



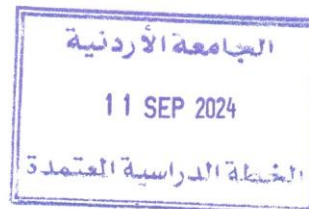
<b>Form: Study Plan- Bachelors</b>	Form Number	EXC-01-03-02A
	Issue Number and Date	2963/2022/24/3/2
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	Number of Pages	08

1.	School	Science
2.	Department	Biological Sciences
3.	Program title (Arabic)	بكالوريوس في العلوم الحياتية
4.	Program title (English)	Biological Sciences Bachelor in

## 5. Components of Curriculum:

The curriculum for the bachelor's degree in Biological Sciences consists of ( 136 ) credit hours distributed as follows

Number	Type of requirement	credit hours
First	University requirement	27
Second	Faculty requirement	21
Third	Specialty requirement	88
<b>Total</b>		<b>136</b>





## 6. Numbering System:

## A- Department number

Department	Number
Mathematics	1
Physics	2
Chemistry	3
Biological Sciences	4
Geology	5
Clinical Sciences	6

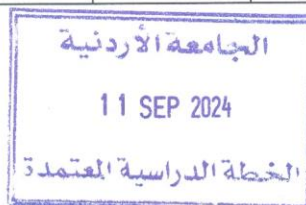
## B- Course number

Domain title	Domain number	Domain title	Domain number
Botany	5	General Biology	0
Zoology	6	Practical Biology	1
Ecology	7	Biochemistry & Clinical Chemistry	2
Genetics & Molecular Biology	8	Microtechniques & Histology	3
Graduation Project	9	Microbiology & Immunology	4

## C- Course number consists of 7 digits

Serial number	Level	Department	School
3	1	2	0
		4	0
			3

First: University Requirements:





Compulsory Requirements					
(18 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Military Science	2220100	3		
2	National Culture	3400100	3		
3	Introduction to Philosophy and Critical Thinking	3400103	3	1932099, 3410100	
4	Ethics and Human Values	3400100	3		
5	Entrepreneurship Innovation	3400101	3	1932099, 3410100	
6	Life and Practical Skills	3400102	3	1932099, 3410100	

Preparation Program Requirements					
All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program					
(0 - 15 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Basics of Arabic	3201099	3		Pass/Fail
2	Arabic Languages Skills	3201100	3	3201099	Pass/Fail
3	Basics of English	3202099	3		Pass/Fail
4	English Language Skills	3202100	3	3202099	Pass/Fail
5	Basics of Computing	1932099	3		Pass/Fail

Electives					
(9 Credit Hours)					
Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.					
(First Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Great Books	3400107	3		



2	Islam and Contemporary Issues	0400101	3		
3	Arab-Islamic Civilization	2300101	3		
4	Jordan: History and Civilization	2300102	3		
5	Jerusalem	3400108	3		
Electives					
(Second Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Legal Culture	1000102	3		
2	Environmental Culture	0300102	3		
3	Physical Fitness Culture	1100100	3		
4	Islamic Culture	0400102	3		
5	Health Culture	0720100	3		
6	Digital Skills	1900102	3		
Electives					
(Third Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Foreign Language	2200103	3		
2	Electronic Commerce	1600100	3		
3	Social Media	1900101	3		
4	Appreciation of Arts	2000100	3		
5	Special Subject	3400106	3		

**Second: School courses: distributed as follows:**

- A. Obligatory school courses: ( 21 ) credit hours  
 B. Elective school courses: ( Non ) credit hours

- A. Obligatory school courses: ( 21 ) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		

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0301101	Calculus-1	3	-	3	-
0301131	Principles of Statistics	3	-	3	-
0302101	General Physics-1	3	-	3	-
0303101	General Chemistry-1	3	-	3	-
0304101	General Biology-1	3	-	3	-
0305101	General Geology-1	3	-	3	-
1900103	Modern Digital Skills	3	-	3	1932099

B. Elective school courses: ( 0 ) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		

**Third:** Specialty courses: ( 88 ) credit hours distributed as follows:

B. Obligatory specialty courses: ( 69 ) credit hours

C. Elective specialty courses: ( 19 ) credit hours

A. Obligatory specialty courses: ( 69 ) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0303102	General Chemistry (2)	3	-	3	0303101
0333109	Practical General Chemistry for Non-Chemistry Students	-	3	1	0303101
0333233	Organic Chemistry for Non-Chemistry Students	3	-	3	0303102
0304102	General Biology (2)	3	-	3	0304111+ 0304101
0304111	Practical General Biology	-	3	1	0304101 or concurrently



