



مركز الاعتماد
و ضمان الجودة
ACCREDITATION & QUALITY ASSURANCE CENTER



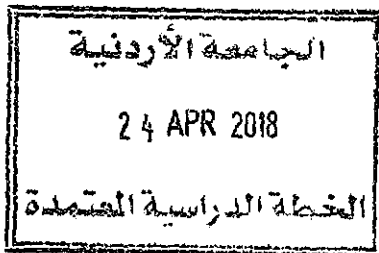
The University of Jordan

Accreditation & Quality Assurance Center

Curriculum for Bachelor's Degree

Program Name: Bachelor Degree In

Biological sciences



1.	Faculty	Marine Sciences
2.	Department	Biological Sciences
3.	Program title (Arabic)	بكالوريوس العلوم الحياتية
4.	Program title (English)	Bachelor Degree In Biological sciences

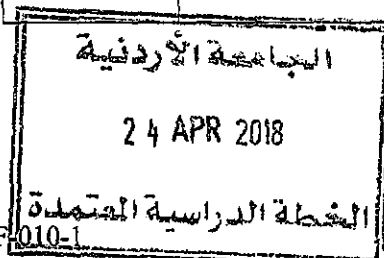
A. **5. Plan Components:** Students studying for the Bachelor's Degree in Biological Sciences must successfully complete (132) credit hours distributed as follows:

Serial	Type of Requirement	Credit Hours
First (I)	University Requirements	27
	Mandatory	18
	Electives	9
Second (II)	Faculty Requirements	21
Third (III)	Specialization Requirements	84
	Mandatory	66
	Electives	18
Total		132

B. **Numbering system:**

1. Departments' codes:

Number	Department
1	Marine Biology
2	Coastal Environment



Courses' codes:

Field code	Specialization address
0	General Biology
1	Practical
2	Biochemistry, Genetics and Molecular Biology, biostatistics
3	Marine Plankton, Immunology and Microbiology
4	Botany, Algae and sea grass
5	Animal, Histology and Microtechnique
6	Ecology & Evolution
7	Seminar & research

3. Course series

55	01	1	1	1
Faculty	Department	level	Specialization	series

I. University Requirements: (27) credit hours

a. Preparation Program Requirements: (0-15) credit hours:

Course No.	Course title	Credit Hours	Prerequisite
5111099	Basics of English	3	--
5111103	English Language Skills	3	5111099
5122099	Basics of Arabic	3	--
5122103	Arabic Languages Skills	3	5122099
5411099	Basic of Computing	3	--

b. **Mandatory:** (18) credit hours as follows:

Course No.	Course title	Credit Hours	Prerequisite
5191002	Communication skills	3	5191100
5191100	Learning & Research Skills	3	5411099 ,5122099 , 5111099
5152101	National culture	3	-
5151101	Military sciences	3	-
5131103	Introduction to philosophy and critical thinking	3	5191100
5102100	Human civilization	3	-
5190011	Campus Life and ethics	0	-

b. **Main Group :** Elective university requirement (9) Credit hours,

Sub Group 1 : min Limit: 3 Max Limit: 3

Course No.	Course title	Credit Hours	Prerequisite
5110099	Islam and contemporary issues	3	-
5110100	Great Books	3	-
5110101	Arab-Islamic Civilization	3	-
5310099	Jordan: History and Civilization	3	-
5310100	Jerusalem	3	-

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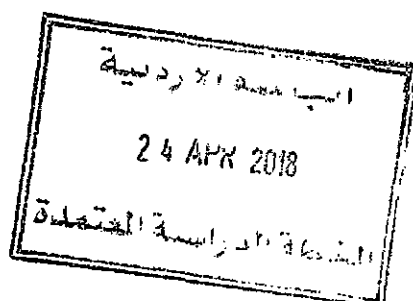
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Sub Group 2: min Limit: 3 Max Limit: 3

Course No.	Course title	Credit Hours	Prerequisite
5110102	Physical Fitness Culture	3	-
5111100	Islamic Culture	3	-
5141100	Legal Culture	3	-
5510099	Environmental Culture	3	-
5510100	Health Culture	3	-

Sub Group 3: min Limit: 3 Max Limit: 3

Course No.	Course title	Credit Hours	Prerequisite
5142100	Appreciation of Arts	3	-
5161100	Foreign Language	3	-
5210099	Entrepreneurship & Creativity	3	-
5210100	Electronic Commerce	3	-
5310101	Special subject	3	-
5410099	Social Media	3	-



ii. **Faculty Requirements: (21) Credit Hours:**

a. **Mandatory:** (21) credit hours.

b. **Electives:** None

c. **Specialty Conditions:** None

a. **Mandatory:** (21) credit hours which includes the following courses:

Course No.	Course title	Weekly Hours		Cr. Hours	Prerequisite
		Theory	Practical		
5401101	Calculus\1	3	-	3	-
5401131	Principles of statistics	3	-	3	-
5401201	Computer Skills for scientific faculties	3	-	3	5411099
5501101	General biology (1)	3	-	3	-
5502101	General chemistry (1)	3	-	3	-
5501103	General physics (1)	3	-	3	-
5502221	Marine Sciences	3	-	3	-

b. **Electives:** None

c. **Specialty Conditions:** None

iii. **Department Requirements: (84) Credit hours as follows:**

a. **Mandatory:** (66) Credit hours.

