

# BIOLOGY (BIO)

## Courses and Descriptions

### BIO 100 Life Science 3 Credits

An introductory course for non-science majors in which students develop an understanding of the nature of science and are introduced to foundational topics in the biological life sciences and how they relate to human affairs. The course may emphasize human evolution, genetics, aging, disease, reproduction, bioethics or other topics in biology. This course counts towards the fulfillment of the Disciplinary Perspectives element of the CLAS general education curriculum.

### BIO 102 The Biology of Cannabis 1.5 Credits

In this course, you will learn about many aspects of the biology of cannabis, including botany, genetics, growth techniques, strain selection, and health benefits. Emphasis is placed on current methods in the marijuana industry to help legal growers and professionals understand best practices for cultivation, management, and medicinal use. Current literature and sources will be discussed.

### BIO 110 Life Science: Inquiry Approach 4 Credits

An introductory course for non-science majors in which students develop an understanding of biological evolution, the molecular basis of heredity, the cell, matter, energy and organization in living systems, and the interdependence of organisms. In addition, students will develop an understanding of science as a human endeavor, the nature of scientific knowledge, and historical perspectives. Through investigative activities, students will develop an understanding about scientific inquiry and develop abilities necessary to do scientific inquiry. Three hours of lecture and one three-hour lab per week.

**Corequisite(s):** BIO 110L.

### BIO 110L Life Science: Inquiry Approach Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 110.

### BIO 115 Principles of Biology I 4 Credits

An introductory biology course focusing on major themes of biology: what is life?; Cells as fundamental structure and functional unit of life; information transmission, storage and retrieval; Diversity and unity of life explained by evolution. Three hours of lecture and one three-hour lab per week.

**Corequisite(s):** BIO 115L.

### BIO 115L Principles of Biology I Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 115.

### BIO 116 Principles of Biology II 4 Credits

An introductory biology course focusing on major themes of biology: Energy and matter to carry out life's essential functions; Interdependent relationships characterize biological systems (homeostasis, growth & development); Behavior of living things; Ecology and the environment. Three hours of lecture and one three-hour lab per week.

**Corequisite(s):** BIO 116L.

### BIO 116L Principles of Biology II Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 116.

### BIO 206 The Pharmaceutical Industry 3 Credits

An introduction to drug discovery and development. Topics include how drugs are used to diagnose, cure, treat, and prevent disease and how drugs affect body function. The origins of diseases and the early attempts at treatment are also covered. Designed for business majors; does not satisfy requirements for the biology major.

**Prerequisite(s):** any BIO1XX or BNS1XX or CHE 1XX.

### BIO 210 Hospital Intern Program 2 Credits

An internship that provides students with the experience in the practical aspects of medicine. Major departments in the hospital such as the emergency room, operating room, clinic, radiology, and the laboratory will be open for student rotations. Field trips to various medical schools in the area will provide information on professional school educational opportunities available in the health professions.

**Prerequisite(s):** sophomore standing or above and permission of instructor.

### BIO 215 Medical Microbiology 4 Credits

Biology of prokaryotes of medical interest with emphasis placed on diversity and host-pathogen interaction. Current research literature will be covered and presented by students. Methods of microbial identification are introduced in the laboratory and applied in the identification of mock clinical isolates. Three hours of lecture and one three-hour lab per week.

**Prerequisite(s):** BIO 115, BIO 116 with a grade of C or better in each course,

**Corequisite(s):** BIO 215L.

### BIO 215L Microbiology Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 215.

### BIO 221 Human Anatomy & Physiology I 4 Credits

A comprehensive survey of the structure and function of musculo-skeletal systems, neuroendocrine systems and related tissues and cellular interactions. Physiological applications include homeostasis, muscle dynamics, and cell activities. Laboratory exercises complement lecture material through the use of animal dissections, wet labs, computer-assisted investigations, microscopy, and models. Exams, case histories, personal investigations, and lab practicums assess learning. Course emphasis supports allied health and pre-professional training. Three hours of lecture and one three-hour lab per week. Designed for allied health students; does not satisfy requirements for the biology major. **Prerequisite(s):** HSC major ONLY or Permission of instructor.

**Corequisite(s):** BIO 221L.

### BIO 221L Human Anatomy & Physiology I Lab 0 Credits

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 221.

**BIO 222 Human Anatomy & Physiology II 4 Credits**

A comprehensive survey of the organ systems of the body including special senses, cardiovascular, respiratory, digestive, excretory, reproduction and development. Physiological components include electrolytes, metabolism, nutrition, and the mechanisms of homeostasis and cell reception. Lab studies support lecture material through dissections, wet labs, computer-assisted learning, microscopy, and models. Assessment includes lab practicums, exams, and reports. Course emphasis supports allied health and pre-professional training. Designed for allied health students; does not satisfy requirements for the biology major. Prerequisite(s): BIO 221.

