BIOLOGY (BIO)

BIO-230 Human Anatomy and Physiology I (4 Credits)
Lecture and laboratory experiences covering the structure and function of the human body, for students in physical education and allied health programs. Body organization and terminology, basic chemistry, the cell, histology, integumentary, skeletal, muscular, sensory, central, and somatic nervous systems.
Prerequisite(s): INCHEM-100 or INCHEM-111
Offered: Spring, Every Year

BIO-290 Special Topics (1-4 Credits)
Exploration and analysis of major topics of biology, such as human genetics, algae and fungi marine biology, freshwater ecology, and biological aspects of sexual reproduction.
Prerequisite(s): Permission of instructor

BIO-294 Cooperative Education (1-6 Credits)
Introductory work-learning experience related to career interests, for which compensation may be received. Positions arranged by students with sponsorship, approval and evaluation by full-time faculty. Elective credit only , normally 20 hours/ credit, to maximum of 12 credits per degree program. Graded Pass/Fail.
Prerequisite(s): Permission of instructor

BIO-298 Independent Study (1-6 Credits)
An opportunity for a qualified student to explore work in an area of individual interest, selected and pursued in consultation with a faculty member. Consent required of the instructor who will supervise the independent study. Repeatable to a total of 6 credits.
Offered: All, Every Year

BIO-311 Genetics (4 Credits)
This course focuses on fundamental transmission and molecular genetics, including mitosis and meiosis, gene mapping, genic interactions, mutation and DNA repair, gene expression and regulation, basic bioinformatics, and genetics in society. Course methods emphasize critical thinking, problem solving and scientific communication.
Prerequisite(s): INBIO-110 and INBIO-111
Offered: Fall, Every Year

BIO-312 Cell Biology (4 Credits)
An integrated lecture-lab experience introducing fundamental concepts and techniques in cell biology. Topics include cell structure, the cell cycle, apoptosis, stem cells, cell signaling, and cancer. Techniques include light and fluorescence microscopy.
Prerequisite(s): INBIO-110 and INBIO-111
Offered: Spring, Every Year

BIO-313 Population and Community Ecology (4 Credits)
This integrated lecture-lab course explores the basic concepts and mechanisms that explain the abundance and distribution of organisms, with a focus on mechanisms structuring populations and communities. Field and lab exercises emphasize the basics of sampling and experimental design, hypothesis formation, spreadsheet use, statistics, data presentation, and scientific writing.
Prerequisite(s): Take INBIO-110 and INBIO-111, OR ENST-252
Offered: Fall, Every Year

BIO-332 Human Anatomy and Physiology II (4 Credits)
Continuation of BIO-230. Lecture and laboratory experiences covering the structure and function of the endocrine, cardiovascular, immune, respiratory digestive, urinary, reproductive, and autonomic nervous systems, and consideration of metabolism, nutrition, heredity, and regulation of temperature fluid, electrolytes, and acid base balance.
Prerequisite(s): BIO-230
Offered: Fall, Every Year

BIO-370 Biochemistry (4 Credits)
In-depth survey of biochemical topics including the structure and function of proteins, enzyme action and kinetics, carbohydrates, lipids, and an introduction to major metabolic pathways and their regulation. Cross-listed as: CHEM-370.
Prerequisite(s): CHEM-221 and INBIO-110, or permission of instructor
Offered: Fall, Every Year

BIO-382 Neurobiology (4 Credits)
An upper-level introduction to the field of neurobiology. Includes an overview of comparative neuroanatomy and the cellular and molecular basis of sensory, motor, and higher brain functions.
Prerequisite(s): INBIO-110, INCHEM-111, and CHEM-112, or permission of the instructor

BIO-433 Invertebrate Zoology (4 Credits)
An integrated lecture-lab course focusing on invertebrate anatomy, physiology, behavior, development, ecology, natural history, evolution, and systematics. Field trips may be required.
Prerequisite(s): BIO-311 and BIO-312

BIO-434 Vertebrate Zoology (4 Credits)
Integrated lecture, laboratory, and field course focusing on vertebrate anatomy, physiology, behavior, ecology, natural history, evolution, systematics, and conservation. Students will become acquainted with local vertebrate communities and with primary research literature and research methods. Field trips may be required.
Prerequisite(s): BIO-311 and BIO-312

BIO-443 Experimental Marine Ecology (4 Credits)
An integrated lecture-lab course exploring the processes that structure nearshore marine ecosystems. Required field and lab projects are used to teach experimental design, data analysis and scientific communication, as well as the identification and natural history of local marine organisms.
Prerequisite(s): BIO-311, BIO-312, and BIO-313

BIO-445 Animal Behavior (4 Credits)
An integrated lecture-lab course that examines how interactions between genes, physiology, development, and the environment determine animal behavior; the adaptive value of behavior; and how behavior has changed over evolutionary time. This course will also involve exercises designed to instruct students in the process of conducting independent research in animal behavior.
Prerequisite(s): BIO-311 or PSYC-253, or permission of instructor

BIO-463 Plant Biology (4 Credits)
A lecture and laboratory course emphasizing the fundamental principles in plant biology, including systematics and evolution, anatomy and morphology, physiology, biotechnology, ecology, conservation biology, and ethnobotany. Lab and field projects will provide first-hand experience with organisms, the process of scientific inquiry, and scientific writing skills.
Prerequisite(s): BIO-311 and BIO-312

BIO-467 Microbial Diversity (4 Credits)
An introduction to the microbial world emphasizing biological diversity. Topics include fundamentals of microbial cell biology, physiology, metabolism, genetics, evolution, classification and ecology. Laboratory experience emphasizes a research perspective and includes isolation, culture, enumeration, characterization and classification of microbes found in the environment.
Prerequisite(s): BIO-311 and BIO-312