0304232	Cell Biology	3	-	3	0304102
0334251	<b>General Botany</b>	3	3	4	0304102
0334261	General Zoology	3	3	4	0304102
0304281	Genetics	2	3	3	0304101
0344221	Biochemistry	3	3	4	0333233
0334341	General Microbiology	3	3	4	0304102+ 0304232
0344351	Plant Anatomy and Development	2	3	3	0334251
0334352	Plant Physiology	2	3	3	0334251
0364361	Vertebrate Anatomy	2	3	3	0334261
0344363	Physiology	3	3	4	0304232
0334382	Molecular Biology	2	3	3	0304281+ 0344221
0304483	Biotechnology	3	-	3	0334382+ 0334341
0304465	Evolution	3	-	3	0334251+ 0334261
0334471	Ecology	2	3	3	0334251+ 0334261
0344443	Immunology	2	3	3	0344221+ 0334341
0304493	Graduation Project	2	-	2	Successfully finished 100 credit hours
0304494	Employability Readiness	5	3	6	Exclusively taught during Summer semester after studying 90 credit hours. The number of students



					in one section must not exceed 5 students.
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## B. Elective specialty courses: ( 19 ) credit hours:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0333213	Analytical Chemistry for Non-Chemistry Students	2	-	2	0303102 0333109
0303216	Practical Analytical Chemistry	-	3	1	0333109+ 0333213 or concurrently
0334282	Human Genetics	3	-	3	0304281
0308357	Medical Mycology	2	3	3	0334341
0364462	Developmental Biology	2	3	3	0304232+0364361
0344421	Metabolism	3	-	3	0344221
0334432	Histology	2	3	3	0304232
0334441	Applied Microbiology	2	3	3	0334341
0308355	Medical Virology	2	-	2	0334341
0334452	Taxonomy of Flowering Plants	2	3	3	0334251
0304468	Principles of Endocrinology	2	-	2	0344363
0304473	An Introduction to Marine Sciences	3	0	3	0334261
0308214	Histological Microtechniques	1	3	2	0304111
0308367	Hematology	2	3	3	0344363
0334332	Cell Dynamics	2	-	2	0304232
0304448	Introduction to Microbial Pathogenesis	2	-	2	0334341

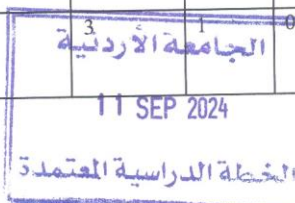
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0334444	Introduction to Human Microbiome	2	-	2	0304232+ 0334341
0304469	Animal Behavior	3	-	3	0364361+ 0344363
0334468	Vertebrate Natural History and Conservation	3	-	3	0364361+ 0344363
0304458	Introduction to Plant Cell Wall Biology	2	-	2	0344221
0304486	Introduction to Bioinformatics	1	3	2	1900103 + 0304483 or concurrently
0304391	Applications in Biostatistics and Biological Experimental Design	2	-	2	0301131+ 0344221

**Fourth:** Courses offered by other faculties/schools and departments:

Course Number	Course Title	Contact Hours		Credit Hours	Pre-requisite
		Theoretical	Practical		
0301101	Calculus (1)	3	-	3	-
0301131	Principles of Statistics	3	-	3	-
0302101	General Physics (1)	3	-	3	-
0303101	General Chemistry (1)	3	-	3	-
0305101	General Geology	3	-	3	-
1931102	Computer Skills (2)-Practical	3	-	3	1932099+ 1902098
0303102	General Chemistry (2)	3	-	3	0303101
0333109	Practical General Chemistry for	-	3	1	0303101







	Non-Chemistry Students				
0333213	Analytical Chemistry for Non-Chemistry Students	2	-	2	0333109+ 0333102
0303216	Practical Analytical Chemistry	-	3	1	0303213+ 0303109
0333233	Organic Chemistry for Non-Chemistry Students	3	-	3	0303102
0308357	Medical Mycology	2	3	3	0334341
0308355	Medical Virology	2	-	2	0334341
0308214	Histological Microtechniques	1	3	2	0304111
0308367	Hematology	2	3	3	0344363

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## Fifth: Advisory Study Plan

( First ) Year

( First ) Semester			( Second ) Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0301101	Calculus (1)	3	0302101	General Physics (1)	3
0303101	General Chemistry (1)	3	0304102	General Biology (2)	3
0304101	General Biology (1)	3	0303102	General Chemistry (2)	3
0304111	Practical General Biology	1	0333109	Practical General Chemistry for Non-Chemistry Students	1
	University Requirement	3		Faculty Requirement	3
	University Requirement	3		University Requirement	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>16</b>

(Second) year

First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0333233	Organic Chemistry for Non-Chemistry Students	3	0304232	Cell Biology	3
0334251	General Botany	4	0334261	General Zoology	4
0304281	Genetics	3	0344221	Biochemistry	4

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	Faculty Requirement	3		University Requirement	3
	Faculty Requirement	3		University Requirement	3
<b>Total</b>		<b>16</b>	<b>Total</b>		<b>17</b>

(Third) year

First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0364361	Vertebrate Anatomy	3	0334341	General Microbiology	4
0334352	Plant Physiology	3	0344351	Plant Anatomy and Development	3
0334363	Physiology	4	0334382	Molecular Biology	3
	Elective Specialty Requirement	2		Elective Specialty Requirement	2
	University Requirement	3		Elective Specialty Requirement	2
	University Requirement	3		University Requirement	3
<b>Total</b>		<b>18</b>	<b>Total</b>		<b>17</b>
<b>Summer Semester</b>					
0304494	Employability Readiness	6			
<b>Total</b>		<b>6</b>			

