

# Department of Biology

Chairperson:	Gali-Muhtasib, Hala U.
Professors:	Baydoun, Elias H.; Darwiche, Nadine D.; Gali-Muhtasib, Hala U.; Knio, Khuzama M.; Kreydiyyeh, Sawsan I.; Safieh-Garabedian, Bared; Talhouk, Rabih S.
Associate Professors:	Bariche, Michel J.; Saoud, Imad P.
Assistant Professors:	Osta, Mike A.; Smith, Colin A.
Lecturers:	<sup>P</sup> Alloush, Habib; <sup>P</sup> Azar, Dany L.; <sup>P</sup> Hamam, Bassam N; <sup>P</sup> Sadek, Riyad A.; Sinno-Saoud, Nada; Tarraf, Charbel G.
Instructors:	<sup>P</sup> Fostok, Sabreen; Hajjar, Layane A.M.; <sup>P</sup> Haykal, Joelle; Rizkallah, Hind D.

The Department of Biology offers programs leading to the degrees of Bachelor of Science and Master of Science. All students admitted as sophomores are eligible to continue in the program provided they obtain, by the end of their third regular semester at AUB, a minimum grade of 70 in BIOL 201 and BIOL 202. No biology major is allowed to register for a biology course for a third time. Transfer to biology from other departments within the Faculty of Arts and Sciences requires departmental approval.

## Undergraduate Program

Departmental requirements for the BS degree in biology are as follows: BIOL 201, 202, 220, 223, and two of the following four courses: BIOL 224, BIOL 252, 260, or 270; and BIOL 293 or 294 (these courses are offered every semester), plus a minimum of 13 credits in biology elective courses including a minimum of one 4 credit course, in addition to the courses: CHEM 201, 210, 211, and 212; STAT 210; PHYS 205 and 205L. The minor in biology requires 15 credits of BIOL courses. The courses are BIOL 201 (4 credits), BIOL 202 (4 credits), plus at least two courses (provided the prerequisites of these courses are satisfied) to complete the 15 credits required for the minor.

Unless otherwise stated, only senior undergraduate biology majors with an average of 80 or above can register in biology graduate courses with consent of instructor.

Students from any field can minor in aquatic and environmental sciences by completing, in addition to BIOL 202 or BIOL 200, a total of 15 credits chosen from the following three lists:

List 1: BIOL 252, BIOL 250, BIOL 256

List 2: BIOL 266, BIOL 246, BIOL 267, BIOL 255

List 3: CHEM 202, PHIL 209, PSPA 288F, BIOL 240, BIOL 258, BIOL 245, BIOL 241, BIOL 250, BIOL 256, BIOL 252, BIOL 254, BIOL 281, BIOL 267, BIOL 246, BIOL 255, BIOL 266, BIOL 286, BIOL 259

Land and Water Resources: LWRS 215, LWRS 275, LWRS 229

Plant Sciences: PLSC 284, PLSC 295

Landscape: LDEM 211, LDEM 215

Ecosystem Management: ECMG 202/ENSC 202

Environmental Health: ENHL 220

Civil Engineering: CIVE 350, CIVE 450

One course from each of lists 1 and 2 is required. All students should take at least three of the total required courses in a field outside their major field of study, and these courses should be from at least two different disciplines. Only one of the courses taken from lists 1 and 2 by biology majors minoring in environmental and aquatic studies is counted toward the major.

