

Department of Biology

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Assistant Professors:	Bariche, Michel; Khattar, Medhat M.; Saoud, Imad P.; Smith, Colin A.
Lecturers:	^P Azar, Dany; ^P Hamam, Bassam N.; ^P Houalla, Rym H.; Jounblat, Rania A.; Sadek, Riyad A.; Tarraf, Charbel G.
Instructors:	^P Alwan, Nisreen H.; Hajjar, Layane; Rizkallah, Hind D.; Sinno-Saoud, Nada; ^P Saleh, Imane A.

The Department of Biology offers programs leading to the degrees of bachelor 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 three courses: 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: 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.

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 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. *Prerequisite: BIOL 202. 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, and 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 also 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 also includes a substantial component of reading and analysis of primary research papers in environmental microbiology, in addition to 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 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 Biology¹

Modes of Analysis	English and Arabic (9)	Humanities (12)	Social Sciences (3)	Sciences, Math, and Technology (37+18) ²
Lecture courses (9+12+3+30+15)	<ol style="list-style-type: none"> Required Arabic course: 201A or B, or any upper level course (3) Required English courses: 203(3), 204(3) 	Required credits in the humanities: 12 credits including 6 credits from CVSP (see pp. 163–65)	Required (3)	<ol style="list-style-type: none"> Required biology³ (18): BIOL 201(4), 202(4), 223(4), 220(3), and two from the following three courses: 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 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 three courses: BIOL 252(4), 260(4), 270(4) Elective biology³ (1)¹: minimum of one 4-credit course Required chemistry (2): CHEM 210(2) Required physics (1): PHYS 205L(1)
Research Project (0, 2, or 3)				Elective biology courses (2–3): BIOL 291/2(2 or 3)

¹ Plus 11 free elective credits

² At least 37 credits in biology, and 18 credits in the sciences

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

THE REQUIREMENTS LISTED ABOVE APPLY TO STUDENTS WHO JOINED THEIR MAJOR AS OF OCTOBER 1, 2001–02. STUDENTS WHO JOINED A MAJOR PRIOR TO THAT DATE SHOULD CONSULT THE 2000–01 CATALOGUE.

Graduate Program

The PhD program in Cell and Molecular Biology will be launched pending final approval by the New York State Education Department. For admission and graduation requirements, refer to the faculty and department webpages.

The Graduate Record Examination (GRE) is required of all applicants for graduate work. Requirements for an MS degree in biology consist of a minimum of 21 credit hours in biology courses numbered 300 or above and a thesis.

The following courses are core courses and should be taken by all students: BIOL 310 (3 cr.), BIOL 315 (3 cr.), and BIOL 393 (1 cr.) or BIOL 394 (1 cr.).

BIOL 310 Quantitative Methods in Biology 2.3; 3 cr.

A course that emphasizes advanced statistical methods for biology; includes use of computers and some software and hardware applications in various fields in biology. *Prerequisite: consent of instructor.*

BIOL 315 Research Techniques in Biology 1.5; 3 cr.

A core course that provides practical experience in a variety of techniques currently employed in biological research, providing an understanding of their application and result interpretation. *Prerequisite: consent of instructor.*

BIOL 324 Proteins Structure and Function 3.0; 3 cr.

A course that covers the structure-function relationship of proteins, both as model systems and as part of biological systems, with special attention to current issues in protein science. Biophysical approaches, structure determination, protein engineering, protein folding, advance enzymology, and biological systems with which to study proteins are included. *Prerequisite: consent of instructor.*

BIOL 328 Plant Biochemistry 3.0; 3 cr.

A course that provides information in areas of biochemistry unique to plants, including that of the cell wall, photosynthesis, assimilation of mineral nutrients, natural products, and growth substances. *Prerequisite: consent of instructor.*

BIOL 330 Molecular Genetics 3.0; 3 cr.

A discussion of recent developments in molecular genetics that provides an understanding of the molecular mechanisms underlying gene regulation and tissue-specific gene expression. *Prerequisite: consent of instructor.*

BIOL 331 Nucleic Acid Structure and Function 3.0; 3 cr.

