

# BIOLOGY (BI)

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## BI 1110 Biological Science I (4)

Covers the fundamentals of living systems, beginning with coverage of the chemistry of life and cell structure and then focuses on genetic systems. The laboratory component involves student projects that complement the lecture portion of the course. Biological Science I and II can be taken in any sequence. Additional course fee required. Falls. (TECO)

## BI 1120 Biological Science II (4)

Covers the evolution, diversity, ecology and functioning of living systems, with a focus on both plants and animals. The laboratory component of the course involves student projects that complement the lecture portion of the course. Biological Science I and II can be taken in any sequence. Additional course fee required. Springs.

## BI 2030 Invertebrate Zoology (4)

The vast majority of described animal species are invertebrates, and this course offers an introduction to their diversity. The morphology, ecology, and evolution of invertebrate phyla are investigated and discussed through lectures and readings. The laboratory component includes field work, data analysis, and the examination of preserved specimens. Additional course fee required. Fall of even years.

## BI 2040 Vertebrate Zoology (4)

The classification, evolution, functional anatomy and development of selected representatives of the vertebrate phyla are considered. Additional course fee required. Spring of odd years.

## BI 2070 Botany (4)

An overview of plants through study of their anatomy, physiology, and morphogenesis and how these aspects relate to the broad concepts of botanical science and how they can be used to identify species in the local flora (New Hampshire and environs). Laboratories for experimentation and illustration. Additional course fee required. Spring of even years.

## BI 2110 Human Anatomy and Physiology I (3)

Students study the structure and function of the human body. Examines major body systems from the perspective of how anatomical structure is integrated with physiological function. Starts with an overview of the basic cell chemistry and biology. Explores the 4 major tissue types, followed by the integument, the skeletomuscular system and its interaction with the nervous system. Discusses developmental processes throughout. Falls. Corequisite(s): BI 2130.

## BI 2120 Human Anatomy and Physiology II (3)

Students study the structure and function of the human body. Examines major body systems from the perspective of how anatomical structure is integrated with physiological function. Starts with a detailed exploration of nervous tissues and the nervous system. The structural and functional relationships between the different components of the endocrine, respiratory, cardiovascular, immune, lymphatic, digestive, reproductive and excretory systems are then examined. Discusses developmental process throughout. Springs. Prerequisite(s): BI 2110 and 2130. Corequisite(s): BI 2140.

## BI 2130 Human Anatomy and Physiology Laboratory I (1)

An examination of the structure and function of the human body. Laboratory supports the corequisite lecture with a hands-on look at both the anatomy and physiological processes of cell biology, cell reproduction, the skeleton, articulations, muscles, and muscle tissue. Additional course fee required. Falls. Corequisite(s): BI 2110.

## BI 2140 Human Anatomy and Physiology Laboratory II (1)

An examination of the structure and function of the human body. Laboratory supports the corequisite lecture with a hands-on look at both the anatomy and physiological processes of the nervous, endocrine, respiratory, cardiovascular, immune, lymphatic, digestive, reproductive, and excretory systems. Additional course fee required. Springs. Prerequisite(s): BI 2110 and BI 2130. Corequisite(s): BI 2120.

## BI 2270 Integrative Biology (4)

A skills-focused course that emphasizes inquiry based discovery with a focus on developing scientific hypotheses based on reading and comprehension of primary literature, testing those hypotheses, analyzing the data, and writing up the results. Content will vary but will always encompass the integration of wellness and information across several different disciplines. Falls. (WECO) Prerequisite(s): BI 1110 and BI 1120.

## BI 2340 Microbiology for Nurses (4)

Bacteria are essential to human health and responsible for infectious disease. Introduces nursing majors to microorganisms with a particular emphasis on how they pertain to clinical concerns. Laboratory component focuses on using traditional microbiology and modern molecular biology techniques to identify unknown bacterial isolates. Additional course fee required. Springs. Prerequisite(s): Nursing majors only.

## BI 3035 Biochemistry I (4)

See CH 3035 for course description. Additional course fee required. Falls. (INCO) Prerequisite(s): CH 3370.