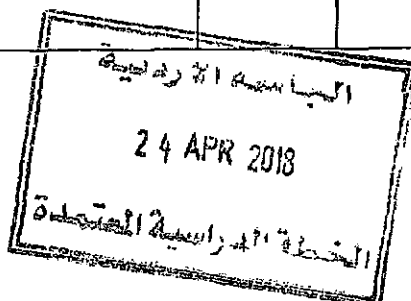
b. **Training:** (0) Credit hours

c. **Elective:** (18) Credit hours.



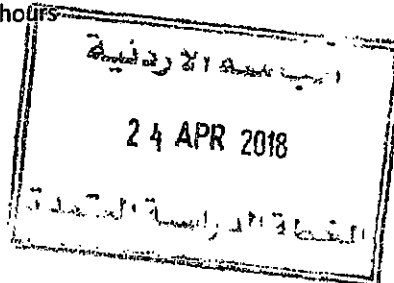
a. **Mandatory** : (66) Credit hours, as follows:

Course No.	Course title	Weekly Hours		Cr. Hours	Prerequisite
		Theory	Practical		
5501102	General biology (2)	3	-	3	5501101
5501113	Practical General biology	-	3	1	5501101 or Concurrently
5501231	Organic Chemistry	3	-	3	5502102
5501232	Cell Biology	3	-	3	5501102
5501321	Biochemistry	3	-	3	5501231
5501323	Practical Biochemistry	-	3	1	5501321 or Concurrently
5501331	Microbiology	3	-	3	5501321 or Concurrently
5501332	Practical Microbiology	-	3	1	5501331 or Concurrently
5501241	General Botany	3	-	3	5501102
5501242	Practical General Botany	-	3	1	5501241 or Concurrently
5501253	General Zoology	3	-	3	5501102
5501254	Practical General Zoology	-	3	1	5501253 or Concurrently
5501322	Genetics	3	-	3	5501102
5501433	Immunology	3	-	3	5501321 or Concurrently



5501424	Molecular Biology	3	0	3	5501331 or Concurrently
5501425	Practical Molecular Biology	-	3	1	5501424 or Concurrently
5501426	Biotechnology	3	-	3	5501424 or Concurrently
5501344	Plant Anatomy	3	-	3	5501241 or Concurrently
5501356	Vertebrate Anatomy	3	-	3	5501253 or Concurrently
5501357	Practical Vertebrate Anatomy	-	3	1	5501356 or Concurrently
5501358	Animal Physiology	3	-	3	5501102
5501343	Plant Physiology	3	-	3	5501101
5502102	General chemistry (2)	3	-	3	5502101
5502113	Practical General chemistry	-	3	1	5502102 or Concurrently
5501105	General physics lab (1)	-	3	1	5501103 or Concurrently
5501462	Molecular Evolution	3	-	3	5501102
5501434	Applied Microbiology	3	-	3	5501331 or Concurrently
5501221	Biostatistics	2	-	2	5401131 or concurrently
5501472	Seminar	1	-	1	Department Approval

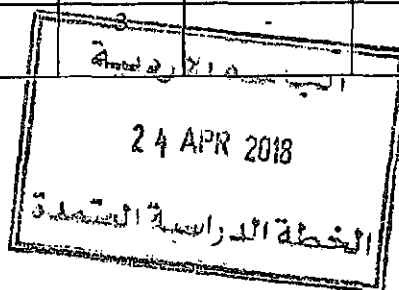
b. **Training:** (0) Credit hours



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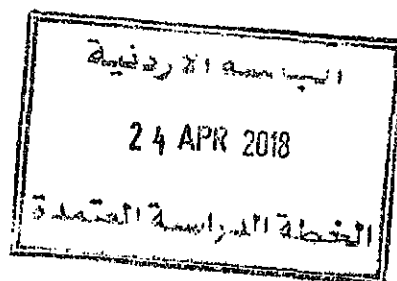
c. *Elective*: (18) Credit hours are chosen by the student from the following table:

Course No.	Course title	Weekly Hours		Cr. Hours	Prerequisite
		Theory	Practical		
5501454	Histology	3	-	3	5501253
5501455	Haematology	2	3	3	5501321 or concurrently
5501427	Bioinformatics	3	-	3	5501424 or concurrently
5501461	Ecology	3	-	3	5501102
5501324	Metabolism	3	-	3	5501321
5501456	Endocrinology	3	-	3	5501358
5501457	Microtechnique	1	6	3	5501241 + 5501253
5501337	Parasitology	3	-	3	5501331
5501435	Medical Biochemistry	2	3	3	5501321 or concurrently
5501428	Nuclear and Radiochemistry	3	-	3	5502102
5501494	Special Topics in Research Methods	3	-	3	Department approval
5501361	Biodiversity	3	-	3	5501102
5501362	Environmental Pollution	3	-	3	5502102



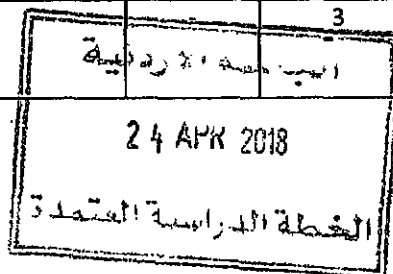
5501353	Fish Biology	2	3	3	5501102
5501443	Taxonomy of Flowering plant	3	-	3	5501344 or concurrently
5501342	Algae & sea grass	2	3	3	5501102
5501301	Marine Biology	3	-	3	5501102
5502231	Dive Science	1	6	3	---
5502360	Geographic Information Systems (GIS)	2	3	3	-
5502422	Environment Impact Assessment (EIA)	3	-	3	5502102
5501351	Benthos and Coral Reef	3	-	3	5501253
5502211	Analytical chemistry	3	-	3	5502102
5501104	General physics (2)	3	-	3	5501103

