University of Baghdad
جامعة بغداد

First Cycle – Bachelor's Degree (B.Sc.) - Biology

بكالوريوس – علوم / علوم حياة

Table of Contents

1. Overview

About

The College of Science was established in 1949 under the name of the College of Arts and Sciences. At that time, the college included five scientific departments (Zoology, Botany, Chemistry, Physics and Mathematics). The College of Arts and Sciences continued as a single college until 1953. It was separated into the College of Science and the College of Arts. The College of Science expanded and many other departments were included. Now the college including twelve departments and scientific units for undergraduate and postgraduate programs.

The Department of Biology is one of these departments, which can be counted as one of the important scientific departments that played a key role in the progress and development of biological sciences in Iraq. Postgraduate program was first established in Zoology at the beginning of the academic year 1966-1967 for Master studies. While the programs of Ph.D were initiated at the beginning of 1970-1971. The study curricula in the Department of Biology have changed and evolved. At first, the Zoology, Botany and Microbiology were separated for bachelor programs. Then these programs were changed for bachelor degree to be only one program for general Biology.

The post graduate programs included four major disciplines: Zoology, Botany , Microbiology and Ecology.

The department of Biology is active, and diverse scientific community of faculty members and researchers dedicated to scientific discovery and to training and educating the next generation of biologists. Our Department's research covers all levels of biological organization—from molecules to ecosystems—and employs a variety of organisms and cutting-edge methodologies, with specific strengths in a number of key study areas. Our department is known for their extensive interdisciplinary research and lack of departmental barriers among specialties in the Biological sciences.

This catalogue is about the courses (modules) given by the program of Biology to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج علوم الحياة للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٨) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
BIO1101	General Biology	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering details for the most relevant biology concepts. In this context, we will explain the characteristics and roles of the basic molecules of life and demonstrate an understanding of the biochemistry that governs their interactions and their functions. Laboratory sessions of 2-hours duration will give active practice in a variety of biology aspects and techniques in tandem with lecture topics			

Module 2

Code	Course/Module Title	ECTS	Semester
	General Chemistry	8	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	2	64	17
Description			
The purpose of the course is to give students a thorough understanding of conventional titration techniques in analytical chemistry. It covers the fundamental principles of acid/base titration, complexometric titration, redox titration, and precipitation titration. Students will delve into the theory behind these methods and explore their wide-ranging applications. In addition to theoretical knowledge, the course emphasizes practical skills. Students will learn how to calculate pH values for various acids, bases, salts, and buffers, enabling them to make accurate determinations in real-world scenarios. They will also develop the ability to evaluate and interpret the results obtained from titration experiments, enhancing their analytical capabilities. Throughout the course, selected classical quantitative analytical methods will be highlighted, giving students a deeper understanding of their importance and practical use. By the end of the course, students will have gained the necessary knowledge and skills to apply classical titration methods effectively in analytical chemistry, both in theory and practice.			

Module 3

Code	Course/Module Title	ECTS	Semester
	General Mathematics and Biostatics	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	23
Description			
The mathematics course for the first stage typically covers a range of fundamental mathematical topics, including calculus, The Rate of change of function,limit , Derivatives of algebraic function and Applications. The course aims to develop students' mathematical skills, including problem-solving, critical thinking, and analytical reasoning, and to prepare them for advanced study in mathematics and related fields.			

Module 4

Code	Course/Module Title	ECTS	Semester
	Computer Skills I	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

0	4	63	1
Description			
This course presents an overview of fundamental computer science topics and an introduction to Windows operating systems. Overview topics include an introduction to computer hardware, operating systems, computer security, Internet, and e-mail. This course also covers the essential concepts and skills relating to the use of devices, file creation and management. It help students to demonstrate the ability to use a Microsoft word processing application to accomplish small tasks associated with creating, formatting, finishing small-sized word processing documents, such as letters and other everyday documents. It also help students to demonstrate the ability to use a Microsoft power point application to accomplish tasks associated with creating, and formatting a presentation, and demonstrate the ability to use a Microsoft Excel application to accomplish a spreadsheet for tasks			

Module 5

Code	Course/Module Title	ECTS	Semester
	Democracy and Human Rights	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	32	18
Description			
- Developing the student's analytical and critical skills regarding the reality and future of human rights and democracy - Training the student on the importance of active participation in aspects of public life, such as promoting respect for the principles of public human rights and active participation in political and cultural life. - Enable students to understand the importance of education and its role in spreading the culture of human rights and democracy in building a civilized society based on good governance, the most important component of which is belief in human rights, education and active participation in governance through free and fair elections.			

