**BIOLOGY (BIO)**

**BIO 001: General Biology I with Lab (4 Credits)**
Principles of biological science underlying the structure and function of living things. Lecture, laboratory, and discussion section. Cells and organelles, enzymes, metabolism, photosynthesis, mitosis and meiosis, genetics, gene expression and its regulation, population genetics, and evolution.

**Prerequisite(s):** CHEM 017 and CHEM 018

**Note(s):** CHEM 017 may be taken concurrently by students who have successfully completed CHEM 004, or who are juniors, seniors, or post-baccalaureate students; or who have AP credit in chemistry and biology, passing scores on the biology and chemistry placement exams and permission of the instructor. This course not recommended for non-science majors.

**BIO 002: General Biology II with Lab (4 Credits)**
Principles of biological science underlying the structure and function of living things. Lecture, laboratory, and discussion section. The origins and diversity of life. An evolutionary survey of viruses, bacteria, fungi, plants, and animals using comparative anatomy, morphology, physiology, and development.

**Prerequisite(s):** BIO 001 or BIO 004

**Note(s):** Prerequisites: BIO 001 or BIO 004 or permission of the instructor. This course not recommended for non-majors.

**Meets the following Gen Ed requirements:** Natural Sciences

**BIO 010N: Introductory Biology for Health Sciences (4 Credits)**
Introduces the fundamental concepts of cell chemistry and structure, biochemistry, genetics, evolution, and transformations of energy and matter central to understanding health sciences. Students will be exposed to scientific thinking and conduct their own experiments in the laboratory. This course will give students the tools to understand biology in the context of human health, and current events.

**Note(s):** Pre-Nursing students and PHHE majors. Other undergraduates need permission of instructor. Limit 30 students. Open to undergraduates only. Open to juniors and seniors only.

**Meets the following Core requirements:** Scientific Inquiry

**Meets the following Gen Ed requirements:** Natural Sciences

**BIO 011N: General Microbiology for Nurses (4 Credits)**
Introduces the fundamental principles of microbiology. The laboratory will focus on aseptic technique, control of bacteria and viruses, immune systems, and health aspects of medical microbiology, epidemiology, biotechnology, growth and control of bacteria and viruses, immune systems, and health aspects of microbiology. The laboratory will focus on aseptic technique, identification, microscopic study of bacteria, control of microbial growth, and diagnostic immunology.

**Prerequisite(s):** CHEM 004

**Note(s):** This course is open to nursing students only. Limit 30 students. Open to undergraduates only.

**BIO 012N: Microbiology for Nurses (4 Credits)**
A fundamental background that will be applicable to the care of infectious patients, to the control of microbial diseases and an understanding of microorganisms. Emphasis is placed on microscopy, medical microbiology, epidemiology, biotechnology, growth and control of bacteria and viruses, immune systems, and health aspects of microbiology. The laboratory will focus on aseptic technique, identification, microscopic study of bacteria, control of microbial growth, and diagnostic immunology.

**Prerequisite(s):** CHEM 004

**Note(s):** This course is open to nursing students only. Limit 30 students. Open to undergraduates only.

**BIO 013N: Human Aspects (3 Credits)**
Our lives are surrounded by genetics: on TV, on the internet, and discussed among our families. We regularly talk, and sometimes vote, about stem cells, the use of DNA in court and the production of recombinant proteins, such as insulin and growth hormones. This class will discuss many of these concepts and increase understanding of the science behind genetic disease, the implications of recombinant DNA genetic engineering; the accessibility of the human genome; and the social, legal, and ethical implications raised by the emerging technologies.

**Note(s):** Open to undergraduates only.

**Meets the following Core requirements:** Critical Analysis, Scientific Inquiry

**Meets the following Gen Ed requirements:** Natural Sciences

**BIO 014N: Human Physiology for Nurses (4 Credits)**
The study of the functions of major organs and organ systems. The course emphasizes integration and aspects of regulation of physiological processes.