(Fourth) year





First Semester			Second Semester		
Course Number	Course Title	Credit Hours	Course Number	Course Title	Credit Hours
0344443	Immunology	3	0304483	Biotechnology	3
0304465	Evolution	3	0334471	Ecology	3
	Elective Specialty Requirement	3	0304493	Graduation Project	2
	Elective Specialty Requirement	3	0304495	University Requirement	3
	Elective Specialty Requirement	3		Elective Specialty Requirement	2
				Elective Specialty Requirement	2
Total		15	Total		15

## Course Description

0304101	General Biology (1)	Credit hours:3
Prerequisite:		







This course includes major general biological concepts including, the chemistry of water, structure and function of biological macromolecules, a tour of the cell, membrane structure and function. The course also deals with metabolism, cellular respiration and photosynthesis. The course further investigates the genetic basis of life including meiosis, mitosis, Mendelian genetics, molecular basis of inheritance and gene expression. During the course, the students will be introduced to the biology of viruses.		
0304102	General Biology (2)	Credit hours: 3
Prerequisite:		0304111&0304101
This course surveys the diversity of living organisms, describes how they coordinate their responses to internal and external stimuli and explores their interactions in the biosphere. It describes the mammalian circulation, immune system, gas exchange, controlling the internal environment, nervous system and motor mechanism, transport in plants, plant reproduction and development. The course further investigates the cellular basis and physiological principles underlying biological response, coordination and control by examining hormonal systems in plants and animals and nervous systems in animals. The comparison between plant hormones and animal endocrine systems demonstrates how different organisms can use different structures and signals to achieve the same basic homeostatic regulatory functions.		
0304111	Practical General Biology	Credit hours: 1
Prerequisite:		0304101 or concurrently
Laboratory experiments in microscopy and cells, chemical aspects of cells, plant and animal issues, animal and plant physiology, mammalian anatomy, and systematic of major living groups.		
0304232	Cell Biology	Credit hours: 3
Prerequisite:		0304102
The focus of Cell Biology is the study of the structure and function of the cell. In this course we will focus on Eukaryotic cell biology and will cover topics such as membrane structure and composition, transport, and trafficking, the cytoskeleton, the extracellular matrix and cell movement; and the integration of cells into tissues. We will also cover important cellular processes such as cell cycle regulation, signal transduction, immune response, apoptosis (programmed cell death), autophagy, and cancer cell biology. Finally, the student will be introduced to the main techniques in cell biology.		
0334251	General Botany	Credit hours: 4
Prerequisite:		0304102
The course is designed to deliver the main basics of plant science, the structure of plant cells compared with prokaryotes cells and animal cells, studying plant tissues, organs like roots, stems, leaves, flowers, seeds, fruits, embryos, classification of plant groups and diversification of plant kingdom, meiosis in plant cells, and alternation of generation, genetics and evolution theories in plants, plant breeding and propagation using conventional and modern non-classical methods of propagation. Studying kingdom Protista, kingdom Fungi, seedless plants like Bryophytes. Flowering plants and civilization, also providing knowledge of the economic and commercial benefits of plant groups to human and other organisms with emphasis on examples of selective global and local plants.		

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0334261	General Zoology	Credit hours: 4
Prerequisite:		0304102
The course is an overview of the field of Zoology. This course investigates levels of organization of animals and criteria used for categorization of organisms belonging to the kingdoms Protista and Animalia. Beside taxonomy, the course focuses on morphology, anatomy, physiology, reproduction, ecology and evolution of organisms belonging to these kingdoms. Laboratory sessions of the course focus on specimens representing various protozoan and animal groups to provide students with the practical experience and knowledge with regard to the diversity of organisms from taxonomic, morphological, structural, functional and ecological perspectives.		
0304281	General Genetics	Credit hours: 3
Prerequisite:		0304101
This course aims to teach the students the structure of the genetic material, mendelian genetics, and extensions of mendelian genetics. Additionally, this course covers sex determination, sex chromosomes, and chromosome mutations. Finally, this course introduces the students briefly to the extranuclear inheritance. This course includes two lectures and one laboratory session, which includes experiments dealing with mitosis, meiosis, how to work with Drosophila, and karyotyping.		
0304282	Human Genetics	Credit hours: 3
Prerequisite:		0304281
This course will introduce the student to the human genome components, chromosome structure and cytogenetics. With a focus on Mendelian and non-Mendelian inheritance in man. The course will introduce the student to multifactorial inheritance, population genetics, implications of genome sequencing and genetic counselling. Finally, the student will be introduced to main hereditary defects, the available diagnostic tools and the recent developments and challenges in current gene therapies.		
0344221	Biochemistry	Credit hours: 4
Prerequisite:		0333233
This course integrates an introduction to the structure of macromolecules and a biochemical approach to cellular function, aiming to develop the student's quantitative understanding of the interactions of biological molecules from a structural, thermodynamic, and molecular dynamic point of view. Topics addressing protein structure-function will include enzyme kinetics, the characterization of major metabolic pathways and their interconnection into tightly regulated networks, and the manipulation of enzymes and pathways with mutations or drugs. Carbohydrate and lipids are presented in sufficient depth to allow the student to fully understand major aspects of central metabolism. The discussion of metabolism is focused on energy generation, fermentation, and metabolic control. The course concludes with an extensive section on nucleic acid biochemistry.		
0334341	General Microbiology	Credit hours: 4
Prerequisite:		0304102 & 0304232
The course is considered as an overview of the field of microbiology. This course investigates the history and scope of microbiology, prokaryotic morphology, cell structure and function, microbial growth, requirements for microbial growth, factors affecting microbial growth, methods for the control of microbial		





