

Biology

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Curricula

Biology and Physical Education curricula offer students the opportunity to study the structure and function of living systems, from the complexity of cellular components to whole organism dynamics to ecosystem design.

Bachelor of Science in Biology

The Bachelor of Science in Biology prepares students for admission into graduate, medical, optometry, dentistry, and veterinary medical schools, as well as for immediate employment in the areas of environmental science, biotechnology, and teaching. Recent graduates are engaged in all of these areas. A core curriculum of science, mathematics and English courses ensures development of appropriate analytical and

communication skills. Rounding out the major, seven free biology electives and 10 totally free electives allow students to mold their programs to meet specific career goals and develop one or more minors and/or double majors. A special Pre-medical Committee oversees our Pre-medical/Pre-dental track and assists in the placement of our graduates. Students who major in Biology may also elect a concentration in Neuroscience (<http://catalog.norwich.edu/archives/2014-15/residentialprograms/catalog/collegeofscienceandmathematics/neuroscience>).

Biology is the scientific discipline that investigates life in all of its forms. An appreciation of the complexity of structure and function requires the use of a variety of teaching tools, including the use of living and preserved organisms. Consequently, both living and preserved organisms will be ethically and humanely employed whenever appropriate to further student understanding and appreciation for life.

B. S. in Biology – Curriculum Map

First Year			
Fall	Credits	Spring	Credits
BI 101 Principles of Biology I	4	BI 102 Principles of Biology II	4
CH 103 General Chemistry I	4	CH 104 General Chemistry II	4
MA 107 Precalculus Mathematics	4	MA 108 Applied Calculus or 232 Elementary Statistics	3-4
EN 101 Composition and Literature I	3	EN 102 Composition and Literature II	3
	15		14-15
Second Year			
Fall	Credits	Spring	Credits
BI 202 Genetics	4	CH 226 Organic Chemistry II	4
CH 225 Organic Chemistry I	4	EN 202 World Literature II	3
EN 201 World Literature I	3	BI 306 Cell Biology	4
BI 203 Introduction to Scientific Method & Bioscientific Terminology	1	Free Elective	3
Free Elective	3		
	15		14
Third Year			
Fall	Credits	Spring	Credits
BI Elective	4	BI Elective	4
PS 201 General Physics I	4	PS 202 General Physics II	4
History Elective ¹	3	Humanities Elective ²	3
Free Elective	3	Ethics (PH 303, PH 323, PH 350)	3
Free Elective	3	Free Elective	3
	17		17

Fourth Year			
Fall	Credits	Spring	Credits
BI Elective	4	BI Elective	4
BI 401 Senior Seminar	3	Social Science Elective ³	3
Free Elective	3	Free Elective	3
BI 405 Ecology	4	BI 402 Evolution	4
	14		14
Total Credits: 120-121			

¹ History Elective = any History Department course (HI) except HI 209.

² Humanities Elective = EN (above EN 206, excluding EN240 - EN 242); FA, MU 101; CM 109, CM 261, CM 335, CM 436: Modern Language (above 112); or PH.

³ Social Science Elective = any PY, SO, EC or PO course.

Biology Minor

Must earn a C or higher in all courses.

BI 101	Principles of Biology I	4
BI 102	Principles of Biology II	4
4 additional BI 200+ courses (of three or four credits), three of which must be 4-credit laboratory courses ¹		12-16
Total Credits		20-24

¹ PE 365, PE 371, or CH 324 may be used as a substitute for one BI 200+ course toward the minor.

Courses

BI 101 Principles of Biology I 4 Credits

This course is the prerequisite for all biology courses and satisfies general education laboratory science requirements for both majors and non-majors. This course gives an introduction to biochemistry, cell structure, metabolism, and protein synthesis, as well as human anatomy and physiology. Dissection of living and preserved animals is required. Classroom 3 hours, laboratory 2 hours. Offered fall and spring semesters.

BI 102 Principles of Biology II 4 Credits

This course is a prerequisite for most biology courses and satisfies general education laboratory science requirements for both majors and non-majors. This course explores genetics, evolutionary theory, diversity of life on earth, history of life on earth, and ecology. Dissection of preserved animals is required. Classroom 3 hours, laboratory 2 hours. Prerequisite: BI 101 or permission of the instructor. Offered spring semesters.