**Prerequisite(s):** CHEM 037N

**Note(s):** This course is open to nursing students only. Limit 30 students. Open to undergraduates only.

**BIO 041N: Microbiology for Nurses (4 Credits)**
A fundamental background that will be applicable to the care of infectious patients, to the control of microbial diseases and an understanding of microorganisms. Emphasis is placed on microscopy, medical microbiology, epidemiology, biotechnology, growth and control of bacteria and viruses, immune systems, and health aspects of microbiology. The laboratory will focus on aseptic technique, identification, microscopic study of bacteria, control of microbial growth, and diagnostic immunology.

**Prerequisite(s):** CHEM 004

**Note(s):** This course is open to nursing students only. Limit 30 students. Open to undergraduates only.

**BIO 042N: Human Anatomy for Nurses (4 Credits)**
Prerequisites: CHEM 001 or CHEM 004 or permission of the instructor. This course not recommended for non-majors.

**Prerequisite(s):** BIO 001 or BIO 004

**Note(s):** Prerequisites: BIO 001 or BIO 004 or permission of the instructor. This course not recommended for non-majors.

**Meets the following Core requirements:** Scientific Inquiry

**Meets the following Gen Ed requirements:** Natural Sciences

**BIO 043: Tropical Marine Conservation (3 Credits)**
This course will focus on the conservation of tropical marine life, including our coral reefs, and the importance of Marine Protected Areas (MPAs). A rare opportunity to participate in travel to Roatan and to Scuba Dive with the Roatan Institute of Marine Sciences (RIMS) is included. Students will learn to apply the scientific method and identify corals, fish and other marine life in the classroom. They will learn about environmental impacts such as ocean acidification and how to more ethically interact with this valuable ecosystem.

**Note(s):** Students need to be certified Scuba divers. For those not certified a separate PE class will be offered in the concurrent semester, for a separate fee. Some lunch, evening and weekend field components will be required. Students must be able to travel internationally, be available over Spring Break, swim and be comfortable in the ocean. Limit 12 students. Open to undergraduates only.

**Meets the following Core requirements:** Community Engagement, International Perspectives, Scientific Inquiry

**BIO 044: Evolution for Future Presidents (3 Credits)**
In On the Origin of Species (1859), Charles Darwin proposed the theory of evolution, a theory of fundamental importance to all citizens. In this seminar, we will establish the historical and scientific context in which this book was written and published. We will read selected chapters of the Origin along with supporting materials, exploring Darwin’s arguments as they applied when originally made, and as they are understood today, given 150 years of advances in genetics, biogeography, and paleontology. The class will be both discussion- and activity-based.

**Meets the following Core requirements:** Scientific Inquiry

**Meets the following Gen Ed requirements:** Natural Sciences
BIO 055: The Ecology of Plants for Non-majors (3 Credits)
An exploration of the ecology of plant form, function and diversity across the globe. Topics include pollination, herbivory, seed predation and dispersal, and the effect of diversity on the stability of ecosystems. Lecture with some experiments in the Botanic Garden and work at the Urban Farm.

Prerequisite(s): ENG 001
Note(s): The only prerequisite for this class is a genuine interest in plants, whether from an agro-ecological perspective, an interest in conservation or basic science. Limit 20 students.

Meets the following Core requirements: Critical Analysis, Scientific Inquiry, Written and Oral Communication

Meets the following Gen Ed requirements: Natural Sciences, Quantitative and Computational Reasoning, Written Communication

BIO 100: Microbiology (4 Credits)
A study of the diversity, genetics, physiology, and ecology of microorganisms, with a particular focus on bacteria and viruses. Emphasis is placed on their growth and reproduction both in natural and artificial environments. Topics include cell structure, mechanisms of energy generation, metabolic regulation, growth and control of microbial growth, viral replication, environmental relationships, microbial diseases, and applied microbiology. The laboratory will focus on aseptic technique, identification, microscopic study of bacteria, and control of microbial growth.

Prerequisite(s): BIO 001

Meets the following Core requirements: Critical Analysis, Written and Oral Communication

Meets the following Gen Ed requirements: Written Communication

BIO 125: Principles of Ecology (4 Credits)
Ecology is the study of the relations between organisms and their natural environments. The goal of this course is to introduce students to ecological theory and empirical evidence in an effort to explain processes operating at multiple levels of organization. Levels span from individuals to populations, communities, and ecosystems. The course provides students with breadth in ecological principles spanning all of these levels, and challenges students to conduct directed research projects in the Bay Area to test their own hypotheses in an effort to explain observed ecological patterns.