growth, microbial metabolism and nutrition, microbial genetics, bacterial reproduction, microbial taxonomy, major groups of bacteria, microorganisms and environment, element cycling and symbiotic associations. The laboratory sessions focus on many significant practical parts, such as pure culture techniques, methods of staining and microscopic, colonial and biochemical identification of microorganisms.		
0344351	Plant Anatomy and Development	Credit hours: 3
Prerequisite:		0334251
The course is basic biology course for students at the B.Sc. level. The objectives of this course are to link structure with function of the plant body. Therefore, it focusis on the organization of tissues from the embryo, then studying each type of plant fundamental tissue types, functions, and characterization, their locations. Then studying dermal tissue especially epidermis organization cell types, functions, developmental type and various trichome types. Then a special attention on the vascular tissue of xylem, phloem, and cambium, especially cell types and their functions, developmental aspects and uses in identification of wood. The Periderm characteristics, various types, cell types, functions and different Periderm aspects including lenticels, leaf abscission, wound healing and so on. Then study of roots, stems and leaves, different types, tissues, primary, secondary, and anomalous growth types. The nodal anatomy and apical meristem organization of both shoot and root tips.		
0334352	Plant Physiology	Credit hours: 3
Prerequisite:		0334251
The course covers core concepts in plant physiology with specific focus on water relations; mineral nutrition; photosynthesis; phloem translocation; plant growth, hormones and a brief coverage of domancy, germination and stress physiology. The course format will consist of lectures and an accompanying laboratory section. The laboratories' main objective is to introduce plant physiology tools by running basic experiments, processing, analyzing, presenting results and preparing a scientific report.		
0308357	Medical Mycology	Credit hours: 3
Prerequisite:		0334341
This course is a study of the medically important fungi, including mode of transmission, pathogenicity, defense mechanisms of host, and relative techniques for clinical laboratory diagnosis and identification.		
0364361	Vertebrate Anatomy	Credit hours: 3
Prerequisite:		0334261
This course aims to introduce the students to the study of the different groups of vertebrates. It will expose the students to the morphological, embryological, structural, functional and evolutionary approaches. The course will integrate vertebrate anatomy with functional morphology and phylogenetic relationships. The following systems will be discussed: the integument, skeletal, digestive, muscular, circulatory, respiratory, excretory and the nervous and sense organs.		
0364362	Developmental Biology	Credit hours: 3
Prerequisite:		0304232 & 0364361





This course deals with the following topics: Male reproductive system, spermatogenesis, oogenesis, fertilization, assisted reproduction technology, cleavage, gastrulation, neurulation, and early human development. In addition, the course covers development of the following: The skin and its derivatives; the central nervous system, the sense organs; the heart and major blood vessels, the excretory and the reproductive systems, the limbs, the digestive system; the respiratory system. Also a study of the fetal membranes, parturition, and twinning is covered.

0344363	Physiology	Credit hours: 4
Prerequisite:		0304232

This course provides an in-depth exploration of the physiological processes that govern the functioning of the human body. Students will study the intricate systems that work together to maintain homeostasis, including the cardiovascular, respiratory, nervous, muscular, digestive, endocrine, and renal systems. By the end of the course, students will have a comprehensive understanding of the human body's functioning and its ability to adapt to various internal and external challenges.

0334382	Molecular Biology	Credit hours: 3
Prerequisite:		0304281 & 0344221

This course aims to introduce the students to the basic concepts of molecular biology. The first part covers the molecular nature of genes and chromosomes. The second part covers DNA replication and DNA repair in prokaryotic and eukaryotic cells, transcription in prokaryotic and eukaryotic cells, translation in prokaryotic and eukaryotic cells, and regulation of gene expression. This course includes two lectures and one laboratory session, which includes experiments of DNA extraction, quantitative and qualitative measurement of DNA, PCR, restriction enzymes digestion, DNA blotting, and gene cloning.

0304483	Biotechnology	Credit hours: 3
Prerequisite:		0334382 and 0334341

This biotechnology course focuses on the intersection of Biology and Technology. This would be achieved through tackling the history of biotechnology, the study and manipulation of living organisms or biological systems to develop products and technologies that improve human lives, address societal needs, or benefit the environment. Providing students with an understanding of modern biotechnology, including molecular biology, food biotechnology, immunology, protein science, biopolymers, bioinformatics, bioenergy and process engineering. Ethical issues of biotechnology and patenting will be highlighted. During the course, the students will be introduced to the ethics and biorisk of genetically modified organisms and recombinant DNA technology. This course will enable students to learn about the science behind biotechnology while also looking at how to succeed in a career in the industry.