BI 122 Concepts in Biology 4 Credits

A lab science course designed exclusively for non-science majors that aims to give students an appreciation of the major concepts and current topics in biology. Concepts may include cell structures, photosynthesis, cellular respiration, genetics and ecology as well as human anatomy and physiology. Current topics may include stem cell research, nutrition, diseases, steroid abuse, traumatic brain injury, global climate change, and other pertinent issues. The course meets the general education requirement for laboratory science, but cannot be counted towards a biology major or minor. Credit may not be earned for both BI 101 and BI 122. Classroom 3 hours, laboratory 2 hours. Offered spring semesters.

BI 202 Genetics 4 Credits

The physical and chemical basis of inheritance, expression, and interaction of the hereditary units, linkage, and variation. The application of Mendelian principles to plants and animals. Consideration is also given to microbial and viral genetics and genetic engineering. Classroom 3 hours, laboratory 2 hours. Prerequisites: BI 101, BI 102. Offered fall semesters.

BI 203 Introduction to Scientific Method & Bioscientific Terminology 1 Credit

An introduction to the philosophy of science, the scientific method and bioscientific terminology. Analysis of data and interpretation of scientific and science-related popular press articles is stressed. Includes exposure to various forms of scientific communication and data collection and analysis. Prepares the student for the rigors of majoring in the biological sciences. Classroom 1 hour. Prerequisites: Sophomore standing, major in Biology.

BI 215 Human Anatomy and Physiology 4 Credits

This is the first half of a two semester course exploring human anatomy and physiology. It covers cellular metabolism, tissues, and the following body systems: skeletal, muscle, coetaneous, and nervous. Dissection of preserved animals is required. Classroom 3 hours, laboratory 2 hours. Prerequisite: BI 101 or permission of the instructor. Offered fall semesters.

BI 216 Human Anatomy and Physiology 4 Credits

This is the second half of a two semester course exploring human anatomy and physiology. It investigates the following body systems: endocrine, digestive, respiratory, circulatory, lymphatic (including the immune response), urinary, and reproductive. Dissection of preserved animals is required. Classroom 3 hours, laboratory 2 hours. Prerequisite: BI 215 or permission of the instructor. Offered spring semesters.

BI 220 Introductory Microbiology 4 Credits

A survey of the field of microbiology with emphasis on those microorganisms of medical significance. Fundamentals of microbial structure, physiology and control are considered along with the role of pathogenic organisms in the infectious and disease processes. Laboratory exercises are designed to provide facility in visualizing, staining, culturing, enumerating, isolating, maintaining, and identifying micro organisms. Classroom 3 hours, laboratory 2 hours. Prerequisite: BI 101 or permission of the instructor. Offered spring semesters.

BI 240 Environmental and Food Microbiology 4 Credits

A course designed to develop an awareness of the essential role of microbes in maintaining the biosphere and the quality of life of its human inhabitants. The role of microorganisms as degraders, bioremediators and recyclers of essential elements will be presented and reinforced through laboratory exercises. The dependence of humans on microorganisms for health, food transformation, pharmaceutical production and genetic engineering will be explored in lecture and lab. Controversies surrounding the use of biotechnology to produce genetically engineered foods and animals as well as agents for bioterrorism, will be discussed. Classroom 3 hours, laboratory 2 hours. Prerequisites: BI 101, BI 102 or permission of the instructor. Offered even-numbered fall semesters.

BI 253 Foods and Nutrition 4 Credits

A course designed to provide the student with a background in organizational structure and activities that emphasize the physiological basis of nutrition with an analysis of nutritional needs at various age levels. Consideration given to the relationship of nutrition to health and fitness, principles of food selection, metabolism of nutrients, vitamins and minerals, energy balance and obesity, food safety and technology. Classroom 3 hours, Field Experience/Laboratory 2 hours. Prerequisite: BI 101. Offered spring semesters.

BI 260 Ornithology 4 Credits

A survey of avian biology and ecology to include evolution, the anatomical and physiological adaptations for flight, migration, behavior, reproduction and identification of birds and their songs. Integrated classroom, laboratory, and field studies will emphasize Vermont birds. Dissection of the pigeon during the spring semester is an integral part of the spring course's laboratory component. The summer course features a nesting study in lieu of dissection. Classroom 3 hours, laboratory 2 hours. Offered spring semesters.