Prerequisite(s): BIO 002
Note(s): Will not be offered in 2018-2019.

Meets the following Core requirements: Create, Innovate & Experiment, Quantitative Literacy, Written and Oral Communication II

BIO 132: Developmental Biology (4 Credits)
This course focuses on current techniques and strategies for working with and studying genes and genomes. The course also discusses what has been learned thus far about genes and genomes, and non-research applications of the techniques and strategies. Within the context of these subjects, the course aims to provide skill development in the areas of experimental design and analysis, reading of scientific literature, and genetics laboratory techniques. Lecture, laboratory, and workshop.

Prerequisite(s): BIO 001

BIO 135Y: Genetics (0.75 Credits)
BIO 136: Developmental Biology (4 Credits)
Morphological and molecular aspects of the development of multicellular organisms. Topics include gametogenesis, fertilization, morphogenesis, pattern formation, cell-extracellular matrix and cell-cell interactions, and induction and regulation of gene expression. Lecture and laboratory.

Prerequisite(s): BIO 001 and CHEM 017

BIO 138: Basic Microbiology (4 Credits)
BIO 144: Animal Behavior (3 Credits)
This course is an introduction to the fundamental principles of how and why animals behave in the ways in which they do. It will focus on understanding the development, mechanisms, ecological function, and evolutionary origins of behavioral traits. Topics include learning, neural and genetic mechanisms, hormonal actions, evolutionary adaptations, life history strategies, survival, foraging, habitat selection, communication, reproduction, sexual selection, mating systems, parental care, social behavior, cooperation, human behavior, and applied animal behavior.

Prerequisite(s): BIO 001 and (BIO 002 or PSYC 049)
Note(s): Student-led discussion of the primary literature is a major focus of this course and therefore requires that the class remains small to ensure high-quality discussions. Limit 20 students.

Meets the following Core requirements: Critical Analysis, Written and Oral Communication II

Meets the following Gen Ed requirements: Written Communication

BIO 148: Evolution (3 Credits)
This course covers major concepts of evolutionary biology including population genetics, speciation, the origin of adaptations, the history of life, phylogenetic analysis, and the historical background of evolutionary theory.

Prerequisite(s): BIO 001 and BIO 002
Note(s): Students with a record of strong performance in Biology 001 may take Evolution concurrently to Biology 002, with prior written consent of the instructor. Limit 20 students. Open to undergraduates only. Open to sophomores, juniors, seniors, and graduate students.

BIO 133: Molecular Cell Biology (4 Credits)
A study of the cell at the molecular level, including cellular organization and function, how cells communicate intra- and intercellularly, and how cellular processes are investigated. Lecture and laboratory.

Prerequisite(s): BIO 001 and BIOC 141
Note(s): Prerequisites: BIO 001 and BIOC 141 or permission of instructor. Recommended courses: BIO 135. Open to juniors, seniors, and post-baccalaureate students. Limit 24 students.
BIO 149: Conservation Biology (4 Credits)
Quantitative treatment of the central concepts in ecology as applied to complex conservation problems. Topics include: mathematical modeling of single populations and species interactions; stochastic and deterministic processes of extinction; demographic modeling and Population Viability Analyses of small, isolated or declining populations; conservation genetics; community-level causes and consequences of the decline of single species; design of effective conservation plans using quantitative approaches. Lecture with lab (conducting PVAs; discussing peer-reviewed literature; field trips).
Prerequisite(s): BIO 125 or BIO 135 or BIO 148
Note(s): Occasionally sophomores will have the prerequisites for this course. Sophomores (but not juniors or seniors) should consult with the professor before registering. Limit 20 students. Open to undergraduates only. Open to sophomores, juniors, and seniors only.
Meets the following Core requirements: Critical Analysis, Quantitative Literacy, Written and Oral Communication II
Meets the following Gen Ed requirements: Written Communication