0344421	Metabolism	Credit hours: 3
Prerequisite:		0344221

This course will help you to understand what metabolism is and how different biological molecules (carbohydrates, proteins, nucleic acids, and lipids) metabolism takes place in human body. The anabolic, catabolic and amphibolic pathways of the main organic molecules in the living cell will be discussed in details, with emphasis on energy metabolism and the role of vitamins as cofactors for enzymatic reactions. The course will focus on the basic biochemistry and physiology relevant to human nutrition, to understand how the body works and how it responds to the food we eat. Students will gain detailed knowledge of the





digestion, absorption and metabolism of carbohydrates, protein, fat, alcohol, vitamins and minerals, as well as energy balance and healthy diet.		
0334432	Histology	Credit hours: 3
Prerequisite:		0304232
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.		
0334441	Applied Microbiology	Credit hours: 3
Prerequisite:		0334341
The course aims at imparting the students with basic principles of applied microbiology and industrial biotechnology and their benefits to humankind. It investigates the involvement, utilization and application of microbes in different processes, such as wastewater treatment, fermentative processes and food production from plant and animal sources. It also focuses on the general concepts of industrial microbiology, particularly industrial fermentation, industrial products and the microorganisms that make them. Besides, the course covers the importance of waterborne and foodborne diseases and the infectious agents causing them, as they significantly relate to the public health. The laboratory sessions focus on providing students with the fundamental understanding of how microorganisms are utilized and controlled for the benefit of human and on developing the laboratory skills needed to investigate different aspects of applied microbiology.		
0344443	Immunology	Credit hours: 3
Prerequisite:		0344221 & 0334341
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-dysfunctions such as hypersensitivity, autoimmunity and immunodeficiencies. The practical part of the course will introduce the student to basic immunological techniques. The protocols include those for the detection of antigen-antibody interactions, lymphocyte proliferation as well as flow cytometry.		
0308355	Medical Virology	Credit hours: 2
Prerequisite:		0334341
Virus structure, viroids, satellites, prions, virus evolution, multiplication of viruses, virus taxonomy, viral pathogenesis, viral persistent, latency, patterns of some viral diseases of human, cell transformation by viruses, host-immune response to viral infections, interferons, antiviral agents, immunization and vaccination. Virus structure, viroids, satellites, prions, virus evolution, multiplication of viruses, virus taxonomy, viral pathogenesis, viral persistent, latency, patterns of some viral diseases of human, cell transformation by viruses, host-immune response to viral infections, interferons, antiviral agents, immunization and vaccination.		

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0344452	<b>Taxonomy of Flowering Plants</b>	<b>Credit hours: 3</b>
<b>Prerequisite:</b>		<b>0334251</b>
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.		
0304468	<b>Principles of Endocrinology</b>	<b>Credit hours: 2</b>
<b>Prerequisite:</b>		<b>0344363</b>
This course provides a foundational understanding of the principles governing the endocrine system, emphasizing the role of hormones in regulating various physiological processes. Students will explore the basic mechanisms of hormone action, including hormone synthesis, secretion, and the interaction with specific receptors on target cells. The course also covers the regulatory pathways that control hormone levels and their effects on metabolism, growth, development, and homeostasis. The course also introduces students to the concept of feedback loops, signal transduction pathways, and the integration of endocrine signals with other physiological systems. Both normal endocrine function and the pathophysiology of common endocrine disorders are discussed, providing students with a broad understanding of how hormones influence health and disease.		
0308214	<b>Histological Microtechniques</b>	<b>Credit hours: 2</b>
<b>Prerequisite:</b>		<b>0304111</b>
The student will be introduced to the microtome and the principles and practices of preparing clinical specimens for histological examination. The course will focus on the procedures used in fixation, decalcification, processing, embedding and microtomy of specimens. major disciplines in medical laboratory sciences.		
0304465	<b>Evolution</b>	<b>Credit hours: 3</b>
<b>Prerequisite:</b>		<b>0334251 and 0334261</b>
A review of the history of evolution and evidence for it, biogeography; natural barriers and oceanic islands; fossils and fossilization, origin of life, biogenetic law; the origin of variation and the genetic basis of evolution, natural selection, adaptation and evolution; species and speciation; rates of evolutionary 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 <i>Homo</i> , and the rise of modern man.		
0334471	<b>Ecology</b>	<b>Credit hours: 3</b>
<b>Prerequisite:</b>		<b>0334251 and 0334261</b>
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; 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;		