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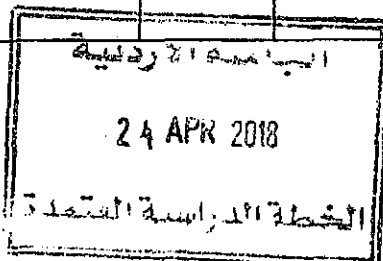


Courses taught by the Department

Course No.	Course title	Weekly Hours		Cr. Hours	Prerequisite
		Theory	Practical		
5510099	Environmental Culture	3	-	3	
5510100	Health Culture	3	-	3	
5501101	General biology (1)	3	-	3	
5502101	General chemistry (1)	3	-	3	
5501103	General physics (1)	3	-	3	
5502221	Marine Sciences	3	-	3	
5501102	General biology (2)	3	-	3	5501101
5501113	Practical General biology	-	3	1	5501101 or Concurrently
5501231	Organic Chemistry	3	-	3	5502102
5501232	Cell Biology	3	-	3	5501102
5501321	Biochemistry	3	-	3	5501231
5501323	Practical Biochemistry	-	3	1	5501321 or Concurrently
5501331	Microbiology	3	-	3	5501321 or Concurrently
5501332	Practical Microbiology		3	1	5501331 or Concurrently



5501241	General Botany	3	-	3	5501102
5501242	Practical General Botany	-	3	1	5501241 or Concurrently
5501253	General Zoology	3	-	3	5501102
5501254	Practical General Zoology	-	3	1	5501253 or Concurrently
5501322	Genetics	3	-	3	5501102
5501433	Immunology	3	-	3	5501321 or Concurrently
5501424	Molecular Biology	3	0	3	5501331 or Concurrently
5501425	Practical Molecular Biology	-	3	1	5501424 or Concurrently
5501426	Biotechnology	3	-	3	5501424 or Concurrently
5501344	Plant Anatomy	3	-	3	5501241 or Concurrently
5501356	Vertebrate Anatomy	3	-	3	5501253 or Concurrently
5501357	Practical Vertebrate Anatomy	-	3	1	5501356 or Concurrently
5501358	Animal Physiology	3	-	3	5501102
5501343	Plant Physiology	3	-	3	5501101
5502102	General chemistry (2)	3	-	3	5502101
5502113	Practical General chemistry	-	3	1	5502102 or Concurrently
5501105	General physics lab (1)	-	3	1	5501103 or



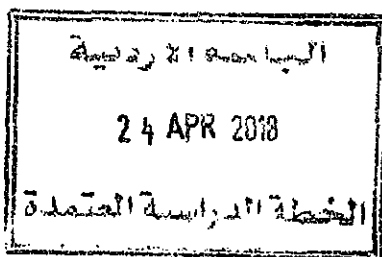
					Concurrently
5501462	Molecular Evolution	3	-	3	5501102
5501434	Applied Microbiology	3	-	3	5501331 or Concurrently
5501221	Biostatistics	2	-	2	5401131 or concurrently
5501472	Seminar	1	-	1	Department Approval
5501454	Histology	3	-	3	5501253
5501455	Haematology	2	3	3	5501321 or concurrently
5501427	Bioinformatics	3	-	3	5501424 or concurrently
5501461	Ecology	3	-	3	5501102
5501324	Metabolism	3	-	3	5501321
5501456	Endocrinology	3	-	3	5501358
5501457	Microtechnique	1	6	3	5501241 + 5501253
5501337	Parasitology	3	-	3	5501331
5501435	Medical Biochemistry	2	3	3	5501321 or concurrently
5501428	Nuclear and Radiochemistry	3	-	3	5502102
5501494	Special Topics in Research Methods	3	-	3	Department approval

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5501361	Biodiversity	3	-	3	5501102
5501362	Environmental Pollution	3	-	3	5502102
5501353	Fish Biology	2	3	3	5501102
5501443	Taxonomy of Flowering plant	3	-	3	5501344 or concurrently
5501342	Algae & sea grass	2	3	3	5501102
5501301	Marine Biology	3	-	3	5501102
5502231	Dive Science	1	6	3	---
5502360	Geographic Information Systems (GIS)	2	3	3	-
5502422	Environment Impact Assessment (EIA)	3	-	3	5502102
5501351	Benthos and Coral Reef	3	-	3	5501253
5502211	Analytical chemistry	3	-	3	5502102
5501104	General physics (2)	3	-	3	5501103



Guidline Plan for students in the Department of the Marine Biology

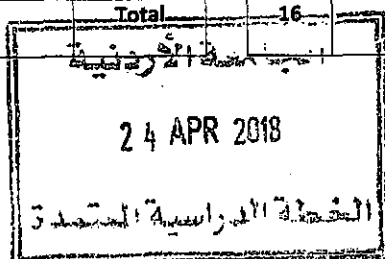
First year - second Semester		
Hour	Article	No.
3	General biology (2)	5501102
3	Mandatory University Requirements	5151100
3	General chemistry (2)	5502102
1	Practical General chemistry	5502113
3	Marine Sciences	5502221
3	Mandatory University Requirements	5101100
16		Total

First year - first Semester		
Hour	Article	No.
3	General Biology (1)	5501101
1	Practical General Biology	5501113
3	General chemistry (1)	5502101
3	Mandatory University Requirements	
3	General physics (1)	5501103
1	General physics lab (1)	5501105
3	Mandatory University Requirements	
17		Total