BIO 153: Human Physiology (3 Credits)
The study of the functioning of the human body. Topics include basic cell functions, the control systems, and the coordinated body functions performed by the cardiovascular, respiratory, excretory, digestive, and reproductive systems. Emphasis is on the interaction of body functions involved in homeostasis.
Prerequisite(s): BIO 001 and BIO 002 and CHEM 018

BIO 155: Plant Ecology (4 Credits)
An exploration of the ecology of plant form, function, distribution, abundance and diversity across the globe. Topics include ecophysiology, pollination ecology, herbivory, seed predation and dispersal; diseases; disturbance and succession; the effect of diversity on stability and productivity. Lecture with lab, experiments and field trips.
Prerequisite(s): BIO 002
Note(s): On occasion sophomores may have completed BIO 002 and may enroll in this course with instructor permission. Limit 20 students. Open to undergraduates only. Open to sophomores, juniors, and seniors only.
Meets the following Core requirements: Create, Innovate & Experiment, Quantitative Literacy, Written and Oral Communication II
Meets the following Gen Ed requirements: Written Communication

BIO 158: Marine Biology (4 Credits)
Description of basic physical, chemical, geological, and geographical characteristics of the marine environment. Subsequent focus on the diversity of marine life—animals and plants will be considered from both an organismal perspective (form and function), and an ecological perspective (their habitats and interactions with each other/their environment). Communities studied will include coral reefs, deep sea benthos, plankton, nektont, and intertidal assemblages. The impact of humanity on the world's oceans will also be considered. Lecture and laboratory.
Prerequisite(s): BIO 001 and BIO 002

BIO 161: Vertebrate Biology (4 Credits)
Anatomy, evolution, physiology, behavior, ecology, and natural history of the various classes of the vertebrates. Lecture and laboratory.
Prerequisite(s): BIO 001 and BIO 002

BIO 175: Neurobiology (4 Credits)
The biological basis of nervous system function: how the concerted activities of molecules working together in signaling pathways and cells working together in neural circuits give rise to the transduction of sensory information, information processing and storage, and the direction of motor activity. Topics include mechanisms of cellular communication, the nature of information coding in various neural circuits, nervous system development, and molecular mechanisms of learning and memory. Lecture, lab, and discussion section.
Prerequisite(s): BIO 001 and BIO 002

BIO 179: Directed Research (1-3 Credits)
BIO 180A: Community-based conservation in a biodiversity hotspot: Ecuador (3 Credits)
This course will focus on the ecology and conversation of the Ecuadorian cloudforests, of the most diverse areas in the world. Topics include tropical ecology, reserve design, and the economics and ethics of ecotourism. This immersive course based in Ecuador will be a combination of discussion, experiential learning in the field, and service work with members of a community conservation consortium. Students will apply an understanding of tropical ecology to the challenges of conservation and take an interdisciplinary approach to evaluating the success of such programs.
Prerequisite(s): BIO 002
Note(s): In some cases, sophomores will have the relevant background for this course and may register with consent of the instructor. Students must be able to travel internationally and be comfortable working or hiking outside in nature reserves for 6 – 8 hours per day. No Spanish language skills are required. Limit 12 students. Open to undergraduates only. Open to sophomores, juniors, and seniors only.
Meets the following Core requirements: Critical Analysis, Community Engagement, Scientific Inquiry
Meets the following Gen Ed requirements: Natural Sciences

BIO 181: Immunology (4 Credits)
A study of the complex set of reactions between the molecules and cells that comprise the immune system. This includes the physical, chemical, and physiological characteristics of the components of this system as well as the malfunctions that can occur (autoimmune diseases, hypersensitivities, etc.). Lecture and laboratory.
Prerequisite(s): BIO 001

BIO 191: Senior Seminar (4 Credits)
Designed to help senior major students attain proficiency in scientific analysis, writing, and oral presentation. Guides preparation of the senior thesis. The senior thesis may be focused on presentation of a student's faculty-supervised, original research, or may be a comprehensive analysis of published literature on a biological topic.
Prerequisite(s): BIO 125 or BIO 148 or BIO 135
Note(s): Students are required to take either BIO 125 or BIO 148 or BIO 135. AND one upper-division Biology Department course before taking BIO 191. Limit 30 students.