BI 275 Environmental Biology 4 Credits

An introduction to the interaction of man and the environment with emphasis on contemporary problems and their possible solutions. Local and global forms of pollution, detrimental environmental practices, and other relationships will be explored in the classroom and the laboratory. Classroom 3 hours, laboratory 2 hours. Prerequisites: BI 101, BI 102 or permission of the instructor. Offered even-numbered spring semesters.

BI 302 Embryology 4 Credits

A study of the fundamental principles of development through the establishment of the major organs and systems, exemplified in the laboratory by study of representative embryonic forms. May require dissection of living and preserved animals. Classroom 3 hours, laboratory 2 hours. Prerequisite: BI 101, BI 102 or permission of instructor. Offered even-numbered spring semesters.

BI 304 Physiology 4 Credits

A study of the comparative physiology of animals. Physical and chemical principles, cell physiology, with emphasis on homeostatic mechanisms and the study of functions of organ systems. May require dissection of living animals. Classroom 3 hours, laboratory 3 hours. Prerequisites: BI 101, BI 102, and 1 year of college chemistry. Offered even-numbered spring semesters.

BI 305 Biomedical Techniques 4 Credits

Students are familiarized with the theories and applications of the new technologies that pervade the fields of biotechnology and molecular biology. Laboratory exercises illustrate key concepts and provide hands-on experience in the use of instrumentation essential to molecular biologists. Classroom 2 hours, laboratory 4 hours. Prerequisites: BI 101, BI 102 or BI 215, BI 216, and CH 103, CH 104. Offered odd numbered fall semesters.

BI 306 Cell Biology 4 Credits

A molecular level examination of the ultrastructure and function of the cytoplasm, intracellular components, cell membrane, extracellular structures and formation, and excretion of extracellular products. Recent developments in molecular biology will be stressed, including the implications for the biotechnology industry. The laboratory component will include state-of-the-art procedures and will emphasize hands-on experimental techniques. May require dissection of living animals. Classroom 3 hours, laboratory 3 hours. Prerequisites: BI 101, BI 102 and one year of college chemistry. Offered even-numbered fall semesters.

BI 316 Plant Taxonomy 4 Credits

A general survey of the taxonomy and evolution of vascular plants, emphasizing herbaceous plants. Recognition of plant families, identification of species, and principles of collecting and preserving are stressed. Classroom 3 hours, laboratory 3 hours. Prerequisite: BI 102 or permission of instructor. Offered even-numbered fall semesters.

BI 325 Invertebrate Zoology 4 Credits

A fundamental course designed to give the student a general knowledge of the structure, physiology, life histories, and ecology of the invertebrate animals. Requires dissection of living and preserved animals. Classroom 3 hours, laboratory 2 hours. Prerequisites: BI 101, BI 102. Offered even-numbered fall semesters.

BI 326 Natural History of the Vertebrates 4 Credits

A study of the classification, identification, and ecology of the vertebrates with special emphasis on the local fauna. Collection and preservation of organisms is an integral part of the course. Classroom 3 hours, laboratory 3 hours. Prerequisites: BI 101, BI 102. Offered odd-numbered fall semesters.

BI 330 Immunology 4 Credits

A course presenting the basic principles of immunology, including antigen-antibody characteristics, the role of the immune system in defense and disease, and the application of fundamental concepts in the development of new technologies and immunodiagnosis. Classroom 3 hours, laboratory 3 hours. Prerequisites: BI 101, BI 102 or BI 215, BI 216, and 1 year of college chemistry. Offered odd-numbered spring semesters.

BI 341 Plant Anatomy 4 Credits

[CAB1 (A), CAB2 (B), CAB5 (S)] The anatomy of vascular plants analyzed from an evolutionary viewpoint. Cell structure, tissues, their distribution in roots, stems, leaves and reproductive organs, and plant development are stressed. Classroom 3 hours, laboratory 3 hours. Prerequisite: BI 102 or permission of instructor. Offered odd-numbered spring semesters.

BI 351 Dendrology and Silvics 4 Credits

An introduction to major woody plant species in the Northeast, including taxonomic characteristics, life histories, habitat requirements, and economic importance. Classroom 3 hours, laboratory and/or field work 3 hours. Prerequisite: BI 102 or permission of instructor. Offered odd-numbered fall semesters.