This course covers the principles by which nucleic acid structures regulate gene expression and replication, with special attention to unusual roles and applications. Antiviral drugs, RNA catalysis, mRNA UTR elements, and the origin of life are discussed. *Prerequisite: consent of instructor.*

BIOL 332 Advanced Cell Biology 3.0; 3 cr.

A discussion of recent findings in cell biology, emphasizing understanding of the research approaches used to elucidate major processes that regulate the normal function of the cell. *Prerequisite: consent of instructor.*

BIOL 333 **Signal Transduction** **3.0; 3 cr.**
A study of the common signal transduction pathways mediating the effect of different first messengers. *Prerequisite: consent of instructor.*

BIOL 335 **Molecular Biology of Cancer** **3.0; 3 cr.**
A course that deals with the regulatory mechanisms of neoplastic cell growth and cancer cell metastasis. This course includes a discussion of recent developments in molecular genetics of the intra- and/or inter-cellular mechanisms involved in tumor formation, cellular proliferation, apoptosis, invasion, and metastasis. *Prerequisite: consent of instructor.*

BIOL 336 **Mechanisms of Development** **3.0; 3 cr.**
A course that employs an experimental analysis approach to the study of different developmental events with emphasis on cellular and molecular mechanisms. *Prerequisite: consent of instructor.*

BIOL 341 **Advanced Microbiology** **3.0; 3 cr.**
A study of energy metabolism of various microbial groups emphasizing degradation of organic compounds under aerobic and anaerobic conditions. This course also deals with applications of microorganisms in industrial, medical, and environmental fields. *Prerequisite: consent of instructor.*

BIOL 342 **Microbial Genetics** **3.0; 3 cr.**
A course that trains students to solve problems in bacterial genetics; develop a comprehension of bacterial genetics including the organization and activation of genes; understand and apply a genetic approach to biology's basic questions: read, understand, and critically evaluate scientific research papers published in leading international journals; identify areas that require further investigation and for which a genetic approach can be designed and pursued; design laboratory experiments in bacterial genetics; write and submit a grant proposal to seek funds for research in this area, and present up-to-date published research findings to a specialized audience. *Prerequisite: consent of instructor.*

BIOL 350 **Advanced Reproductive Physiology** **3.0; 3 cr.**
A course that examines the comparative mechanisms of all major aspects of male and female reproductive physiology. Emphasis is given to species variation in regard to reproductive function and to detailed examination of key reproductive events in both sexes. *Prerequisite: consent of instructor.*

BIOL 355 **Neuroimmunology** **3.0; 3 cr.**
A course that focuses on the interactions between the nervous, endocrine, and immune systems. The role of the various biologically important molecules that play an important role in the bi-directional communication between those three systems and their physiological and pharmacological actions is studied. *Prerequisite: consent of instructor.*

BIOL 362 **Advanced Ecology** **2.3; 3 cr.**
A discussion and analysis of topics of current interest in ecology with emphasis on population and community dynamics; methods of ecological investigation and analysis; includes field work. *Prerequisite: consent of instructor.*

BIOL 363 **Population and Community Ecology** **3.0; 3 cr.**
A course that introduces the various models and theories of population dynamics and community structure, and their applications in assessing the complex interactions that occur in natural plant-animal systems as a result of long co-evolution, with an emphasis on chemical ecology. *Prerequisite: consent of instructor.*

BIOL 364 **Conservation and Restoration Ecology** **3.0; 3 cr.**
A course that introduces various concepts and applications in the field of conservation and landscape ecology. Degradation processes, principles of restoration ecology, and models of conservation biology are discussed. Part of this course concentrates on the use of remote sensing, GIS, and GPS as tools in landscape ecology. *Prerequisite: consent of instructor.*

BIOL 390 **Special Topics in Biology** **1, 2, 3, or 4 cr.**
Prerequisites: graduate standing and consent of instructor. May be repeated for credit.

BIOL 391/392 **Tutorial** **2 or 3 cr.**
Prerequisite: consent of instructor.

BIOL 393/394 **Seminar** **1 cr.**

BIOL 399 **MS Thesis** **9 cr.**