### **BIOL 101 Basic Concepts in Biology 3.0; 3 cr.**

A course that deals with the basic concepts in biology, and prepares students for BIOL 201 and BIOL 202. This course introduces the student to the forms and functions of plants and animals, and to the principles of genetics, evolution, and ecology. *Each semester.*

### **BIOL 105 Introductory Biology 3.3; 4 cr.**

An introduction to the fundamental principles of biology. This course covers the basis of life, the structure and function of cells and systems, the general classification and diversity of plants and animals, as well as genetics and ecology. *Occasionally.*

### **BIOL 106 Contemporary Issues in Biology 3.0; 3 cr.**

A course designed to provide freshman students with the scientific background to some of the current topics in biology today. Students get an in-depth treatment of issues such as genetics and molecular biology, as well as topics related to the environment. The understanding of such issues is of value to students at the freshman level wishing to major in the different fields of study. *Each semester.*

### **BIOL 200 Diversity of Life 3.3; 4 cr.**

A course that deals with the basic aspects of cell structure and function, heredity, diversity, classification, evolution and interrelationships of living things, and briefly covers organs and systems in animals and plants. Laboratory activity reflects the contents of the course. Not open to biology majors. *Sophomore standing is required. Each semester.*

### **BIOL 201 General Biology I 3.3; 4 cr.**

An integrated approach to the biology of organisms covering the organization of life, energy transfer through living systems, perpetuation of life, and diversity of life. *Each semester.*

### **BIOL 202 General Biology II 3.3; 4 cr.**

A study of the anatomy and physiology of plants and animals covering their structure, growth, nutrition, transport, reproduction, development, and control systems. This course focuses also on the relationships between structure and function, and stresses the evolutionary adaptation and changes in the different systems of the major plant and animal groups. *Prerequisite: BIOL 201. Each semester.*

### **BIOL 210 Human Biology 3.0; 3 cr.**

A course that covers the fundamental principles of cell biology, genetics, and human biology, with emphasis on the morphology, physiology, and disorder of body systems. *Not open to biology majors. Students cannot receive credit for all three of the following: BIOL 201, BIOL 202, BIOL 210. Each semester.*

**BIOL 220 Introductory Biochemistry 3.0; 3 cr.**  
An introduction to the structure-function relationships of biomolecules, cells, enzymes, and the metabolic reactions of living cells. *Prerequisite: BIOL 202; Pre- or corequisite: CHEM 211. Each semester.*

**BIOL 223 Genetics 3.3; 4 cr.**  
A course that deals with the basic principles of classical and modern genetics with emphasis on the analysis of genetic material and genetic processes at the molecular level. *Prerequisite: BIOL 202. Each semester.*

**BIOL 224 Microbiology 3.3; 4 cr.**  
A course that deals with micro-organisms, especially bacteria, and in particular those of pathogenic and industrial importance. Basic knowledge on isolation, classification, and the various metabolic processes is included in this course. *Prerequisite: BIOL 223. Each semester.*

**BIOL 225 Molecular Biology 3.0; 3 cr.**  
A course that introduces the different techniques of molecular biology and recombinant DNA technology, and discusses the most recent advances in the field. *Prerequisite: BIOL 223. Occasionally.*

**BIOL 230 Plant Morphology 3.3, 4 cr.**  
A study of the form and structure of the different plant divisions on the basis of similarity of plan and origin. Both reproductive and non-reproductive organs are studied. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 233 Non-Vascular Autotrophs and Fungi 2.3; 3 cr.**  
A survey of the biology and classification of bacteria, algae, bryophytes, lichens, and fungi. Life cycles, anatomy, morphology, physiology, and ecology of each group are covered, and their role in diseases and production of food and antibiotics is emphasized. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 234 Vascular Plants 2.3; 3 cr.**  
A course that deals with the structure, life history, and classification of vascular plants, including psilophytes, club mosses, horsetails, ferns, conifers, and flowering plants, emphasizing their evolutionary relationships. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 235 Plant Anatomy 2.3; 3 cr.**  
A course that deals with the structure and function of tissues and organs of higher plants, their origin, and differentiation. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 236 Plant Systematics 2.3; 3 cr.**  
A course that deals with the relationships between and among vascular plants based on evolutionary principles as expressed by systematics. The underlying principles of systematics, including modern molecular technological approaches are provided. Students deal with plant identification, and classification of the major families of local vascular plants. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 240 Animal Behavior 3.0; 3 cr.**  
A course that covers the basic concepts of animal behavior including physiological, genetic, ecological, and evolutionary aspects, as well as exploration of the controversial ideas of sociobiology. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 241 Biology of Invertebrates 3.3; 4 cr.**  
A study of invertebrates, excluding insects, emphasizing their morphological and functional diversity, phylogenetic relationships, classification, development, and adaptation. *Prerequisite: BIOL 202. Annually.*