BI 360 Pathophysiology 3 Credits

The study of human illness with primary emphasis on the pathogenesis of disease, its disruption of normal physiology, and the body's mechanism for restoring the steady state. The biology of the disease process is examined at the molecular, cellular, tissue, organ, and organ system level. Classroom 3 hours. Prerequisites: minimum "C" grade in BI 215, BI 216 or permission of instructor. Offered fall semesters.

BI 364 Pathophysiology in Sports Medicine 4 Credits

The study of human pathology with primary emphasis on the pathogenesis of those pathological states most commonly encountered in sports medicine, their disruption of normal physiology and the body's mechanism for restoring the steady state (homeostasis). The biology of the disease process is examined at the molecular, cellular, tissue, organ and organ system level. Classroom 3 hours, laboratory 2 hours. Prerequisites: BI 215 & BI 216 with "C" or higher, or permission of instructor. Offered even-numbered spring semesters.

BI 370 Introduction to Neuroscience 4 Credits

An interdisciplinary course designed to introduce the structure and function of the mammalian nervous system. Topics include, but are not limited to, neuronal development, sensory and motor systems, chemical control of the brain and behavior, and the underlying mechanisms of neurodegenerative disease. May require dissection of living animals. Classroom 3 hours, laboratory 2 hours. Prerequisites: BI 101 and either BI 215 or PY 230. Offered fall semesters.

BI 399 Topics in Biology 4 Credits**BI 401 Senior Seminar 3 Credits**

This is the capstone course that integrates reading, writing, speaking and critical thinking skills. It includes instruction in scientific writing, use of contemporary scientific biological literature, library research techniques, and requires a major paper considering ethics in science and research. Students will prepare research papers on current topics using primary sources and give oral presentations on their topics to the department faculty. Classroom 3 hours. Prerequisites: senior class standing or permission of the instructor. Offered fall semesters.

BI 402 Evolution 4 Credits

This course is designed to introduce the student to Darwinian and Non-Darwinian mechanisms of evolutionary change, a history of life in the context of contemporary biology, and scientific and cultural controversies surrounding this topic. Offered Fall semesters. Classroom: 4 hours. Prerequisites - BI 101, BI 102 and BI 202 or permission of the instructor. This class can fulfill the CAB1 (anatomy) or CAB5 (systematic) requirements.

BI 405 Ecology 4 Credits

The interrelationships between living organisms and their total environment are studied through a combination of lecture, laboratory and field studies. Major concepts include ecosystem structure and function, community development, species diversity, succession, interspecific and intraspecific relationships, competition, predation, behavior, population growth and regulation. Collection and preservation of plants and animals may be required. Classroom 3 hours. If taken for four credits also laboratory and/or field work 3 hours. Prerequisites: BI 101, BI 102. Offered fall and spring semesters.

BI 418 Medical Microbiology 4 Credits

A study of pathogenic microorganisms including their general characteristics, physiology, pathogenesis, pathology, diagnosis, treatment, immunity, prevention, and control. Laboratory exercises are designed to familiarize students with diagnostic procedures used in the clinical microbiology laboratory. Classroom 2 hours, laboratory 4 hours. Prerequisite: BI 220 or BI 240. Offered even-numbered spring semesters.

BI 424 Woodland Ecology and Management 4 Credits

A review of biotic and abiotic factors controlling the forest environment, methods for determining vegetation structure and succession, introduction to major forest associations in the Northeast, and consequences of various harvesting and management techniques. Classroom 3 hours, field studies 3 hours. Prerequisites: BI 351 or BI 316, or permission of instructor. Offered even-numbered spring semesters.

BI 440 Reading and Research 3,4 Credits

Independent study under the supervision of a department faculty member. Open to junior and senior majors with permission of instructor. BI 440 may be taken no more than twice, for a maximum of 7 credits. Students requesting this course must have a 3.0 GPA in biology courses or departmental approval. An approved topic, a brief outline of the research to be conducted, and a signature from a biology mentor must be submitted to the department chair before the end of the drop-add period of the enrolled semester.

BI 450 Internship in Biology 3,4 Credits

Internship in Biology.

BI 499 Evolution 4 Credits