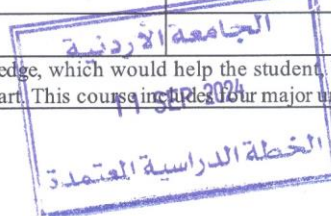
community structure and interactions; succession patterns in aquatic and terrestrial communities; field trips to the different vegetation types in Jordan and analysis of quantitative data from the field.		
0304473	An Introduction to Marine Sciences.	Credit hours:3
Prerequisite:		0334261
The course is divided into three sections. The first section introduces the students to the earth's water cycle, the formation of ocean basins, and large-scale wind patterns and ocean circulation. In the second section, students will learn about the connections among dissolved compounds in the ocean, global patterns of primary productivity, and the health of marine food webs and ecosystems. Students will also learn about the ocean's role in global warming and changes in the Arctic Ocean in response to a warming planet. In the third section, students will learn about the marine communities, e.g., coral reefs, shallow grass flats, deep-sea communities, and the factors limiting the distribution of organisms within those communities. Discussion will also be directed toward the impacts and interactions between humans and oceans.		
303101	General Chemistry-1	Credit hours: 3
Prerequisite:		
Measurements and significant figures, chemical reactions; stoichiometry; the gaseous state; thermochemistry; electronic structure and periodicity; chemical bonding; molecular shapes; states of matter and intermolecular forces.		
0303102	General Chemistry-2	Credit hours:3
Prerequisite:		
Physical properties of solutions; chemical kinetics; chemical equilibrium; acids and bases; acid-base equilibria in aqueous solutions; solubility and complex ion equilibria; chemical thermodynamics; electrochemistry.		
0333213	Analytical Chemistry for Non-Chemistry Students	Credit hours: 2
Prerequisite:		0333109, 0303102
Analytical chemistry is an undergraduate course that covers the following analytical methods and concepts: The nature of analytical chemistry, chemical equilibria, titration methods including neutralization and complexation titration, spectroscopy, and Chromatography.		
0303216	Practical Analytical Chemistry	Credit hour: 1
Prerequisite:		0333109,0333213
The course includes experiments dealing with the following topics: statistical treatment of data; gravimetric analysis; acid-base titrations; precipitation titrations; complexometric titrations; redox titrations, analysis of real samples.		
0308367	Hematology	Credit hours: 3
Prerequisite:		0344363







Theory and application of hematology tests performed routinely in the clinical laboratory. Hematopoiesis. Counting and identification of blood cells including erythrocytes, leukocytes and platelets. RBC production, destruction and Functions. Iron and Hemoglobin Metabolism. WBC production, kinetics and functions. Platelets production and function. Blood Hemostasis, its function, interaction, and monitoring.		
0333233	Organic Chemistry for Non-Chemistry Students	Credit hours: 3
Prerequisite:		0303102
Hydrocarbons: alkanes, cycloalkanes, alkenes, alkynes; aromatic compounds; stereochemistry; halides; alcohols; phenols; ethers; amines; carbonyl compounds and carboxylic acids.		
0301101	Calculus-I	Credit hours: 3
Prerequisite:		
Functions: domain, operations on functions, graphs of functions; trigonometric functions; limits: meaning of a limit, computational techniques, limits at infinity, infinite limits ;continuity; limits and continuity of trigonometric functions; the derivative: techniques of differentiation, derivatives of trigonometric functions; the chain rule; implicit differentiation; differentials; Roll's Theorem; the mean value theorem; the extended mean value theorem; L'Hopital's rule; increasing and decreasing functions; concavity; maximum and minimum values of a function; graphs of functions including rational functions (asymptotes) and functions with vertical tangents (cusps); antiderivatives; the indefinite integral; the definite integral; the fundamental theorem of calculus ; the area under a curve; the area between two curves; transcendental functions: inverse functions, logarithmic and exponential functions; derivatives and integrals; limits (the indeterminate forms); hyperbolic functions and their inverses; inverse trigonometric functions; some techniques of integration.		
0301131	Principles of Statistics	Credit hours: 3
Prerequisite:		
Describing statistical data by tables, graphs and numerical measures, Chebychev's inequality and the empirical rule, counting methods, combinations, permutations, elements of probability and random variables, the binomial, the Poisson, and the normal distributions, sampling distributions, elements of testing hypotheses, statistical inference about one and two populations parameters.		
0302101	General Physics-1	Credit hours 3
Prerequisite:		
Motion in One Dimension, Vectors, Motion in Two Dimensions, The Laws of Motion, Circular Motion and Other Applications of Newton's Laws, Work and Kinetic Energy, Potential Energy and Conservation of Energy, Linear Momentum and Collisions, Rotation of a Rigid Object About a Fixed Axis, Rolling Motion and Angular Momentum.		
0305101	General Geology	Credit hours: 3
Prerequisite:		
This Course provides a base of general earth science knowledge, which would help the student better understand the natural world of which we are an inseparable part. This course includes four major units as		







follows: Earth materials: Earth and the universe; Minerals; Rocks (Igneous, Sedimentary, and metamorphic); Processes that shape the earth surface: Weathering and Soils; Mass wasting; Surface and ground water; Volcanic Activity; Wind and Deserts; The Evolving Earth: Rock Deformation; Earthquakes; Plate Tectonics; Geologic Time scale; Fluid spheres: Oceans; Atmosphere.