Second Year - second Semester		
Hour	Article	No.
3	Organic chemistry	5501231
3	General Zoology	5501253
1	Practical General Zoology	5501254
3	Principles of statistics	5401131
3	Mandatory University Requirements	
3	Elective University Requirements	
16		Total

Second Year - first Semester		
Hour	Article	No.
3	General Botany	5501241
1	Practical General Botany	5501242
3	Cell Biology	5501232
3	Calculus	5411101
3	Mandatory University Requirements	
3	Elective University Requirements	
16		Total

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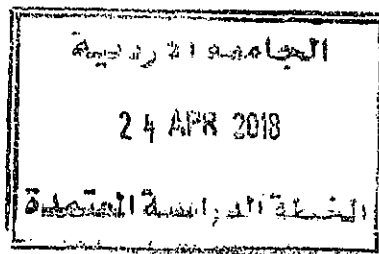
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Third year - second Semester		
Hour	Article	No.
3	Microbiology	5501331
1	Practical Microbiology	5501332
3	Animal Physiology	5501358
3	Plant Anatomy	5501344
3	Elective Programm Requirements	
3	Elective Programm Requirements	
17		Total

Third year - first Semester		
Hour	Article	No.
3	Biochemistry	5501321
1	Practical Biochemistry	5501323
3	Vertebrate Anatomy	5501356
1	Practical Vertebrate Anatomy	5501357
3	Elective University Requirements	
3	Genetics	5501322
3	Plant physiology	5501343
17		Total

Fourth year - second Semester		
Hour	Article	الرقم
3	Biotechnology	5501426
3	Molecular Evolution	5501462
1	seminar	5501472
3	Immunology	5501433
3	Elective Programm Requirements	
3	Elective Programm Requirements	
16		Total

Fourth year - first Semester		
Hour	Article	الرقم
3	Molecular Biology	5501424
1	Practical Molecular Biology	5501425
3	Applied Microbiology	5501434
3	Elective Programm Requirements	
3	Computer Skills for scientific faculties	5501221
3	Elective Programm Requirements	
2	Biostatistics	5401201
18		Total



Course Description Bachelor Program in Biological Sciences

5510099 Environmental Culture (Credit hours: 3)

Prerequisite- :

This course aims at introducing the student to the rudiments of environmental science whose corner stone was laid in the second half of the 20th century. This is being accomplished by discussing the following topics: The earth and natural hazards, Ecosystems, Biogeochemical Cycles, Man and the Environment and the Natural Resources in the Solid Earth System, Air Pollution, Water Resources, management and Pollution, Solid Waste, Food and Health, Environmental Impact Assessment.

5510100 Health Culture (credit hours: 3)

Prerequisite: ---

This course aims to provide better understanding of the main concepts related with health, clarify the main difference between standard and quality immune responses against illness, categorise major illnesses among population based on scientific merits, understand infectious diseases and ways of their transmission. It also presents an overview about epidemics such as diabetes mellitus and uncontrolled blood pressure. Also define factors associated with addiction, define relationship between individual health and concepts related with motherhood, childhood and women's health, identity differences between healthy and problematic health behaviour patterns.

5501101 General biology (1) (Credit hours: 3)

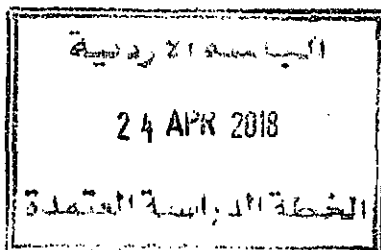
Prerequisite: -

The internal structure of the cell, molecules of the cell, metabolism, respiration & photosynthesis, cell-cell signaling, cell division, Mendelian inheritance, molecular biology of the gene, DNA technology, chemical signals in plants and animals, phylogeny & systematic introduction to the ecosystem.

5501102 General biology (2) (Credit hours: 3)

Prerequisite: 5501101

Animal & plant tissues, mammalian circulation, immune system, gas exchange controlling the internal environment, nervous system & motor mechanism, transport in plants, plant nutrition, plant reproduction & development. Eco-distribution & adaptations of organisms, population ecology & community ecology.



5501113 Practical General biology (Credit hours: 1)

Prerequisite: 5501101 or Concurrently

Laboratory experiments in microscopy & cells, chemical aspects of cells, plant & animal tissues, animal & plant physiology,

5502101 General chemistry (1) (Credit hours: 3)

Prerequisite: -

Scientific Measurements; Stoichiometry; Chemical reactions, Atomic structure, Molecular structure, Periodic table, Chemical bonding, Gases and their laws, States of matter and forces among molecules.

5502102 General chemistry (2) (Credit hours: 3)

Prerequisite: 5502101

Chemical kinetics, Thermochemistry and thermodynamics, Electrochemistry, Acids and bases, Chemical equilibrium, Precipitation reactions, Introduction to organic chemistry.