BIO-468 Genomic Bioinformatics (4 Credits)
An introduction to the core principles and methodologies for analyzing genomic data to answer biological questions. Topics include BASH, cloud computing, molecular biology, DNA sequencing, data structure, genomic databases, similarity searching, sequence alignment, gene prediction, phylogenetic trees, and comparative genomics. Project based learning.
Prerequisite(s): BIO-311, or permission of instructor

BIO-477 Immunology (4 Credits)
Integrated lecture-lab experience covering the cellular and molecular basis of vertebrate adaptive immune response. Topics include structures and cells of the immune system, antibody formation and diversity, role of immune system in health and disease, and evolution of adaptive immunity. Applied immunology and disorders of immunity will also be covered.
Prerequisite(s): BIO-311 and BIO-312

BIO-478 Developmental Biology (4 Credits)
An integrated lecture-lab course examining fundamental developmental phenomena, such as the differentiation and patterning of tissues and organs. Classic experiments in the field using a variety of model organisms will be discussed, and students will complete original laboratory research projects investigating the genetic basis of animal development.
Prerequisite(s): BIO-311 and BIO-312

BIO-485 Global Change Biology (4 Credits)
Human-induced climate changes have been impacting numerous species worldwide. These effects have largely been ignored in the last century. Here, we will use a combination of lectures, discussions, debates and presentations to identify such effects on different species other than humans, while learning the fundamentals of current global change issues.
Prerequisite(s): INBIO-111 or ENST-252

BIO-490 Advanced Special Topics (1-4 Credits)
Exploration and analysis of major topics of Biology, such as microtechnique, vertebrate and invertebrate zoology, plant physiology, algae, and biological aspects of sexual reproduction.
Prerequisite(s): BIO-311 and BIO-312, or permission of instructor

BIO-494 Advanced Cooperative Education (1-6 Credits)
Sequential work learning experience for which compensation may be received. Positions arranged by students with sponsorship, approval and evaluation by full time faculty. Elective credit (normally 120 hours / credit) to maximum of 12 credits per degree program. May be repeated for credit. Graded Pass/Fail.
Prerequisite(s): Permission of instructor

BIO-498 Independent Study (1-6 Credits)
Advanced independent study related to experimental aspects of various fields of Biology. The student is required to initiate a research project and to submit a written progress report. One hour conference. May be repeated as desired.
Prerequisite(s): two advanced courses in Biology

INBIO-101 Topics in Biology (4 Credits)
An exploration of biological issues and methods for nonmajors. Applying basic principles to modern problems, the course may focus on a theme such as evolution and conservation of biodiversity, plants and society, or ecology and environmental issues. Can be repeated for elective credit but not ISP credit as topics change.

INBIO-110 Cells and Molecules (4 Credits)
Introduction to the life processes from the molecular to the physiological level using an integrated lecture and lab experience. Topics include the chemistry of macromolecules, cell structure and function, cellular respiration, photosynthesis, and gene expression. Use of experimental inquiry to integrate course content into a physiological context.
Offered: All, Every Year

INBIO-111 Evolution and Ecology (4 Credits)
An integrated lecture-lab experience that introduces the basic principles of evolution and ecology. Students investigate the causes and consequences of organismal diversity, both within and among species. Lab and field projects teach the scientific method.
Offered: All, Every Year

INBIO-300 Advanced Topics in Biology (4 Credits)
Topics in the biological sciences such as genetics, health, ecology, and others will be explored at an in-depth level. Socially relevant and ethical issues such as AIDS, genetic engineering, embryo research, environmental crises and other issues will be emphasized. Repeatable as topics change.
Prerequisite(s): 24 credits in ISP including ITW-101 and QL

INBIO-301 Stem Cells and Regeneration (4 Credits)
Advances in biomedical research have raised the prospect of using stem cells to regenerate lost or damaged body parts. This course explores the biology of this field and associated ethical and political issues. A laboratory project introduces the scientific method and the amazing regenerative ability of planarian flatworms.
Prerequisite(s): 24 credits in ISP including ITW-101 and QL

INBIO-303 Barely Tolerating Yourself (4 Credits)
Protecting oneself against a constant threat of pathogens depends on the body's ability to determine friend from foe. This course will explore fundamental biological concepts in the context of the vertebrate immune system. Topics covered include innate and adaptive immunity, vaccinations, allergies, organ transplants, pregnancy, antibiotic resistance, and cancer.
Prerequisite(s): 24 credits in ISP, including ITW-101 and QL

INBIO-304 Forensic Biology (4 Credits)
This integrated lecture-lab experience introduces the basic principles of forensics science with special emphasis on biological and molecular techniques used in modern day forensics investigations. Specifically, we focus on the theory and principles of biology that applies to blood typing, fingerprinting, DNA and molecular profiling, chromatography and microbiome analyses.

INBIO-305 Marine Ecology and Conservation (4 Credits)
This course explores the ecology of coastal and marine systems, the major threats they face, and current approaches to marine conservation. It will introduce students to current conservation issues in here New England and around the world, emphasizing scientific literacy, interpretation of quantitative data, and critical thinking.
Offered: Spring, Even Years

INBIO-306 Biology of Plagues (4 Credits)
There are a handful of disease-causing microbes on Earth that greatly affect human society. What makes these microbes deadly and how do we respond? This is an integrated lecture-lab course that addresses this topic. Satifies the lab science requirement for education majors.
Prerequisite(s): 24 credits in ISP, including ITW-101 and QL