Module 6

Code	Course/Module Title	ECTS	Semester
	Arabic Language	2	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		32	18

Description

يتضمن المحتوى الإرشادي ما يلي.

مقدمة في البداية التي أسس لها علماء اللغة العربية وكيف بدأت كتابة المؤلفات بالمعاجم والقواعد وجمع اللهجات واستقراء اللغة وحركة الترجمة والفتوحات وتطور اللغة.

ومشكلات المراجعة (٦ ساعات)

ودراسة الجمل وانواعها والافعال والعلامات الاصلية والفرعية والعدد. ومشكلات الكتابة والاملاء التي يقع فيها الطلبة في التفرقة بين الضاد والظاء والتاء المربوطة والطويلة والهمزة وانواعها وكيفية كتابتها. (٦ساعات)

ودراسة الموضوعات الصرفية التي تخص المشتقات من اسم الفاعل واسم المفعول وصيغة المبالغة واوزانها ومعانيها وصيغها السماعية والقياسية..

وعلامات الترقيم وكيفية توظيفها في كتابة التقارير والبحوث والمخطوطات.

(٦ساعات)

Module 7

Code	Course/Module Title	ECTS	Semester
BIO1217	Cytology	8	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17

Description

The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering details for the most relevant cytological concepts. In this context, we will also examine how such knowledge might help understanding cellular components and their functions. Laboratory sessions of 2-hours duration will give active practice in a variety of cytological aspects and techniques in tandem with lecture topics.

Module 8

Code	Course/Module Title	ECTS	Semester
	Biochemistry	6	2

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	17

Description

A- Theory (3ECTS)

Biochemistry combines biology and chemistry to study living matter, structure of biomolecules, and how they interact in essential processes and pathways in cells of living organisms. This course covers the fundamentals, properties, structures and function of

1- Carbohydrates (monosaccharides, disaccharides, polysaccharides)

2- Lipids (simple lipids, compound lipids, Steroids and Miscellaneous lipids)

3- Amino acids and proteins

4- Nucleic acids.

B- Experiments (3ECTS)

This Biochemistry laboratory seeks to introduce undergraduate students techniques used in biochemistry. A collection of experiments has been presented that teach students how to detect, estimate different biomolecules (e.g. carbohydrates, lipids and amino acids) with simple equipment. Each experiment set introduces a theoretical principle and the needed equipment and chemicals used in each experiment

Module 9

Code	Course/Module Title	ECTS	Semester
BIO1209	Biosafety and Biosecurity	3	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1		64	15

Description

Knowing the local and international guidelines and how to apply them with caution, guiding the student and developing his desire for specialization, expanding the student's ability to understand biosafety laws, dealing with biological materials professionally, safely and ethically, not dealing with any party outside the laboratory or scientific institution.

Module 10

Code	Course/Module Title	ECTS	Semester

BIO12010	Bacteriology	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
In this course, the module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive pathogenesis. In this context, we will also examine how such knowledge might help with bacterial isolation and identification, prevention, and prophylaxis ways. Laboratory sessions of a 2-hour duration will give active practice in a variety of bacterial methodologies in tandem with lecture topics.			

Module 11

Code	Course/Module Title	ECTS	Semester
	Biophysics	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
A branch of science concerned with the nature and properties of matter and energy. The topic of general physics includes an introduction to physics, vector analysis, and Newton laws in motion. Also, gravitational force, work, energy, torque, angular momentum, laws of motion with a constant acceleration, fluids, particle stability, electric charge, electric field in electrical circuits and ray optics. Experimental general physics provides knowledge of some physical ideas and laws with their experimental applications such as gravity, flywheel moment of inertia, surface tension of water, viscosity, and refractive index of glass and the speed of sound. In addition to determining the wavelength of light emitted from a laser diode using a diffraction grating and finding the focal length of the lens.			

Module 12

Code	Course/Module Title	ECTS	Semester

	English Language	٢	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
٢		٣٢	١٨
Description			
New Headway Beginner Plus is a Beginner course in English intended to provide students with the fundamentals of the language and a foundation at First Year students / college of science, moving towards a higher level of proficiency at this stage.			