5502113 Practical General chemistry (Credit hours: 1)

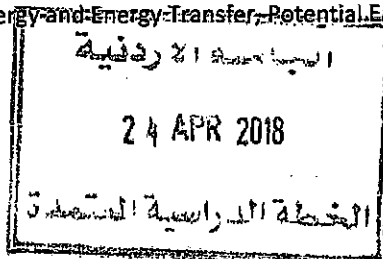
Prerequisite: 5502102 or concurrently

Lab. safety and basic Lab. techniques, Formula of hydrate, Empirical formula of a compound, Limiting reactant, Periodic chart and periodic law, Spectroscopy and molecular geometry, Properties of inorganic compounds and metathesis reactions, Molecular weight of a volatile liquid, Aspirin synthesis, Standardization of NaOH solution, Equivalent weight of an acid, Colligative properties (FW Determination) Calorimetry, Determination of a Rate Law, Spectrophotometric determination of an equilibrium constant, Equilibrium constant for a slightly soluble salt, Solubility product constant and common-ion effect, Bleach analysis, Preparation of Nickel (II) complex, qualitative analysis: Common anion, Qualitative analysis: Group I cations, Group II cations, Group III cations and general unknown

5501103 General Physics (1) (Credit hours: 3)

Prerequisite: -

Motion in one dimension, vectors, motion in two dimensions, the law of motions, Circular Motion and Other Applications of Newton's Laws, Energy and Energy Transfer, Potential Energy, Linear Momentum



and Collisions, Rotation of a Rigid Object about a Fixed Axis, Angular Momentum, Gravitation, Fluid Mechanics.

5501105 General Physics lab (1) (Credit hours: 1)

Prerequisite: 5501103 or concurrently

This lab consists of 12 experiments, collecting and analyzing data, measurement and precise, vectors, forces table, motion in one dimension, force and motion, Newton's laws, collisions in two dimensions, rotational motion, simple pendulum oscillation, gases' laws, viscosity parameter, and specific heat.

5501231 Organic chemistry (Credit hours: 3)

Prerequisite: 5502102

Structure and bonding, Bonding and molecular properties, the nature of organic compounds: Alkanes and cycloalkanes, Stereochemistry of alkanes and cycloalkanes, An overview of organic reactions, alkanes: Structure and reactivity, alkenes: Reactions and synthesis, Alkynes, Stereochemistry, Alkyl halides. Reactions of alkyl halides: Nucleophilic substitution and eliminations reactions.

5501232 Cell Biology (Credit hours: 3)

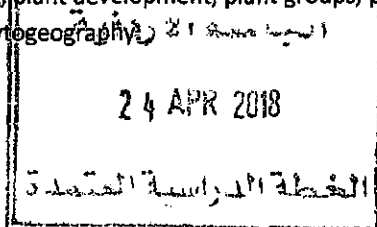
Prerequisite: 5501102

This course deals with the cell as a unit of structure and function of all living organisms. It includes: Cell theory. Principles and technology of microscopy, biological membranes: Ultrastructure and function and their role in controlling cellular responses to cell matrix. Intracellular compartments: Endoplasmic reticulum, golgi complex, lysosomes and peroxisoms ultrastructure and function. Energy transformers: Mitochondria and chloroplasts. The course concentrates also on the nuclear ultrastructure. Chromatin and DNA packaging. Nucleolus and ribosome's biosynthesis. Cell cycle and mechanism of cell division. Also studies cellular junctions. Adhesions and extracellular structures. Cell-to-substratum interactions. Transient differentiations associated with surface activity. Motile cell processes. Plant cell wall and plasmodesmata and bacterial cell wall. The course investigates also the ultrastructure and functions of cytoskeleton. Other topics covered by the course include cellular movement: motility and contractility and cell-to cell signaling as well as the cellular aspects of cancer, aging and death.

5501241 General Botany (Credit Hours: 3)

Prerequisite: 5501102

Plants on our planet , the plant body, the plant cell, the tissues, the root, the stem the leaf, the flower, inflorescence, the fruit, seed and seedling, plant development, plant groups, plants and man (economic, medicinal, poisonous, ..) , climate and phytogeography.



5501242 Practical General Botany (Credit Hours: 1)

Prerequisite: 5501241 or Concurrently

The practical Field to identify models of plant cells and tissues of the root, stem, leaves, vegetative and reproductive parts of the plant also to identify the plant species

5501253 General Zoology (Credit Hours:3)

Prerequisite: 5501102

Introduction to the living animal continuity and evolution, principles of genetics, organic evolution, reproduction and development, diversity of animal life (structural patterns, classification and phylogeny, principles of nomenclatures); invertebrate and vertebrate animals; activity of life; behavior; animal environment and its influence on its distribution and adaptations.

5501254 Practical General Zoology (Credit hour: 1)

Prerequisite: 5501253 or concurrently

The practical part deals with the identification of vertebrate & Invertebrate organisms classification structure and function anatomy

5501322 Genetics (Credit hours: 3)

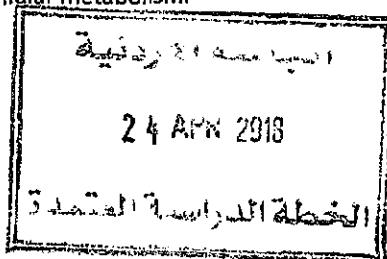
Prerequisite: 5501102

The course is designed to cover the basic principles of classical and molecular genetics. Model systems for genetic analysis such as *Drosophila melanogaster* will be covered. The course covers a detailed description of the structure and function of nucleic acids. This include; replication of DNA and regulation with emphasis on genetic diseases, mutations, and genetic engineering and its applications will be emphasized.

5501321 Biochemistry (Credit hours: 3)

Prerequisite: 5501231

This course deals with aminoacids, bases and buffers. The purification and isolation of macromolecules is stressed as an introduction to the study of proteins and nucleic acids. The course deals with the structure of proteins in general and the function of enzymes. Biochemical aspect of nucleic acids including gene expression and regulation are adressed. The course culminates in an overview of carbohydrates, lipids and integrated cellular metabolism.