0304493	Graduation Project	Credit hours: 2
Prerequisite:		successfully finished 100 credit hours
This course gives students the opportunity to apply the knowledge he/she gained from the program courses in one project. The instructor will teach the students how to use search engines to find scientific articles and the skills of scientific presentation. Then, the student will conduct a graduation project, in which he/she has three options: the student can do a research project in the lab, or a computer based-research project (bioinformatics or other software/databank-based analysis), or a literature review and comparative data analysis in a certain topic or technique(s) in any of the biological disciplines such as biochemistry, microbiology, molecular biology...etc. In all cases, the student needs to write a report and present his/her work at the end of the semester in front of classmates and the instructor. During the course, the students will be introduced to the basic concepts and the different topics of Biorisk Management.		
0304486	Introduction to Bioinformatics	Credit hours: 2
Prerequisite:		1931102, 0304483 or concurrently
This course introduces basic concepts and tools in the field of bioinformatics with a focus on developing the student basic skills for working with large biological data sets. Students will be introduced to; key concepts and bioinformatic algorithms, the history of bioinformatics, bioinformatics applications, biological databases and information retrieval, basics of using command line and Python, pairwise and multiple sequence alignment, phylogenetic trees construction, score matrices calculations, statistical evaluation of alignment scores, measures of classification performance, and prediction of protein secondary structure from amino acid sequence, prediction of tertiary structure of proteins by modelling. The course also reviews some basics of biochemistry and molecular biology in particular the concepts of genomes and proteins structure and function.		
0334332	Cell Dynamics	Credit hours: 2
Prerequisite:		0304232
This course aims to understand how cells can move and how cell movement is directed and organized to allow single cells, small groups and entire cell fields to migrate. Students will learn how cells interact with other cells and how the extracellular matrix allowing for tissue formation and maintenance. The course also reviews spatial organization within the cell, how cellular asymmetry and polarity can be created and maintained, and why this can be important for cell function. The course also aims to understand the homeostasis mechanisms that allow cells to adapt to changes in development and cellular physiology.		
0304448	Introduction to Microbial Pathogenesis	Credit hours: 2
Prerequisite:		0334341





<p>This course will address concepts related to the pathogenesis of infectious diseases within the framework of host cell characteristics. It will introduce various human pathogens, outlining their virulence, and delve into how pathogens engage with their host cells, as well as how host cells defend themselves against invading microorganisms. The curriculum will cover topics such as bacterial toxins and secretion types and mechanisms, microbial invasion and intracellular parasitism, manipulation of host cell functions, induction of cell death by pathogens, innate defence mechanisms of the host, autophagy, inflammation, sepsis, and advancements in microbial genomics, including vaccines, and anti-infective developments.</p>		
0304391	Applied Biostatistics and Biological Experimental Design	Credit hours: 2
Prerequisite:		0301131
<p>This course covers the methods, software, theory, and philosophy used in biological experimental design and contemporary biostatistics, drawing examples from various biological disciplines, including ecology, physiology, genomics, cell biology, molecular biology, and more. The course presents the fundamental processes for designing, collecting, and analyzing biological data, exploring different ways for students to convert data into information and examining how this process aligns with decision-making aspects in the life sciences. Topics covered include basic data science and visualization, hypothesis testing and model building, analysis of variance (ANOVA), linear regression, multivariate statistics, power analysis, and basic random effects models, with a focus on using statistical software such as GraphPad Prism and SPSS to apply these methods to real biological data. The course complements traditional analytical skills course by delving into the diverse scientific thinking methods applied in biology, ranging from tightly controlled laboratory experiments to non-repetitive field surveys. It offers an opportunity to enhance handling of basic data and integrate it within the framework of scientific thinking to address biological issues, encouraging students to refine their critical thinking, evaluation, and experimental design skills through real-life research examples in the life sciences.</p>		
334444	Introduction to Human Microbiome	Credit hours: 2
Prerequisite:		0304232 & 033434
<p>The Human Microbiome" is an introductory course that delves into the collection of microorganisms residing in and on the human body, highlighting their captivating role in maintaining our health. Throughout the course, we will examine various microbial communities within the human body, including those in the gut, urogenital tract, oral cavity, and skin microbiota. Our exploration will encompass understanding how these communities contribute to or undergo alterations in both healthy and diseased states. Topics covered in the course include, but are not limited to, the impact of microbial communities on processes such as digestion and gut health, mood regulation, obesity, immune system function, fertility, pregnancy, and neurological disorders. Given the dynamic nature of this field, we will place special emphasis on exploring these subjects through an in-depth review of primary research articles.</p>		
0304469	Animal Behavior	Credit hours: 3
Prerequisite:		0364361 & 0344363
<p>This course is about what animals do, how they do it, and why. The course aims to introduce the basic questions about animal behavior and the main techniques for answering these questions. The lectures will</p>		





focus on examining the adaptive significance of behavior in an ecological context. The topics include optimal foraging, predator-prey interaction, competition, social behavior, mating systems, sexual selection, territoriality, and cooperation. The lectures will also include a mixture of delivering information and developing skills in independent learning such as case studies, exercises, and discussions. The course will also introduce the students to various methodologies and experimental approaches in animal behavior.

<b>0334468</b>	<b>Vertebrate Natural History and Conservation</b>	<b>Credit hours: 3</b>
<b>Prerequisite:</b>		<b>0364361 &amp; 0344363</b>

The course aims to introduce the students to the vertebrate diversity and the factors that determine their current distribution and abundance. The course will explore the distribution of vertebrates will be addressed within a geographical and ecological context, how vertebrates deal with environmental stresses on physiology, morphology, feeding, breeding, and overall existence. The course will also focus on protecting the remaining vertebrate diversity, major threats to vertebrate diversity, and practical aspects of conservation, with more emphasis on the vertebrates of Jordan. Current questions of conservation-oriented research and management aimed at protecting species will be addressed.