Module 13

Code	**Course/Module Title**	**ECTS**	**Semester**
BIO23013	Invertebrates	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The vast majority of animals are invertebrates - they do not have backbones. This module provides an overview of the major invertebrate groups, highlighting the variety of body types while illuminating how basic functional needs like nutrition, reproduction, respiration, and excretion are done. The module begins with the most basic animals, such protozoa, sponges and jellyfish, and explores the possibility that these early creatures descended from earlier. The description of the many worm groups, as well as the molluscs and arthropods. The echinoderms, which are near invertebrate relatives of vertebrate creatures like us, were the last significant group to be covered. The economic, social, and scientific impact that invertebrates have on human society is identified. The evolutionary relations between the various groups is the common thread that binds this diversity into a coherent story. A series of practical exercises reinforces and complements the lecture component of this module.			

Module 14

Code	Course/Module Title	ECTS	Semester
BIO23014	Entomology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
1. Including the scientific names of insects, species descriptions and overviews, taxonomic orders, and classifications of evolutionary and insects' histories 2. Studying the diversity of organisms and the differentiation between extinct and living creatures. Biologists study the well-understood relationships between them 3. Explaining the biodiversity of the insect's orders. The systematic study is that of conservation			

Module 15

Code	Course/Module Title	ECTS	Semester
BIO23015	Genetics	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering details for the most relevant cytological concepts. In this context, we will also examine how such knowledge might help understanding cellular components and their functions. Laboratory sessions of 2-hours duration will give active practice in a variety of cytological aspects and techniques in tandem with lecture topics.			

Module 16

Code	Course/Module Title	ECTS	Semester
BIO23016	Ecology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
1. Ecological systems and what they are(types , description and relationships) 2.the correlated sciences with Ecology such as chemical ecology, radiation ecology and applied ecology and their relationships, effects with environmental pollution and its danger to human later. 3.patterns of population groups distribution and their type of distribution in environment (randam , regular…etc) , their density (with all the types of it)..etc			

Module 17

Code	Course/Module Title	ECTS	Semester
BIO23117	Plant Anatomy	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The plant anatomy module is designed to recognize the plant cell wall and its pits, the properties of living and non-living cell component as well as the properties of each tissue in different plant body, in addition to identify the difference between Monocotyledon and Dicotyledon plant sections. and these aims increase the student skill in recognizing the properties and difference in these tissue between different plants in addition to identification the plant group according to the properties of different tissues.			

Module 18

Code	Course/Module Title	ECTS	Semester
BIO23018	Mycology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The module will begin with a brief introduction outlining the module's goals, content, evaluation criteria, and learning outcomes. The module material is divided into themes, offering the key pathways driving pathogenesis. In this context, we will also examine how such knowledge might help with diagnosing fungi, pathogens, prevention, and treatment. Laboratory sessions of a 2-hour duration will give active practice in a variety of fungal methodologies in tandem with lecture topics.			

Module 19

Code	Course/Module Title	ECTS	Semester
BIO24119	Protozoan Parasitology	7	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	19
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive parasitic infection. In this context, we will also examine how such knowledge might help with parasitic pathogen diagnosis, prevention, and treatment. Laboratory sessions of 2-hours duration will give active practice in a variety of parasitic methodologies in tandem with lecture topics. Moreover, directing the student to spread the healthy culture in his environment.			

Module 20

Code	Course/Module Title	ECTS	Semester
BIO24020	Biosystematics	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
1- in this field we will provide scientific names for organisms describes them, preserves collections of them. 2- provides classifications for the organisms, keys for their identification. 3- investigates their evolutionary histories, and considers their environmental adaptations. 4- classifications of evolutionary and organism histories			

Module 21

Code	Course/Module Title	ECTS	Semester
	Computer Skills II	3	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
	4	62	1
Description			
This section includes a description of the module, 100-150 words			

Module 22

Code	Course/Module Title	ECTS	Semester
BIO24122	Pollution	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction to understand this vital subject by the academic content includes the concept of pollution, types of pollutants, their sources and potential risks, especially to humans. Principal atmospheric and indoor air pollution: sources, characteristics and effects on human and community. Water quality; Sources of water pollution; Municipal and industrial waste water; Water treatment processes. Soil pollution: fertilizers and pesticides and their properties			

Module 23

Code	Course/Module Title	ECTS	Semester
BIO24123	Plant Groups	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive characteristic. In this context, we will also examine how such knowledge might help with plant groups diagnosis, study the main character for all groups Laboratory sessions of 2-hours duration will give active practice in a variety of characteristic of plant groups in tandem with lecture topics.			