5501323 Practical Biochemistry (Credit hours: 1)

Prerequisite: 5501321 or concurrently

The practical Field deals with the enzyme mechanism and the conditions which affect ,Buffer solution preparation and their chemical properties, identifying of Biological macromolecules and their quantity and quality analysis , also deals with the definition of the full biochemical analysis devices in terms of principle and method of use.

5501331 Microbiology (Credit hours: 3)

Prerequisite: 5501321 or Concurrently

History and scope of microbiology, prokaryotes cell structure and function; metabolism

and nutrition, microbial growth, requirements for growth, environmental factors affecting growth, effect of antimicrobial agents on growth; microbial genetics, and gene cloning, bacterial reproduction, microbial taxonomy, major groups of bacteria, microorganisms and environment, elements cycling; symbiotic associations; immune response and antigen – antibody reactions in vitro.

5501332 Practical Microbiology (Credit hours: 1)

Prerequisite: 5501331or Concurrently

Laboratory exercises will expose students to techniques that microbial researchers use on a daily basis, and students will isolate and culture marine bacteria from a variety of samples, identify dominant groups, and use applied molecular biology tools to analyze bacterial communities.

5501356 Vertebrate Anatomy (Credit Hours: 3)

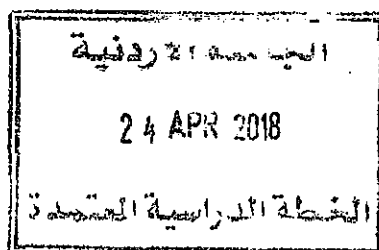
Prerequisite: 5501253 or Concurrently

Using embryonic, morphological, and developmental patterns in the anatomy of vertebrates Dissecting samples of vertebrate classes in the laboratory.

5501357 Practical Vertebrate Anatomy (Credit hour: 1)

Prerequisite: 5501356 or Concurrently

Anatomy of some models of vertebrates in the laboratory and the comparison between the evolutions of vertebrates organs according to of structure and function



5501344 Plant Anatomy (Credit Hours: 3)

Prerequisite: 5501241 or Concurrently

A study of the functional aspects of the internal structure for all plants vegetative and reproductive organs and development of vascular plants, identifies aspects of internal anatomical structures to all vegetative and reproductive plant organs, and to compare anatomy of the plant tissue of vascular plants.

5501343 Plant Physiology (Credit hour: 3)

Prerequisite: 5501101

Plant water relations: absorption, transport and transpiration. Mineral nutrition, photosynthesis, phloem translocation, phytohormones. growth, dormancy, seed germination, phytochrome and photomorphogenesis and stress physiology.

5501358 Animal physiology (Credit Hours: 3)

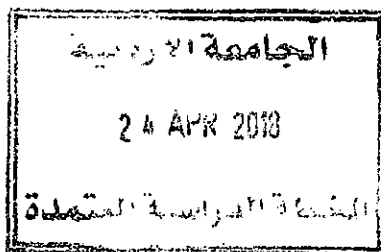
Prerequisite: 5501102

The physiologic concepts related to the organ systems including the nervous, muscular, endocrine, cardiovascular, excretory and respiratory systems are studied. Special emphasis is given to the molecular aspects of the signal transduction mechanisms.

5501462 Molecular Evolution (Credit hours: 3)

Prerequisite: 5501102

A review of the history of evolution and evidence for it, biogeography; natural barriers and oceanic islands; The Archaeology of the Genome (fossils and fossilization), origin of life biogenetic law; the origin of variation and the cellular genetic basis of evolution, natural selections, adaptation and evolution; Genes in Populations, species and speciation; rates of evolution changes, ecology, behavior, and evolution; human evolution; the primates and apes; family hominidae; major functional and structural changes in relation to new habitat; origin of man; genus homo, and the rise of modern man, Inferring Molecular Phylogeny, Models of Molecular Evolution, Applications of Molecular Phylogenetics, genetic drift, gene conversion.



5501433 Immunology (Credit hour: 3)

Prerequisite: 5501321 or Concurrently

This course aims to introduce the student to concepts of immunology. Including basic components of innate and acquired immunity, genetic basis of antibody diversity, mechanisms of immune response both humoral and cell mediated, role of major histocompatibility complex (MHC) in immune response, biology of T- and B- lymphocytes, cytokines and complement system. Moreover, the course will cast a light on special cases of immune-disfunctions such as hypersensitivity, autoimmunity and immunodeficiencies

5501434 Applied Microbiology (credit hours: 3)

Prerequisite: 5501331 or Concurrently

Food as a substrate for microorganisms, factors affecting growth in food; microorganisms important in food, principles of food preservation, food borne diseases and toxins. Industrial microbiology: primary and secondary metabolites, downstream processing, strain development, microorganisms as food, microbial transformation, water pollution and sewage treatment, microbial treatment and utilization of waste, environmental microbiology, soil microbiology, microbial genetics, aquatic microbiology, and bioremediation

5501424 Molecular Biology (Credit hours: 3)

Prerequisite: 5501331

Molecular structure in some marine organisms and description of the factors that affect their molecular structure. DNA and amino-acids, gene replication, gene expression, DNA replication and mutants, DNA repair.