**BIOL 242 Comparative Vertebrate Anatomy 3.3; 4 cr.**  
A comparative study of the structure and function of selected examples of chordate animals with a presentation of the history of structural organization and association of structural changes with functional adaptations. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 243 Behavioral Neuroscience 3.0; 3 cr.**  
An introduction to the neural basis of behavior. The course surveys the structure and organization of the human brain and how complex behavior arises from it. *Prerequisite: PSYC 102 or 20. Annually.*

**BIOL 244 Introduction to Neurobiology 3.0; 3 cr.**  
A foundation course that introduces students to the functions of the nervous system. Broad and comparative in approach. This course covers material from the molecular to higher organizational levels of neural functions. *Prerequisite: BIOL 202. Annually.*

**BIOL 245 Environmental Physiology of Aquatic Organisms 3.0; 3 cr.**  
A course that describes the strategies used by aquatic animals to deal with environmental variations. Various animal physiological systems are covered with an emphasis on aquatic adaptations. Some topics such as air bladder control, electrical generation and reception, and gill excretion are specific to aquatic organisms and are introduced herein. *Prerequisites: BIOL 200 or BIOL 202. Annually.*

**BIOL 246 Marine Biology 3.3; 4 cr.**  
A course that introduces the biology of life in the marine environment (microbial world, seaweeds and plants, marine animals) as well as the structure and function of the marine ecosystem (e.g., coral reefs, the ocean depths, estuaries). The impact of humans on the marine environment is also covered. *Prerequisite: BIOL 202. Each semester.*

**BIOL 247 Animal Physiology 3.0; 3 cr.**  
A study of the fundamental principles and mechanisms that govern body functions in animals, with an emphasis on the molecular aspects. *Prerequisites: BIOL 202 and senior standing. Annually.*

**BIOL 249 Parasitology 3.3; 4 cr.**  
A general overview on the classification, morphology, development, and physiology of human and animal parasites. *Prerequisite: BIOL 202. Annually.*

**BIOL 250 Biosphere 3.0; 3 cr.**  
A course that focuses on defining global environmental problems such as global warming, acid rain, deforestation, and loss of biodiversity, and introduces methods that can help eliminate or reduce these problems. *Prerequisite: BIOL 202. Annually.*

**BIOL 252 Ecology 3.3; 4 cr.**  
A study of organisms in relation to their biotic and abiotic environment. This course deals with population growth and regulation, species diversity, age structure, succession, food chains, energy flow, and recycling of nutrients. *Prerequisites: BIOL 202 or LDEM 209. Each semester.*

**BIOL 254 Evolution 3.0; 3 cr.**  
A study of the processes that bring about evolutionary changes in organisms, evolutionary trends, patterns of adaptations, and principal factors that influence the patterns of speciation. *Prerequisite: BIOL 223. Annually.*

**BIOL 255 Marine Ecology 3.0; 3 cr.**  
An introduction to the ecology of marine and brackish water ecosystems, structures and processes, with special attention to the eastern Mediterranean Sea. Interrelationships among animals, plants, and chemical and physical aspects of the environment are studied, as well as the unique adaptations for survival in these habitats. *Prerequisite: BIOL 200 or BIOL 202. Occasionally.*

**BIOL 256 Conservation Biology 3.0; 3 cr.**  
A course that deals with various environmental issues in the world today; introduces the science of conservation; and describes typical methods of conservation, restoration, and restocking. Students are trained in proper research techniques, proper scientific writing, effective presentation delivery using PowerPoint, and are required to research a conservation topic of contemporary importance to the world and present their findings to the class. *Prerequisite: BIOL 200 or BIOL 202. Annually.*

