify DNA, RNA and proteins within a model organism. Students use bioinformatic techniques in the design of their experiments. This course helps students to identify appropriate technologies to use when performing molecular biology procedures and prepares students seeking an entry position in the field of biotechnology and/or entry into a graduate research lab.

Prerequisite(s): BIO2001, Corequisite: BIO3040.

Offered at Providence

1 Semester Credit

BIO3070 Evolution

This course provides a background into the mechanisms of evolution including natural and other forms of selection and the role of genetic variation, mutations and genetic drift in these processes. Problems associated with classification and inferring phylogenetic relationships between organisms are also examined. Other topics include a history of life on earth, causes of speciation and extinction, coevolution, human evolution and cultural evolution.

Prerequisite(s): BIO1011, BIO1016, BIO1022, BIO1026.

Offered at Providence

3 Semester Credits

BIO3100 Coastal Ecology

This course examines the characteristics of coastal marine habitats, the flora and fauna of these habitats, and their ecological relationships. Anthropogenic effects on coastal habitats are also examined.

Prerequisite(s): BIO1022 and BIO1026, Corequisite: BIO3106.

Offered at Providence

3 Semester Credits

BIO3106 Coastal Ecology Laboratory

This laboratory companion course coordinates with BIO3100. This course uses an inquiry-based learning approach to reinforce fundamental ecological concepts and introduce students to methods of data collection and analysis commonly used in ecology. Students are required to organize, analyze, interpret and present ecological data collected using various laboratory and field methods. Additionally, this laboratory course provides students with the opportunity to practice laboratory and field safety procedures. Special consideration is given to concepts and methods relevant to research conducted in the coastal environment.

Prerequisite(s): BIO1022 and BIO1026, Corequisite: BIO3100.

Offered at Providence

1 Semester Credit

BIO3510 Plant Cultivation II: Hydroponics, Aquaponics, Tissue Culture, Genetics and Extraction

This course builds upon the major concepts introduced in BIO2510: Plant Cultivation I: Soil, Soil Substitutes, and Disease Management. Students learn how to propagate plants from cells, seeds, and mature vegetative cuttings, via hydroponic, aquaponics and tissue culture systems. The application of biotechnology to optimize and create economically valuable plants is discussed. Students are introduced to harvesting of targeted parts of the plant and chemical extraction techniques to isolate bioactive compounds for medicinal purposes. This course is taken concurrently with Plant Cultivation II: Hydroponics, Aquaponics, Tissue Culture, Genetic Manipulation and Extractions Laboratory.

Prerequisite(s): BIO2510, BIO2516 and (CHM1000/CHM1006 or

CHM1022/CHM1026), Corequisite: BIO3516.

Offered at Providence

3 Semester Credits

BIO3516 Plant Cultivation II: Hydroponics, Aquaponics, Tissue Culture, Genetics and Extraction Laboratory

This laboratory companion course coordinates with BIO3510. Students have the opportunity to implement the techniques and equipment used to propagate plants from cells, seeds, and mature vegetative cuttings, via hydroponic, aquaponics and tissue culture systems. The application of biotechnology to optimize and create economically valuable plants are discussed and applied. Students learn how to harvest targeted parts of the plant and are introduced to chemical extraction techniques used to isolate bioactive compounds for medicinal purposes.

Prerequisite(s): BIO2510, BIO2516 and (CHM1000/CHM1006 or

CHM1022/CHM1026), Corequisite: BIO3510.

Offered at Providence

1 Semester Credit

BIO4020 Integrative Biology

Integrative biology is a capstone biology course that applies the fundamental biological concepts of genetics, molecular biology, biochemistry, evolution and ecology to explain biological systems from molecules to communities. This course uses primary literature and bioinformatics to explore microbial interactions, personalized medicine, and biomimics. This course is paired with BIO4026 Integrative Biology Laboratory, which allows students to complete a senior research project tied to one of the major topic areas.

Prerequisite(s): BIO3040, Corequisite: BIO4026.

Offered at Providence

3 Semester Credits

BIO4026 Integrative Biology Laboratory

This course is a thematic laboratory experience associated with BIO4020 Integrative Biology. This course requires students to investigate a scientific problem through a laboratory, in silico, and/or field research study in one of the following areas: microbial host interactions, personalized medicine, or biomimics. Students develop skills essential for becoming an active member of the scientific community and workforce, such as scientific literacy, experimental design, modern research techniques, data collection and analysis, and scientific oral and written communication.

Prerequisite(s): BIO3040, Corequisite: BIO4020.

Offered at Providence

1 Semester Credit

BIO4040 Functional Histology

This course focuses on the relationship between structure and function of the microscopic aspects of mammalian cells, tissues, and organ systems. It begins with examination of the four basic tissue types. This background is then applied to the histological examination of human organ systems. Functional relationships are emphasized by contrasting normal and pathological specimens.

Prerequisite(s): BIO2021, BIO2026, Corequisite: BIO4046.

Offered at Providence

3 Semester Credits

BIO4046 Functional Histology Laboratory

This course supplements BIO4040, giving students a hands-on experience with microscopic investigation of the histological structure of mammalian tissues with a specific focus on human histology. The laboratory includes experience preparing tissue and making slides of animal tissue.

Prerequisite(s): BIO2021, BIO2026, Corequisite: BIO4040.

Offered at Providence

1 Semester Credit

BIO4070 Fundamentals of Immunology

This is a survey course that introduces students to basic concepts of immunology and fosters an understanding of the immunological processes that underlie human disease pathogenesis.

Prerequisite(s): BIO1011, BIO1016, BIO3010 or CHM3040.

Offered at Providence, Providence CE

3 Semester Credits

BIO4100 Senior Seminar in Biology

This is a capstone biology course that allows students to integrate all previous coursework to examine relevant topics in biology. Each term the course focuses on one such topic, and students are charged with finding, analyzing and critically discussing relevant primary journal articles related to that theme. Additionally, students are assigned a research project, for which they must complete a written report and oral presentation.

Prerequisite(s): BIO1011, BIO1016, BIO1022, BIO1026, CHM1022, CHM1026, MATH2010, senior status.

Offered at Providence

3 Semester Credits

BIO4510 Applications of Plants & Fungi

This course presents an in-depth look at the evolution of plants and fungi and their respective uses in our society. Students immerse themselves in the structure, function and life cycle of representative members of the Kingdom Plantae and Fungi. Students explore how plants and fungi contribute to all aspects of modern society, such as food, medicine, industrial application, clothing, biotechnology, energy, etc.

Prerequisite(s): BIO3510, BIO3516, Corequisite: BIO4516.

Offered at Providence

3 Semester Credits

BIO4516 Applications of Plants & Fungi Laboratory

This laboratory companion course coordinates with BIO4510. This course uses hands-on experiences to reinforce the major concepts associated with the evolution of plants and fungi and their respective uses in our society. Students immerse themselves in the structure, function and life cycle of representative members of the Kingdom Plantae and Fungi. Students explore how plants and fungi contribute to all aspects of modern society, such as food, medicine, industrial application, clothing, biotechnology, energy, etc.

Prerequisite(s): BIO3510, BIO3516, Corequisite: BIO4510.

Offered at Providence

1 Semester Credit