5501425 Practical Molecular Biology (Credit hours: 1)

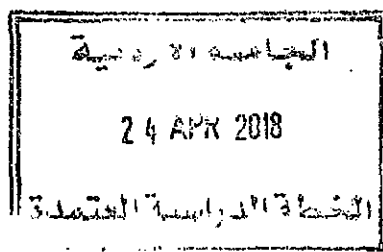
Prerequisite: 5501424 or Concurrently

Practical part will introduce the students to hands on experience of molecular biology techniques for marine sampling and analysis, including DNA extraction, purification.

5501426 Biotechnology (Credit hours: 3)

Prerequisite: 5501424 or Concurrently

AQAC-F-010-1



This course covers an introduction to the basics of biotechnology. The course will introduce students to various biotechnology applications in the environment and obtain useful products from biosystems. Students examine progress in discovery of drugs, enzymes and industrial substances from organisms, technologies for the conservation of biodiversity and the environment, advanced approaches in aquaculture of food and non food marine organisms.

5501472 Seminar (Credit Hours:1)

Prerequisite: Department approval

Library use, reference collection, reference organization, presentation of term paper and a short talk using the collected references.

5501454 Histology (Credit Hours:3)

Prerequisite: 5501253

This course covers the following topics: types of tissues, characteristics, structural and functional aspects of the following tissues: epithelial, connective, cartilage, bone, blood, muscular and nervous. In addition, the course deals with study of histology of the following systems: integumentary; lymphoid, digestive, respiratory, excretory, reproductive, and endocrine.

5501461 Ecology (Credit hour: 3)

Prerequisite: 5501102

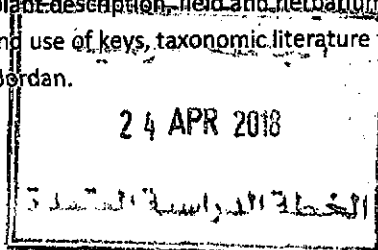
Basic concepts in ecology; organization, structure and function of ecosystem and ecosystem properties; cycling of matter and flow of energy in ecosystems and their

equilibrium; , bioremediation, utilization of beneficial Microbiology in our life factors involved in the regulation, growth, and general dynamics of populations; data needed to describe populations, population growth, population models, and regulatory mechanisms; spatial and temporal variation and properties of populations; community structure and interactions; succession patterns in aquatic and terrestrial communities; field trips to the different vegetation types in Jordan and analysis of quantitative data from the field, The role of microorganisms in the elements natural cycle such as nitrogen.

5501443 Taxonomy of Flowering Plants (Credit Hours:3)

Prerequisite: 5501344 or concurrently

Taxonomy of flowering plants, plant according to simple principles, aims to taxonomy, historical summary, phytogeography, and terminology of plant description, field and herbarium methods, nomenclature, concepts of taxa, construction and use of keys, taxonomic literature for such study of the characteristics of about 48 families of plants in Jordan.



5501455 Haematology**(Credit hours: 3)**

Prerequisite: 5501321 or concurrently

Formation and functions of blood cells, metabolism of iron, folate B12 and hemoglobin, blood volume and its changes, types of hemolysis and diagnostic tests, bleeding disorders, leukocyte diseases.

5501301 Marine Biology**(Credit hours: 3)**

Prerequisite: 5501102

This course is introduction to organisms living in saltwater ecosystems. Topics include in-depth studies of marine ecosystems and organisms, including physiology, behavior, and ecology.

5501342 Algae and seagrass (Credit hours: 3)

Prerequisite: 5501102

Introduction on the marine micro and macro algae and sea grass, their taxonomy, morphology and anatomy. Factors affecting life cycle in the different habitats. The practical part will include intensive study of different marine micro-, macro-algae and sea grass.

5501351 Benthos and coral reef**(Credit hours: 3)**

Prerequisite: 5501253

Description on bottom living organisms, their distribution within the different habitats in addition to the identification of coral reef ecosystem, taxonomy, distribution and interaction with the different inhabitants.

5501353 Fish biology**(Credit hours: 3)**

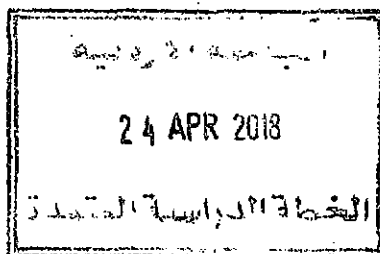
Prerequisite: 5501102

Introduction to the fish biology; includes taxonomy, morphology and anatomy. Factors affecting adaptations in the different habitats.

5501494 Special Topics in Research methods (Credit hours: 3)

Prerequisite: Department approval

AQAC-F-010-1



Determine a specific scientific problem and solve it through the scientific process, and write a scientific report.

5502211 Analytical chemistry**(Credit hours: 3)**

Prerequisite: 5502102

Introduction, Errors and treatments of analytical data, Titrimetric methods of analysis, Gravimetric methods of analysis, Review of chemical equilibrium, Acid-base equilibrium, Acid-base equilibrium in complex systems, Complex formation titrations, Solubility equilibrium, Oxidation reduction equilibrium, Application of oxidation reduction titrations.

5502221 Marine Sciences**(Credit hours: 3)**

Prerequisite:

Detailed information on processes of biological, chemical, physical and geological that affect the marine environment for animal and marine plants.

5502231 Dive science**(Credit hours: 3)**

Prerequisite: -

Introduction, diving theory, confined water dives theoretical and practical, open water dives

5501362 Environmental Pollution**(Credit hours: 3)**

Prerequisite: 5502102

Types of marine pollution, organic and inorganic pollution, nutrient pollution, petroleum and oil pollution.