**BIOL 258 Introduction to Aquaculture 3.0; 3 cr.**  
An introduction to the general concepts of aquaculture. Topics such as culture species, culture methods, water quality, filtration, feeding, and harvesting are discussed. Uses of aquaculture for food production, biomedical research, ornamentals, or restocking programs are also introduced. *Prerequisite: BIOL 200 or BIOL 202. Occasionally.*

**BIOL 259 Microbes and the Environment 3.0; 3 cr.**  
A course that explores the various habitats of micro-organisms in nature and the interactions within. Microbial metabolic activities and their impact on the environment are discussed. The course explores the role of microbes as pathogens, particularly environmentally transmitted ones. The beneficial role of microbes in the biodegradation of pollutants is also discussed, in addition to public health topics in microbiology. The course includes a substantial component of reading and analysis of primary research papers in environmental microbiology, in addition to presenting a poster session. *Prerequisite: BIOL 202. Annually.*

**BIOL 260 Cell Biology 3.3; 4 cr.**  
A course that provides an understanding of the structure and function of cellular organelles and components, and the functional interaction of the cell with its microenvironment. *Prerequisites: BIOL 220 and BIOL 223. Each semester.*

**BIOL 262 Virology 3.0; 3 cr.**  
A general overview on the classification, biophysical, and biochemical characteristics of DNA- and RNA-containing bacterial, plant, and animal viruses. *Prerequisite: BIOL 202. Annually.*

**BIOL 263 Immunology 3.0; 3 cr.**  
An introduction to basic immunology, types of immune responses, and basic aspects of the specific and non-specific body defense mechanisms, as well as primary immunological diseases and disorders. *Prerequisite: BIOL 202. Annually.*

**BIOL 264 Biology of Retroviruses 3.0; 3 cr.**  
A course that provides an understanding of the composition, genomic organization, and life cycle of animal RNA-containing retroviruses, with special emphasis on HIV, the etiological agent of AIDS. An overview of other sexually transmitted diseases and of animal viruses of pathological significance is also provided. *Prerequisite: BIOL 223. Annually.*

**BIOL 266 Oceanography 3.0; 3 cr.**  
An introduction to the basic concepts of oceanography and marine science. The course focuses on the chemical, physical, and geological processes that affect life in the oceans and on planet earth in general. Additional topics such as environmental science, conservation, world fisheries, marine resources, and effects of coastal development on life in the oceans are discussed. *Annually.*

**BIOL 266L Oceanography Lab 0.3; 1 cr.**  
A course that introduces students to the basic concepts of oceanographic science applications. The course focuses on the chemical, physical, and geological processes that affect life in the oceans and on planet earth in general. Methods of research used by oceanographers past and present are introduced and demonstrated. *Annually.*

**BIOL 267 Limnology 3.0; 3 cr.**  
A course that introduces students to the basic concepts of freshwater riverine and limnetic systems. The course focuses on the chemical, physical, and nutrient cycling processes that affect life in freshwater bodies. It introduces various freshwater life forms, including kingdoms and phyla, and gives examples of various families. Physiological adaptations of various animals are discussed. Additional topics such as environmental science, conservation, fisheries, aquatic resources, and effects of development on life in streams, rivers, and lakes are discussed when relevant. *Annually.*

**BIOL 268 Introduction to Biotechnology 3.0; 3 cr.**  
An introduction of both the principles and the applications of recombinant DNA technology to animals, plants, and microbial organisms. This course describes the use of genetically engineered products to solve environmental problems and to cure human diseases. *Prerequisite: BIOL 223. Annually.*

**BIOL 270 Plant Physiology 3.3; 4 cr.**  
A study of the vital processes that occur in flowering plants, including biophysical and metabolic processes, with emphasis on photosynthesis, growth, and development. This course also deals with plant responses to the physical environment. *Prerequisite: BIOL 220. Each semester.*