**Corequisite(s):** BIO 222L.

**BIO 222L Human Anatomy & Phys II Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 221L.

**Corequisite(s):** BIO 222.

**BIO 260 Principles of Biology: Evolution, Diversity, and Biology of Cells 4 Credits**

Lectures and labs focus on basic cell biology. Cell diversity and function, genetics and biotechnology are emphasized. Three hours of lecture and one three-hour lab per week. Prerequisite(s): BIO 115/115L and BIO 116/116L or BIO 115, BIO 117, (BNS 118 or BNS 275).

**Corequisite(s):** BIO 260L.

**BIO 260L Principle of Biology: Cells Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 260.

**BIO 265 Genetics 4 Credits**

A comprehensive course focusing on molecular, Mendelian, and population genetics. Topics covered will include molecular advances in the study of genetics, including genomics and bioinformatics; evolution and the effects of genetic mutations; the application of population genetics to forensic science; genetic problem solving, including genetic crosses and statistical analysis; and regulation of gene expression. The laboratory for this course will introduce students to commonly used genetic model organisms and basic molecular biology techniques. Three hours of lecture and one three-hour lab per week. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and (BIO 117 with a minimum grade of C or BIO 260 with a minimum grade of C)

**Corequisite(s):** BIO 265L.

**BIO 265L Genetics Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and (BIO 117 with a minimum grade of C or BIO 260 with a minimum grade of C)

**Corequisite(s):** BIO 265.

**BIO 272 Intro to Marine Biology 4 Credits**

Introduces students to the study of marine environments, emphasizing the diversity, ecology, and physiology of marine animals, algae, and plants. Aspects of the human impact on marine environments are also discussed. Prerequisite(s): BIO 115 or BIO 116 or BNS 118 and grade of "C" or better.

**Corequisite(s):** BIO 272L.

**BIO 272L Marine Biology Laboratory 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 272.

**BIO 290 Special Topics in Biology 3 Credits****BIO 300 Developmental Biology 4 Credits**

Lectures and laboratories explore molecular, cellular, and genetic mechanisms of animal development. Aspects of gametogenesis, fertilization, induction, cytoplasmic determinants, morphogenetic movements, differentiation and developmental evolution are discussed. Three hours of lecture and one three-hour lab per week. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and (BIO 117 with a minimum grade of C or BIO 260 with a minimum grade of C)

**Corequisite(s):** BIO 300L.

**BIO 300L Developmental Biology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and (BIO 117 with a minimum grade of C or BIO 260 with a minimum grade of C)

**Corequisite(s):** BIO 300.

**BIO 305 Animal Physiology 4 Credits**

Study of the principles and mechanisms of animal physiology. Topics include the nervous system, muscle physiology, cardiovascular physiology, respiration, gastrointestinal activity, renal function, and endocrine physiology. Lectures and laboratory exercises emphasize homeostatic mechanisms and organ-system interactions. Three hours of lecture and one three-hour lab per week.

**Prerequisite(s):** BIO 115 and BIO 116 with a grade of C or better in each course.

**BIO 305L Animal Physiology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course.

**Prerequisite(s):** BIO 115 and BIO 116 with a grade of C or better in each course.

**BIO 310 Health and Ecology in Central America 3 Credits**

This interdisciplinary course seeks to provide a unique educational experience for students to explore the relationship between human health, ecological health, and environmental concerns. Using a country in Central America as our focus (e.g., Costa Rica or Panama) we will begin by studying the health care system, including visits to several hospitals and clinics to see firsthand some of the challenges they face. We will also examine the ecotourism industry in the country, including visits to coffee plantations and a National Wildlife Refuge on the coast, again with a focus on environmental health challenges. We begin our exploration of these topics with three pre-departure meetings at Rider University during the Fall semester. We continue our experience with a ten-day trip to Central America during the January term and will meet for four additional class sessions during the Spring semester.

**BIO 335 Plant Biology 4 Credits**

Biology of seed plants, including growth, development, and reproduction of flowering plants. Emphasis is placed on acclimation and adaptations demonstrating environmental influences on plant structure and function. Current literature involving molecular mechanisms of control will be discussed. Three hours of lecture and one three-hour lab per week. One Saturday field trip. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C.

**Corequisite(s):** BIO 335L.

**BIO 335L Modern Plant Biology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C

**Corequisite(s):** BIO 335.

**BIO 340 Evolutionary Biology 4 Credits**

Where did we come from? This course will explore the generation of biological diversity on earth. Course topics will include: the history of evolutionary thought; the different lines of evidence and fields of inquiry that bear on our understanding of evolution; selection vs. random changes in populations over time; speciation; extinction; the molecular basis of evolution; and evolutionary developmental biology. Three hours of lecture and one three-hour lab per week. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and BIO 260 with a minimum grade of C Co-requisite(s): BIO 340L.

**BIO 340L Evolutionary Biology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and BIO 260 with a minimum grade of C Co-requisite(s): BIO 340.