<b>0304458</b>	<b>Introduction to Plant Cell Wall Biology</b>	<b>Credit hours: 2</b>
<b>Prerequisite:</b>		<b>0344221</b>

This course aims to teach the students the basic concepts of plant cell wall biology. The course will introduce the students to the basic structure of plant cell wall and cell wall architecture. Additionally, the course will introduce the students to the plant cell wall biosynthesis and assembly, and the role of cell wall in plant growth and cell differentiation. Finally, the course will cover briefly the plant cell walls as sources of food, feed, fiber, and fuel, and their genetic improvement.

<b>0304494</b>	<b>Employability Readiness</b>	<b>Credit hours: 6</b>
<b>Prerequisite:</b>		Exclusively taught during Summer semester after studying 90 credit hours

This course focuses on training students on the use of modern educational techniques, formulating learning outcomes, taking into account individual differences when writing exam questions and linking them to the required learning outcomes, and presenting information in a clear manner. The course also trains students on the basics of conducting scientific experiments, collecting and analyzing data using mathematical and statistical methods, and using scientific equipment. The course also focuses on developing the student's professional skills, including resume writing, job interviewing, effective communication, and calm and logical dialog. In addition to stimulating constructive criticism and the ability to solve issues, this course trains students on the ability to adapt in different environments and changes of individuals and work. This course also enhances students' ability to make decisions and learn how to use digital devices, search and exchange information.

<b>0304103</b>	<b>General Biology for Life Sciences Students</b>	<b>Credit hours: 3</b>
<b>Prerequisite:</b>		

This introductory biology course covers the fundamental principles of biology, focusing on the chemical basis of life, cell structure and function, energy transformations, and cellular processes. The course is





designed to provide a comprehensive overview of biological concepts and processes, preparing students for advanced study in agricultural sciences.		
0344222	Biochemistry for Agriculture Students	Credit hours: 3
Prerequisite:		0333233
Biochemistry for agriculture students focuses on the chemical processes in living organisms related to agriculture, particularly within plants, animals, and microorganisms. It explores the molecular mechanisms behind growth, development, and interactions, examining biochemical pathways like nutrient absorption, photosynthesis, and metabolism. This field is vital for understanding how these processes affect crop yields, nutritional value, and overall agricultural productivity. This course aims to provide information on the chemical nature of the different classes of nutrients in a bid to increase our understanding and appreciation of their roles in chemical and biological processes concerned with the living process.		
0334105	Cell Biology for Dental Students	Credit hours: 3
Prerequisite:		0304101
The course is designed to introduce students to the basics of cellular biology. Students will explore major concepts in cell biology including eukaryotic cell structure and function, the cellular use of biomolecules, membranes, signal transduction, motility, the extracellular matrix, cell interactions, regulation, and death. Examples of well-known disease mechanisms are discussed. Therapeutic approaches and relationships to underlying disease mechanisms are included to illustrate how interventions at the cell biological level restore normal function. Students will engage in techniques appropriate to the study of cells and cellular processes and gain experience in experimental design, and data analysis and interpretation.		

## Courses offered by Biological Sciences Department:

Course Number	Course Title	Contact Hours		Credit Hours	Prerequisites
		Theoretical	Practical		
0304103	General Biology for Life Sciences Students	3	-	3	-
0304101	General Biology (1)	3	-	3	-
0344222	Biochemistry for Agriculture Students	3	-	3	0333233
0334105	Cell Biology for Dental Students	3	-	3	0304101
0304102	General Biology (2)	3	-	3	0304111+ 0304101
0304111	Practical General Biology	-	3	1	0304101 or



					concurrently
0304232	Cell Biology	3	-	3	0304102
0334251	General Botany	3	3	4	0304102
0334261	General Zoology	3	3	4	0304102
0304281	Genetics	2	3	3	0304101
0344221	Biochemistry	3	3	4	0333233
0334341	General Microbiology	3	3	4	0304102+ 0304232
0344351	Plant Anatomy and Development	2	3	3	0334251
0334352	Plant Physiology	2	3	3	0334251
0364361	Vertebrate Anatomy	2	3	3	0334261
0344363	Physiology	3	3	4	0304232
0334382	Molecular Biology	2	3	3	0304281+ 0344221
0304483	Biotechnology	3	-	3	0334382+ 0334341
0304465	Evolution	3	-	3	0334251+ 0334261
0334471	Ecology	2	3	3	0334251+ 0334261
0344443	Immunology	2	3	3	0344221+ 0334341
0304493	Graduation Project	2	-	2	Successfully finished 100 credit hours
0304494	Employability Readiness	5	3	6	Exclusively taught during Summer semester after studying 90 credit hours
0334282	Human Genetics	3	-	3	0304281

الجامعة الأردنية

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شهادة الدراسة المعتمدة