5502360 Geographic Information Systems (GIS)**(Credit hours: 3)**

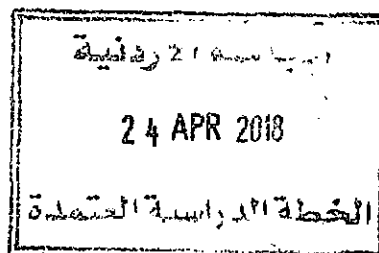
Prerequisite: -

The course aims at dealing with the principles of GIS, such as: Definitions, development, components, and their theories. Several subjects will be taught such as: database construction which includes building of geographical data and their attributes. Also, manipulating database according to symbolizing, charting, tabling, matching, buffering, merging and making successive output.

5501337 Parasitology (Credit Hours: 3)

Prerequisite: 5501321 or concurrently

AQAC-F-010-1



The lectures for this course will provide you with an introduction to the general biology of the parasitic protozoan, helminthes, and arthropods of humans and domestic animals. Lectures will emphasize the morphology, form and function, life cycles, symptomatology, and pathogenesis of representative taxa from these major parasitic groups. This information will be useful to you when you study animal and protozoan parasites in the laboratory. Moreover, with this foundational understanding of parasitology in place, student shall be in a better position to appreciate the impact that parasites have had on human civilizations throughout history, the applications of parasites to pure and applied research programs and the recent contributions of parasitism to our general understanding of the ecology and evolution of organisms.

5502422 Environment Impact Assessment (EIA) (Credit hours: 3)

Prerequisite: 5502102

Collection of the required data on each environmental component of a project or problem. Evaluation and comparison of the collected data, with the standards and regulations, prediction of the impacts on the biotic and a biotic parameters. Mitigation measures to minimize or eliminate impacts, impacts monitoring during and after the project execution. Live examples.

5501361 biodiversity (credit hours :3)

Prerequisite- :5501102

Fundamental aspects of earth biological diversity, natural processes that maintain its structure and function, human impact and threats, means to conserve and preserve this diversity.

5501428 Nuclear and Radiochemistry (3 Credit Hours)

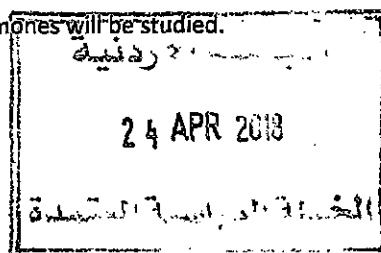
Prerequisite: 5502102

Introduction; nuclear structure and binding energy; radioactive decay processes; equations of radioactive decay and growth; interaction of radiation with matter; nuclear energy; applications in chemistry.

5501456 Endocrinology (Credit Hours:3)

Prerequisite: 5501358

The function and organization of the major endocrine glands in mammals with emphasis on molecular endocrinology. It also includes the biosynthesis, secretion, metabolism, mechanism and physiological action of the hormones. Some endocrinological disorders resulted from hyposecretion or hypersecretion of hormones will be studied.



5501324 Metabolism (Credit Hours:3)

Prerequisite: 5501321

Metabolism (anabolism and catabolism) of the main organic molecules in the living cell which includes carbohydrates, lipids proteins and nucleic acids with the emphasis on energy metabolism and the role of vitamins as cofactors for enzymes' action.

5501457 Microtechnique (Credit Hours:3)

Prerequisite: 5501241 + 5501253

Theory and practice of preparing plants and animals for microscopic examination, general routines for the preparation of tissue.

5501221 Biostatistics (Credit hours: 3)

Prerequisite:- 5401131 or concurrently

Biological data and measures, parametric and non parametric tests for proportions, categorical data analysis (cross-sectional, prospective, retrospective) and relative risks measure, Evaluation of laboratory Tests (specificity, sensitivity and related tests), Efficiency of vaccine, survival functions, Tests for difference in survival curves using clinical life tables, Dose-Response curve and estimating Effective Doses EDp.

5501427 Bioinformatics (Credit hour:3)

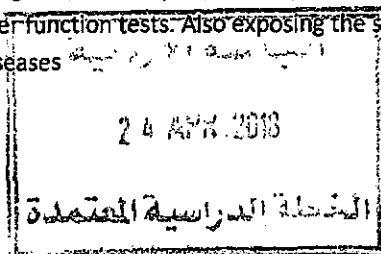
Prerequisite: 5501424 or concurrently

This course is an introduction to the application of computational methods for classifying sequences, databases of biological information, and computational biology tools to extract new concepts. The focus will be on analyzing the structure and function of DNA, RNA and proteins. Gene identification, expression, homology searching, alignment, multiple alignment, PSI-BLAST. Phylogenetic analysis, proteins 3-D structure and function prediction from the sequences.

5501435 Medical Biochemistry (Credit Hours: 3)

Prerequisite: 5501321 or concurrently

Essentials of clinical biochemistry that related to the biochemical basis of diseases and the principals of laboratory diagnosis particularly in the following conditions ; inborn errors of metabolism, disorders of plasma proteins, plasma enzymes, acid-base balance, blood gases, electrolytes, carbohydrates, lipids, nitrogen metabolites, calcium and phosphate, renal and liver function tests. Also exposing the student to the routine biochemical tests used in the diagnosis of diseases



5501104 General Physics (2)**(Credit hours: 3)**

Prerequisite: 5501103

Charge and matter, electric field, gauss's law, electric potential, capacitors and dielectrics, current and resistance, electromotive force and circuits, the magnetic field, ampere's law, faraday's law of induction, Maxwell's equations; magnetic properties of matter, A.C. circuits.

