BIOLOGY (BI)

BI 1110 Biological Science I (4 Credits)
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.
Prerequisite(s): Biology majors or minors, or Chemistry majors.

BI 1120 Biological Science II (4 Credits)
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.
Prerequisite(s): Biology majors or minors, Chemistry majors, or Environmental Science and Policy majors.

BI 2030 Invertebrate Zoology (4 Credits)
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 Credits)
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 Credits)
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 Credits)
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 four major tissue types, followed by the integument, the skeleton-muscular 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 Credits)
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 processes throughout. Springs.
Prerequisite(s): BI 2110 and 2130.
Corequisite(s): BI 2140.

BI 2130 Human Anatomy and Physiology Laboratory I (1 Credit)
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 Credit)
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 2340 Microbiology for Nurses (4 Credits)
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. Spring.
Prerequisite(s): Nursing majors only.

BI 2360 Genetics for Nurses (3 Credits)
Advances in genetics have revolutionized modern medical approaches to diagnosis, management, and treatment of disease. Understanding the role genetics plays in human health is essential for healthcare providers. First half focuses on understanding the basic principles of human genetics. Second half considers topics related to clinical practice such as diagnosis of genetic conditions, newborn screen, gene therapy, and ethical principles of genetic healthcare. Falls.
Prerequisite(s): Nursing majors only.

BI 3025 Obesity – The Biology and Sociology of an Epidemic (3 Credits)
A sharp rise in obesity has left the US healthcare system overwhelmed by increased diabetes and cardiovascular disease. The epidemic is touching every social class and sub-culture in America. Obesity has deep social stigma and a wealth of misinformation spread by the multi-billion dollar fitness and beauty industries, which makes prevention difficult. Examines the biology and health implications of obesity and examines the sociocultural causes and solutions. Falls. (INCO) (WECO)
Prerequisite(s): Junior status; any BI, BIDI, CH or CHDI course or permission of instructor.

BI 3035 Biochemistry I (4 Credits)
See CH 3035 for course description. Additional course fee required. Falls.
Prerequisite(s): CH 3370.

BI 3040 Microbiology (4 Credits)
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 2110, BI 2120, (CH 2330 or CH 2335), and CH 2340.
BI 3060 Genetics (4 Credits)
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 Credits)
An analysis of the mechanisms of evolution from the viewpoint of population genetics. Provides opportunities for students to examine the evidence of evolution: comparative anatomy and biochemistry; fossils and embryology; the mechanisms of evolution: variation in populations, the Hardy-Weinberg Equilibrium and the forces which disturb it and the effects of selection on gene frequencies; the results of evolution. Additional course fee required. Springs.
Prerequisite(s): BI 3060 (may be concurrent) and at least 8 credits in Biology at the 2000 level or higher.

BI 3210 Tropical Biology (4 Credits)
The diversity of life and basic ecological processes of tropical ecosystems are investigated through readings and field studies. Examines both terrestrial and marine ecosystems. Winterim of even years.
Prerequisite(s): permission of the instructor.

BI 3240 Conservation (3 Credits)
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. Falls. (DICO)(GACO)(INCO)
Prerequisite(s): Junior or Senior status.

BI 3250 Ornithology (4 Credits)
An introduction to ornithology including bird identification, external and internal features, locomotion, behavior, reproduction, migration, feeding habits and distribution of species. Additional course fee required. Spring of even years.

BI 3260 Freshwater Ecology (4 Credits)
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 Credits)
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 4100 Cell Structure and Function (4 Credits)
Addresses the diversity of form and function found in the basic units of life, the cells. The first segment centers on the various techniques, especially electron microscopy, which are used to study microscopic anatomy. The components, organelles, which comprise a "generalized cell," are examined and their functional relationships discussed. The second segment centers on the structural differences between tissues of the body (classical histology). Finally, this knowledge of cell and tissue structure is employed to understand organs and organ systems. This course is not purely morphological. Examines the development and functional properties of these systems. Laboratory. Additional course fee required. Springs.

BI 4150 Developmental Biology (4 Credits)
Structured as an experimental approach to animal development with both lecture and laboratory components. Topics covered focus on genetic, molecular and cellular phenomena during development and include gametogenesis, fertilization, cleavage, cell determination, pattern formation, gastrulation, organ-system development and differentiation. Explores development with a case study approach in a suite of invertebrate and vertebrate models. Integrates developmental patterns and processes into the modern idea of the developmental mechanisms of evolutionary changes. Additional course fee required. Fall of odd years. (WRCO)
Prerequisite(s): BI 1110 and BI 1120.

BI 4170 Ecology and Development (4 Credits)
Exposes students to the integrative field of ecological developmental biology, a field that focuses upon the impact of the environment on development. Explores a suite of modern studies of developmental phenomena that link across multiple levels of biological complexity. Builds strong writing skills. Fall of even years. (WRCO)
Prerequisite(s): junior or senior status; sophomores with permission of instructor only.

BI 4188 Molecular Biology (4 Credits)
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 4190 Introduction to Research (2 Credits)
See CH 4190 for course description. Springs.

BI 4200 Senior Research (4 Credits)
Guided research in the biological sciences. Students are expected to pursue in-depth a research project in the biological sciences under the direct supervision of a Biological Sciences Department faculty member. Work accomplished is reported in a written paper and in a formal oral seminar presentation in the Biology Seminar course. Credit is given either for work done during the summer between the junior and senior years and/or during the fall of the senior year. Additional course fee required. Prerequisite(s): permission of the Department Chair and Faculty Supervisor.

BI 4330 Science in Secondary School (3 Credits)
The science programs, methods and materials used in the secondary school. Required observation and participation in secondary schools. May be taken as CH 4330. Last offering Fall 2018.
BI 4600 Internship (1-4 Credits)
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 Credits)
Students engage in a work program to apply, in a practical manner, knowledge gained in major, minor or interdisciplinary coursework 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 Credits)
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 4760 Animal Behavior (4 Credits)
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. Fall of even years. (WRCO)
Prerequisite(s): Junior or Senior Biology or Psychology major.

BI 4770 Animal Physiology (4 Credits)
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, oscilloscopes, manipulators, transducers, and amplifiers to test student and/or instructor generated hypotheses. Additional course fee required. Spring of odd years. (WRCO)
Prerequisite(s): Junior or Senior Biology or Psychology major.

BI 4780 Neurobiology (4 Credits)
Examines the functioning 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 Credits)
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 Credits)
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 Credits)
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 4970 Biology Seminar (1 Credit)
Reports and discussions of current literature and recent developments in the biological sciences. Presentations by seniors of their research programs. Springs.
Prerequisite(s): Biology majors with Senior status.