**BIOL 273 Economic Plants 3.0; 3 cr.**  
A course that deals with man's relationship to plants and their economic interest, including their diversity of use in industry and production of food and medicine. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 280 Endocrinology 3.0; 3 cr.**  
A study of the role of chemical messengers in the control of physiological and metabolic processes. This course deals with the biosynthesis, chemistry, and secretion of hormones, as well as their mechanism of action. *Prerequisite: BIOL 202. Annually.*

**BIOL 281 Ichthyology 3.0; 3 cr.**  
A study of the different types of fish, their natural history, and environmental and ecological adaptations. It also deals with methods of conserving and culturing fish of economic value, as well as the effect of pollution on fish fauna. *Prerequisite: BIOL 202. Annually.*

**BIOL 283 Reproductive Physiology 3.0; 3 cr.**  
An examination of the mechanisms of all major aspects of male and female mammalian reproductive physiology. Emphasis is also given to species variation with regard to reproductive function and to a detailed examination of key reproductive events in both sexes. *Prerequisite: BIOL 202. Annually.*

**BIOL 284 Developmental Biology 3.3; 4 cr.**

A study of basic mechanisms, molecular basis, and environmental factors that control embryonic development in both plants and animals, with special emphasis on vertebrate animal systems. *Prerequisite: BIOL 202. Occasionally.*

**BIOL 286 Entomology 3.3; 4 cr.**

An introduction to the study of insects, their diversity, classification, morphology, biology, behavior; and their medical, ecological, and agricultural importance. *Prerequisite: BIOL 202. Annually.*

**BIOL 290 Special Topics in Biology 1, 2, 3, or 4 cr.**

Topics in biology that warrant an extensive coverage in a separate course not typically offered by the department. *May be repeated for credit. Each semester.*

**BIOL 291/292 Undergraduate Tutorial 2 or 3 cr.**

*Prerequisites: senior standing, a minimum average of 80 in the major, and consent of instructor. Each semester.*

**BIOL 293/294 Undergraduate Seminar 1 cr.**

*Credit cannot be obtained for both 293 and 294. Prerequisite: senior standing. Each semester.*

## 37 Credits in Biology<sup>1</sup>

Modes of Analysis	English and Arabic (9)	Humanities (12)	Social Sciences (3)	Sciences, Math, and Technology (37+18) <sup>2</sup>
Lecture courses (9+12+3+30+15)	1. Required Arabic course: 201A or B, or any upper level course (3) 2. Required English courses: 203(3), 204(3)	Required credits in the humanities: 12 credits including 6 credits from CVSP (see pp. 150–52)	Required (3)	1. Required biology <sup>3</sup> (18): BIOL 201(4), 202(4), 223(4), 220(3), and two from the following four courses: 224(4), 260(4), 270(4), 252(4) 2. Elective biology (12+1 lab): a total of 13 credits, including a minimum of one 4-credit course 3. Required chemistry (9): CHEM 201(3), 211(3), 212(3) 4. Required physics (3): PHYS 205(3) 5. Required mathematics (3): STAT 210(3)
Seminar (1)				Required: BIOL 293/4(1)
Laboratory (5+1+2+1)				1. Required biology <sup>3</sup> (5): BIOL 201(4), 202(4), 223(4), and two from the following four courses: BIOL 224,(4), BIOL 252(4), 260(4), 270(4) 2. Elective biology <sup>3</sup> (1) <sup>1</sup> : minimum of one 4-credit course 3. Required chemistry (2): CHEM 210(2) 4. Required physics (1): PHYS 205L(1)
Research Project (0, 2, or 3)				Elective biology courses (2–3): BIOL 291/2(2 or 3)

<sup>1</sup> Plus 11 free elective credits

<sup>2</sup> At least 37 credits in biology, and 18 credits in the sciences

<sup>3</sup> Courses have a 1-credit laboratory component and have been cross-listed in the course and lab sections