## BI 3040 Microbiology (4)

Modern microbiological concepts. Studies groups of microorganisms characterized to reveal their morphological and physiological nature. Emphasizes biological functions of bacteria, their occurrence in nature and their relationships to each other, as well as to other forms of life, especially human beings. Additional course fee required. Falls. Prerequisite(s): BI 1110, BI 1120, (CH 2330 or CH 2335), and CH 2340.

## BI 3060 Genetics (4)

Hereditary characteristics and contemporary views regarding basic genetic concepts. The physical and chemical nature of the genetic material, the mechanisms involved in the transmission of genetic material and the manner in which genetic principles are expressed in living organisms, especially human beings. Additional course fee required. Falls. Prerequisite(s): BI 1110, BI 1120, (CH 2330 or CH 2335), and CH 2340.

## BI 3130 Evolution (4)

Focuses on fundamental and emerging concepts in evolutionary theory. Synthesizes fundamental evidence with more recent studies of evolutionary change in lab and field populations using a range of examples spanning taxonomic diversity. Springs. Prerequisite(s): At least 8 credits in Biology.

**BI 3240 Conservation (3)**

An examination of the interdependence of all species on Earth, the current trend in loss of biodiversity, the causes for this trend, with special attention to global economics, value systems, resource consumption patterns and the interface between all 3 of these and cultural diversity. The ecology and mechanisms of species extinction are covered in depth. Alternative paradigms are discussed. Not open to students who have earned credit for BI 2240. Springs. (DICO) (GACO)

**BI 3260 Freshwater Ecology (4)**

An examination of the ecology of freshwater environments through lectures, readings, discussions, field activities, and data analysis. Explores the physical features of different freshwater systems and their ecological implications as well as the characteristics and ecological roles of major groups of freshwater organisms. Discusses environmental issues related to freshwater ecology. Additional course fee required. Fall of odd years.

**BI 4050 Ecology (4)**

An introduction to the fundamental ecological concepts which illustrate the complex interrelationships of living organisms with each other and with the non-living environment. Laboratory time used for field work, experimentation and analysis of data. Additional course fee required. Falls. (QRCO) (WRCO)  
Prerequisite(s): 2 upper-level biology courses.

**BI 4120 Cell Biology (4)**

This course introduces students to the structure and function of the cell, the fundamental unit of life. We will discuss topics including cellular and organelle structure, cellular trafficking, cell movement, control of the cell cycle and cancer. Within each topic we will also discuss techniques some of which will be utilized in the laboratory portion. Additional course fee required. Springs.  
Prerequisite(s): BI 2270 OR BI 3060

**BI 4150 Developmental Biology (4)**

Structured as an experimental approach to animal development with both lecture and laboratory components. Topics covered focus on genetic, molecular and cellular phenomena during animal development including fertilization, cleavage, cell determination, pattern formation, gastrulation, organ-system development, and differentiation. Builds strong writing skills. Additional course fee required. Falls Odd. (WRCO)  
Prerequisite(s): BI 1110 and BI 1120.

**BI 4170 Ecology and Development (4)**

Exposes students to an integrative field in biology that examines the genetic, epigenetic, molecular, developmental, and environmental influences on organismal form and function. Focuses on a systems-level approach to understanding phenotype using diverse types of biological data. Builds strong writing skills. Falls Even. (WRCO)  
Prerequisite(s): Junior or Senior status; sophomores with permission of instructor only.

**BI 4188 Molecular Biology (4)**

Covers an in-depth analysis of gene function at the molecular level. Studies, in a seminar-style approach, the mechanisms of DNA replication, repair, transcription, protein synthesis, and regulation. Laboratory component is project-based, allowing students to advance their molecular skills using a combination of tools, such as RNA interference and quantitative PCR. Additional course fee required. Springs.  
Prerequisite(s): (BI 3060 or CH 3020), (CH 2330 or CH 2335), and CH 2340.

**BI 4600 Internship (1-4)**

Students engage in a work program to apply, in a practical manner, knowledge gained in major or minor coursework under the supervision of a faculty sponsor, the Department Chair and a supervising agency. Students must obtain a faculty sponsor and submit a detailed written proposal prior to undertaking the internship. Students must also submit a written report to their faculty sponsor when the internship is completed. Final approval of the internship will come from the Department Chair. Pass/No Pass. With permission.

