BIOLOGY (BIOL)

BIOL1000 GENERAL BIOLOGY
Introduces basic principles of biology, including cell structure and function, and metabolism; genetics; reproduction; theories of evolution; classifications of organisms; plant form and function, animal form and function; community ecology and ecosystems dynamics. Emphasis placed on scientific inquiry. (4 Credits)

BIOL1050 GENERAL BIOLOGY II
Introduction to the evolution, biology and classification of vertebrates, including fish, amphibians, reptiles, birds and mammals. A comparative approach will be used to examine the respiratory, circulatory, endocrine, skeletal, nervous reproductive and digestive systems of vertebrates. Emphasis on evolution, speciation, behavior, spatial patters, migration. Communications, thermal adaptations, communication, coloration and behavior of vertebrates may be emphasized. Lecture and laboratory components are included. ***Prerequisite:*** *BIOL1000 (4 credits)*

BIOL1100 CELL & MOLECULAR BIOLOGY
This course introduces basic principles of cellular and molecular biology. Topics include: properties of life, organic molecules, general features of cells, membrane structure, synthesis and transport, introduction to energy, enzymes and metabolism, cell respiration, photosynthesis, cell communication, extra cellular matrices, cell junctions, tissues, nucleic acid structure, DNA replication and chromosome structure, gene expression and regulation, mutation, the eukaryotic cell cycle, mitosis and meiosis, viruses and bacteria. (4 credits) fall, spring, summer

BIOL1200 FUNDAMENTALS OF ECOLOGY
This introductory course provides students with a comprehensive overview of ecological principles, processes, and concepts. Topics include population dynamics, adaptation and natural selection, trophic relations, and different ecosystems. Through a combination of lectures, laboratory exercises, fieldwork, and interactive discussions, students gain a solid foundation in ecological theory and its practical applications. (4 credits) fall.

BIOL1500 INTRODUCTION TO MEDICAL BIOTECHNOLOGY
This course introduces students to the central dogma of molecular biology and to insights on how medical biotechnology applications can be used to solve important social and medical problems for the benefit of humankind. Students will learn essential molecular biology techniques commonly used in modern research labs, including preparation of biological reagents, use of expression vectors, selective growth and transformation of bacteria, DNA synthesis and polymerase chain reactions (PCR), subcloning, electrophoresis and the use of bioinformatics databases and algorithms to design and perform successful cloning experiments. ***Prerequisite:*** *BIOL1100 (4 credits)*

BIOL1700 ANATOMY & PHYSIOLOGY I
This course covers the basic structure and function of the human body as an integrated set of systems. Topics include: functional compartments of the cells and body, tissues, mechanisms of communication, integration and homeostasis, an overview of the endocrine, nervous and sensory systems and the integrative control and mechanisms of body movement. ***Prerequisite:*** *BIOL1100 (4 credits) fall, spring*

BIOL1750 ANATOMY & PHYSIOLOGY II
This course covers the basic structure and function of the human body as an integrated set of systems. Topics include an overview of the cardiovascular, circulatory, respiratory, excretory and digestive systems and energy balance. ***Prerequisite:*** *BIOL1700 (4 credits) fall, spring*

BIOL2200 ADVANCED MOLECULAR BIOLOGY
This course takes an in depth look at the principles of modern molecular biology. Topics include: Organization of DNA into genomes, gene replication, recombination, repair, and cellular responses to DNA damage, RNA transcription, structure, function, processing and transport, protein translation and transport, cell cycle regulation, developmental regulation, and modern applications of molecular biology. Labs will provide functional training for a range of techniques commonly employed in molecular biology and genetics followed by application of methods to complete inquiry-based projects. The first portion of the semester student will investigate the impact of RNAi on transcription and translation; whereas, in the second half of the semester students will develop and execute a research project. ***Prerequisite:*** *BIOL1100 (4 credits) fall*