**BIO 350 General Ecology 4 Credits**

An investigation of the processes that regulate the distribution of plants and animals throughout the biosphere. Relationships among species and their interactions with the environment are stressed. Quantitative analyses of experimental results and current research in basic and applied ecology are discussed. Laboratory activities explore conceptual models using both field activities and computer simulations. Three hours of lecture and one three-hour lab per week. One Saturday field trip (laboratory time will be adjusted accordingly). Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C

**Corequisite(s):** BIO 350L.

**BIO 350L General Ecology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C

**Corequisite(s):** BIO 350.

**BIO 370 Immunology 4 Credits**

An introduction to the cells and molecules of the immune system with emphasis on recent advances. Topics include AIDS, autoimmunity, transplantation, and cancer. Readings from current journals will be discussed and presented by students. The laboratory will introduce current research techniques and then apply these to a research problem with critical analyses of the data generated. Three hours of lecture and one three-hour lab per week. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and (BIO 260 with a minimum grade of C or BIO 117 with a minimum grade of C)

**Corequisite(s):** BIO 370L.

**BIO 370L Immunology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course. Prerequisite(s): BIO 115 with a minimum grade of C and BIO 116 with a minimum grade of C and (BIO 260 with a minimum grade of C or BIO 117 with a minimum grade of C)

**Corequisite(s):** BIO 370.

**BIO 372 Behavior of Marine Organisms: Evolutionary Approach 4 Credits**

An examination of the underlying mechanisms and evolutionary causes of behavior, including habitat use, feeding, and mate choice, particularly in marine organisms. The laboratory will involve collecting, analyzing and interpreting field data and performing experiments in the lab using a variety of marine organisms including fish and crabs. Three hours of lecture and one three-hour lab per week. Some full-day field trips (usually on a weekend) are required. Prerequisite(s): BIO 115, BIO 116 with a grade of C or better in each course.

**Corequisite(s):** BIO 372L.

**BIO 372L Behavior of Marine Organisms: Evolutionary Approach Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 372.

**BIO 390 Special Topics in Biology 4 Credits**

This course will provide students the opportunity to deeply explore a specialized topic in the broad field of biological sciences. The course entails 3 hours of lecture and 3 hours of laboratory per week, and may satisfy upper-level biology course requirements for the Biology, Behavioral Neuroscience, and/or Health Sciences majors. Examples may include such topics as ornithology, ethnobotany, entomology, neuroelectrophysiology, or exercise physiology, among other possibilities. Prerequisite(s): BIO 115/BIO 115L and BIO 116/BIO 116L.

**Corequisite(s):** BIO 390L.

**BIO 390L Special Topics in Biology Lab 0 Credits**

This lab is a co-requisite and must be taken with the corresponding course.

**Corequisite(s):** BIO 390.

**BIO 400 Seminar in Cellular and Molecular Biology 3 Credits**

Critical analysis of the scientific literature pertaining to current topics in cell and molecular biology. Topics may include: genomics, regulation of gene expression, development, and molecular processes of disease. Three hours of lecture per week.

**Prerequisite(s):** BIO 115, BIO 116, (BIO 260 or BIO 117) with a grade of C or better in each course, junior standing, and permission of instructor.

**BIO 416 Bioinformatics 3 Credits**

A comprehensive overview of relevant computer-based technologies used in genome research, DNA sequence analysis, and evolutionary biology. Will focus extensively on Internet resources and predictive algorithm usage for determining evolutionary relationships of organisms based on molecular evidence. Lectures will focus on terms and concepts frequently used in genomic and bioinformatic research, while computer labs will allow students to perform hands-on projects with actual DNA sequence data.

**Prerequisite(s):** BIO 115, BIO 116, (BIO 260 or BIO 117) with a grade of C or better in each course, junior standing, permission of instructor and BIO 265 recommended.

**BIO 420 Seminar in Organismal Biology 3 Credits**

Critical analysis of the scientific literature pertaining to current topics in physiology and organismal biology. Topics may include hormonal control of behavior, immune pathogen interactions, and other aspects of whole animal and/or plant biology. Three hours of lecture per week.

**Prerequisite(s):** BIO 115, BIO 116 with a grade of C or better in each course; junior standing, and permission of instructor.

**BIO 450 Seminar in Ecology & Evolution 3 Credits**

Critical analysis of the scientific literature pertaining to current topics in ecology and evolutionary biology. Ecology and evolution of terrestrial and aquatic systems may include scales of adaptation, mechanisms, or human impacts. Three hours of lecture per week.

**Prerequisite(s):** BIO 115, BIO 116 with a grade of C or better in each course; junior standing, and permission of instructor.

**BIO 490 Independent Study: Research and Creative Expression 1-4 Credits**

Immerses the student in field or laboratory research. The student learns to organize material, use the literature, make precise measurements, and obtain reproducible data. If possible, the student will publish the results or present them at a scientific meeting.

**BIO 491 Internship in Biology 1-4 Credits**

A supervised work experience in an approved organization where qualified students gain real-world knowledge and utilize their academic training in a professional environment. Placement may be in private, public, non-profit, or governmental organizations. These can include educational or research institutions. The method of evaluation will be formalized prior to the approval of the internship by the sponsoring faculty and should include keeping a journal of activities, a term paper or project report and a poster presentation. 2.5 GPA required.

**Prerequisite(s):** Permission of the instructor.