

Department of Biology

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Assistant Professors:	Ghanem, Noel D.; Jaalouk, Diana E.; Kambris, Zakaria S.; Osta, Mike A.; Sadek, Riyad A.
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Instructor:	Hajjar, Layane A.M.

BS in Biology

Mission Statement

The BS program in Biology prepares students for advanced study and careers in research, education, and service in Biology-related disciplines. Students will acquire descriptive, experimental, quantitative, and conceptual abilities spanning molecular, cellular, organismal, and ecological levels. Lecture and laboratory courses will emphasize model systems, the role of evolution, diversity of living systems, hypothesis-based reasoning, and communication skills. Science, social science, and humanities coursework will foster creativity, free thought, interdisciplinary skills, and commitment to ethical scholarship.

Requirements

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 average of 70 in their biology courses. Transfer to biology from other departments within the Faculty of Arts and Sciences requires departmental approval. Students can transfer to Biology provided they obtain a minimum grade of 70 in BIOL 201 and 70 in BIOL 202 and a passing grade in CHEM 201 by the end of their third regular semester at AUB.

The requirements for a BS degree in Biology are 90 credits for students entering the department at the sophomore level. The distribution of these courses is as follows:

University Language Requirements: 6 credits in English and 3 credits in Arabic.

University General Education Requirement: 12 credits in the humanities including six credits of CVSP. 6 credits in the Social Sciences. (37+15) credits in the Natural Sciences, 3 credits in Quantitative Thought; Stat 210.

Major Requirements

37 credits of Biology: BIOL 201, 202, 220, 223; two of the following four courses: BIOL 224, 252, 260, 270; BIOL 293 or 294 (these courses are offered every semester); and a minimum of 13 credits in biology elective courses, including a minimum of one 4 credit course.

15 credits of Natural Sciences. CHEM 201, 210, 211, 212; PHYS 204 with PHYS 204L, or PHYS 205 with PHYS 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 241, BIOL 245, BIOL 246, BIOL 250, BIOL 252, BIOL 254, BIOL 255, BIOL 256, BIOL 258, BIOL 259, BIOL 266, BIOL 267, BIOL 281.

Land and Water Resources: AGSC 215, LDEM 230.

Plant Sciences: AGSC 284, AGSC 295.

Landscape: LDEM 211, LDEM 215.

Ecosystem Management: LDEM 203.

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. The course introduces students to the general concepts of biology, including origins of life, evolution and organic building blocks. Moreover, the course will cover socially important contemporary topics such as human evolution, fresh water issues, ecology, environmental conservation, cloning, stem cell research, GMOs, diseases and nutrition. Topics will be added and removed as new discoveries are made and news changes. *Each semester.*

- 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. *Prerequisite: 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 258L Aquaculture Laboratory 0.3 ; 1 cr.**
The course will introduce students to the practical side of aquaculture. Students will get their hands wet. They will set up fish maintenance systems, evaluate progressive changes in water chemistry, evaluate effects of water chemistry on fish health and most importantly learn techniques used to maintain fish in healthy and sustainable environments. Students will be expected to keep a detailed log of their activities and that will be part of assessment. *Prerequisite: BIOL 258. Annually.*
- 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 261** **Biology of Cancer** **3.0; 3 cr.**
This course compares the basic biology of normal versus the malignant neoplastic state and provides a comprehensive over-view of the basic biology of cancer. *Prerequisite: BIOL 223. Annually.*
- 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. Each semester.*
- 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.
- BIOL 295 Summer Undergraduate Research. 4 cr.**
A course intended to train and recruit well-prepared students for graduate work in biology at AUB. Students will conduct a research project during the summer term, and then present and defend their findings. *Prerequisites: completion of 80/120 credits, a minimum average of 75 in the major, consent of instructor and approval of the department. Each summer.*

37 Credits in Biology¹

Modes of Analysis	English and Arabic (9)	Humanities (12)	Social Sciences (6)	Natural Sciences (37+15) ²	Quantitative Thought (3)
Lecture courses (9+12+6+30+12+3)	<ol style="list-style-type: none"> Required Arabic course: 201A or any General Education Arabic communication skills (3) Required English courses: 203(3), 204(3) 	<ol style="list-style-type: none"> Required credits in the humanities: 12 credits including 6 credits from CVSP 	Required (6)	<ol style="list-style-type: none"> Required biology³ (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) Elective biology (12+1 lab): a total of 13 credits, including a minimum of one 4-credit course Required chemistry (9): CHEM 201(3), 211(3), 212(3) Required physics (3): PHYS 204(3) or PHYS 205(3) 	Required mathematics (3): STAT 210 (3)
Seminar (1)				Required: BIOL 293/4(1)	
Laboratory (5+1+2+1)				<ol style="list-style-type: none"> Required biology³ (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) Elective biology³ (1): minimum of one 4-credit course Required chemistry (2): CHEM 210(2) Required physics (1): PHYS 204L(1) or PHYS 205(1) 	
Research Project (0, 2, or 3)				Elective biology courses (2-3): BIOL 291/2(2 or 3)	

¹ Plus 8 free elective credits

² At least 37 credits in biology, and 15 credits in the sciences

³ These courses include 1-credit laboratory component and have been listed both under lecture and laboratory courses.