BIOL2990 INDEPENDENT STUDY IN BIOLOGY
This course investigates a topic of special interest to faculty and students that is outside regular course offerings. ***Prerequisites:*** *Consent of the academic unit and instructor (1 - 4 credits)*

BIOL3000 APPLICATIONS IN GENETICS
This course will explore the vast applications of genetics in biomedical science. Students will survey recently published primary research articles, read and discuss selected scientific literature and view relevant biomedical films or attend symposia in the Boston area, which emphasize the importance of genetics in biomedical progress. Topics will include: classical molecular genetics, genetic disease, genomics, genetic engineering, epigenetics and the social, moral, and ethical issues surrounding biomedicine. ***Prerequisite:*** *BIOL1100 (4 credits) spring*

BIOL3100 MICROBIOLOGY
This course introduces those concepts that are basic to viruses and prokaryotic and eukaryotic cells. Topics include microbial growth, evolution, and classification; descriptions of different prokaryotic, eukaryotic and other lifeforms and how the utilize these principles; the natural ecology of microorganism; the human use of microorganism; and how microorganism function in disease. ***Prerequisites:*** *BIOL2200 (4 credits) summer*

BIOL3200 CELL PHYSIOLOGY & SIGNALING
This course provides a conceptual framework of cell signaling processes that shape the behavior of single-celled and multicellular organisms. Topics include: protein-protein interaction, receptor molecules, molecular conformation, interaction, localization, modification and degradation, signaling networks, examples of important physiological pathways. ***Prerequisites:*** *BIOL2200 and CHEM2500 (4 credits) fall*

BIOL3550 ENVIRONMENTAL BIOLOGY FOR ENGINEERS
This course is an introduction to fundamental aspects of microbiology pertinent to Earth systems, an understanding of living cell structure bioenergetics and metabolism and microbial genetics is applied to topics pertinent to environmental issues, such as: bioenergy; bioremediation; carbon, nitrogen and sulfur cycles; microbial ecology; disease and immunity; and molecular microbiology. This course will explore the use of microbes in biodegeneration and as biocatalysts, as well as the molecular techniques used in these applications. Additionally, impacts of biogeochemical interfaces will be explored including, but not limited to nutrient cycling and limitation, biological redox processes, bio-active metals, controls of atmospheric carbon dioxide, carbon cycle models and others. Laboratory session give student hands-on experience in analytical and molecular methods. ***Prerequisites:*** *CHEM1100 and ENGR1000 (4 credits)*

BIOL3750 MOLECULAR GENETICS & TRANSGENETICS
This course will explore the vast applications of genetics in biomedical science. Students will survey recently published primary research articles, read selected scientific literature and view relevant biomedical films or attend symposia in the Boston area, which emphasize the importance of genetics in biomedical process. Topics will include: classical molecular genetics, genetic disease, genetic engineering, epigenetics and the social, moral and ethical issues surrounding biomedicine. Laboratories will be primarily research-driven using Drosophila melanogaster as a model organism. ***Prerequisites:*** *BIOL1100, BIOL2200 and CHEM3550 (4 credits)*

BIOL3800 SPECIAL TOPICS IN BIOLOGY
These courses present topics that are not covered by existing courses and are likely to change from semester to semester. Refer to the semester schedule for the courses offered. (1 - 4 credits)

BIOL4400 SYNTHETIC BIOLOGY
This course explores the artificial design and engineering of macromolecules, molecular motors, biological systems and living organisms. Computational tools are utilized and developed in the course for synthetic biology. ***Prerequisites:*** *CHEM3550, BIOE2000 and BIOE2500 (4 credits) summer*

BIOL4500 MOLECULAR NEUROBIOLOGY
This course focuses on the molecular, cellular and biochemical events that underlie neuronal function. Specialization of nerve cells, neural development, and maturation of the central nervous system is taught at the cellular level. Emphasis is placed on the molecular pathways that facilitate the specialized function of neuronal cells and the molecular aspects of neural disease process. ***Prerequisites:*** *BIOL2200;* ***Corequisites:*** *CHEM3550 (4 credits) spring*