**BI 4610 Environmental Internship (4-12)**

Students engage in a work program to apply, in a practical manner, knowledge gained in major, minor or interdisciplinary course work, under the supervision of a faculty sponsor and a supervising agency. Students must obtain a faculty sponsor and submit a detailed written proposal prior to undertaking the internship. Students must also keep a daily logbook of their working hours, tasks and duties. In addition, a written report must be submitted to the faculty sponsor when the internship is completed. Final approval of the internship comes from the Coordinator of Environmental Biology. Internships are usually completed with state, federal or private environmental programs. Also offered Summer and Winterim. Pass/No Pass.  
Prerequisite(s): approval of the Coordinator of Environmental Biology, Junior/Senior status, enrollment in Environmental or Interdisciplinary majors.

**BI 4750 Plant Diversity & Evolution (4)**

In this advanced botany course, students traverse plant systematics and the major concepts and skill sets relevant to modern studies of plant diversification patterns and evolutionary processes. The course of study includes reading and discussion of scientific papers, phylogenetic and network methods, phytogeography and mapping, cytology, statistical methods for characterizing morphological variation, and the use of natural history specimens in the Plymouth State University Herbarium (PSH) for scientific research. Additional course fee required. Unscheduled.  
Prerequisite(s): BI 1110 and BI 1120.

**BI 4765 Animal Behavior (4)**

The study of animal behavior offers a unique opportunity to understand the relationship between ecology, evolution, physiology, populations and individual organisms. Examines the influence of genetics and environment on animal behavior. Outdoor and laboratory investigations test specific student and/or instructor generated hypotheses concerning the causal mechanisms underlying behavior. Additional course fee required.

**BI 4770 Animal Physiology (4)**

Examines the various systems of the body including the respiratory, cardiovascular, digestive and excretory systems using a comparative approach. Discusses the control of these systems and behavior by the nervous and endocrine systems. Inherent is an analysis of an interaction between the mechanisms of homeostatic regulation and the environment. Laboratory investigations using local animals illustrate some of the principles outlined in lecture through the use of student and/or instructor generated hypothesis testing and uses modern equipment including computers, Data Acquisition Units, amplifiers, transducers, stimulators and activity monitors. Additional course fee required. Spring of odd years. (WRCO)  
Prerequisite(s): Junior or Senior Biology or Psychology major.

**BI 4780 Neurobiology (4)**

Examines the functioning principles of the nervous system in vertebrates. The fundamental principles underlying membrane potentials, action potentials, and conduction are followed by mechanisms of communication between single cells and groups of cells. Different aspects of sensory, motor, and integrative physiology are discussed and the role of specific parts of the brain is explored. The laboratory portion is used to demonstrate important principles. Students use Data Acquisition Units, oscilloscopes, manipulators, transducers, and amplifiers to test student and /or instructor generated hypotheses. Additional course fee required. Spring of even years. (WRCO)

Prerequisite(s): Junior or Senior Biology or Psychology major.

**BI 4800 Current Environmental Issues (3)**

Intended primarily for seniors in the Environmental Biology degree program, a capstone course in which students and faculty examine the main issues that face ecologists, biologists and policymakers regarding the health of the biosphere. The current state of scientific understanding of such issues as global warming, ozone depletion, acid deposition, loss of biodiversity, pollution and desertification is elucidated through a combination of lectures, student presentations, seminars and discussions. Springs.

Prerequisite(s): Biology majors only, Junior/Senior status.

**BI 4910 Independent Study (1-4)**

Studies undertaken are defined by students concerned and subject to approval by appropriate staff members. Work may involve reading, conferences, historical, experimental or theoretical projects, field investigations, statistical surveys, or combinations of the foregoing, or other activities deemed appropriate. Consent required of the instructor who will supervise the independent study and the Department Chair.

**BI 4950 Undergraduate Research (1-4)**

Provides an opportunity for students to conduct biological research in collaboration with a faculty member. The number of credits corresponds to the level of effort and scope of work; 60 hours per credit. Repeatable for a maximum of 12 credits. Additional course fee required. Consent required of the faculty research mentor and the Department Chair.

**BI 4980 Biology Seminar (2)**

Senior capstone course. Students select an area of interest in the biological sciences and conduct a literature review including critical reading, interpretation of data, and synthesis of multiple datasets. Students may opt to integrate datasets that they have collected in undergraduate research. Students create an oral presentation to their peers and biology faculty. Springs.