Module 24

Code	Course/Module Title	ECTS	Semester
	English Language	٢	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
٢		٣٢	١٨
Description			
a pre-intermediate level course builds and further improves language proficiency for second year students/ college of science,			

Module 25

Code	Course/Module Title	ECTS	Semester
BIO35125	Plant Physiology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The academic content of this unit covers the theoretical and practical side of many topics. Each theoretical topic is dealt with in practice in the laboratory in the form of laboratory experiments that allow the student to get to know the theoretical vocabulary realistically and bring him closer to understanding the theoretical content. Physical processes such as diffusion and osmosis, which are dealt with theoretically. The student conducts practical experiments through which he understands how to work with these phenomena, in addition to the student acquiring many skills through theoretical study and practical application. The student will have the ability to conduct paper chromatography, thin layer chromatography TLC, extraction and separating method of dyes and enabling them to measure using a spectrophotometer, in addition to estimating enzymes, preparing			

plant hormones, preparing culture media, etc.

Module 26

Code	Course/Module Title	ECTS	Semester
BIO35126	Microbial Physiology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
Study the Microbial cell structure, fine molecular structures of cellular organelles, function of different organelles, assembly & biogenesis of cellular structures, Study in details different pathways that taking place within microbial cells and how these affected the pathogenicity of pathogenic microorganism, and how to adapt prokaryotes to serve human in various fields			

Module 27

Code	Course/Module Title	ECTS	Semester
BIO35027	Histology	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The study of histology depends on dividing the tissues into groups according to the histological structures each of them, and this in turn depends on the functions that tissues performs into 1- Epithelial tissue. 2-connective tissue. 3- Muscle tissue. 4- nervous tissue			

Module 28

Code	Course/Module Title	ECTS	Semester
BIO35128	Pathogenic Bacteria	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and			

evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive pathogenesis. In this context, we will also examine how such knowledge might help with bacterial pathogen diagnosis, prevention, and treatment. Laboratory sessions of 2-hours duration will give active practice in a variety of bacterial methodologies in tandem with lecture topics.

Module 29

Code	Course/Module Title	ECTS	Semester
BIO35029	Immunology	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, we will also examine how such knowledge might help prepare specimens' diagnosis, prevention, and prophylaxis ways. Laboratory sessions of a 2-hour duration will give active practice in using antigen and immune response against it and how we control infection by vaccine the immunological methodologies in tandem with lecture topics.			

Module 30

Code	Course/Module Title	ECTS	Semester
	English Language	٢	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		٣٢	١٨
Description			
This course develops further knowledge of the grammar and of essential vocabulary in order to lead the students to an advanced level of proficiency. Emphasis is placed on developing listening, speaking, reading and writing skills through an integrated approach. It focuses on grammar and fundamental writing skills. New Headway Plus, Special Edition, Intermediate Level is a writing course in which students read different essays and discuss ways to formulate their scientific writing. Peer revision, collaboration with class members, in-class writing activities, reading, extensive revision of essays, class discussion, and error pattern identification comprise the core requirements.			

Module 31

Code	Course/Module Title	ECTS	Semester
BIO36131	Medicinal Plants	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	2	64	17
Description			
In this course, students will practically learn about local medicinal plants from an expert herbalist through oral history and hands-on experiential activities. Current literature will complement case study exemplars to demonstrate the benefits, uses, and considerations of numerous medicinal plants. Eclectic and western herbal medicine will be reviewed, and students will gain skills to gather, process, and apply selected local plants and herbs as ointments, salves, tinctures, and essences. Students should expect to walk during each class session, and should note that there is an all-day off-site field visit that will require personal or student group transportation approximately an hour outside of the Twin Cities.			

Module 32

Code	Course/Module Title	ECTS	Semester
BIO36132	Soil and Aquatic Microbiology	٦	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	١٧
Description			
Soil and aquatic microbiology module covers a wide range of topics at ١٥ weeks, starting with brief introduction outlining the module's aims, content, evaluation criteria, and the learning outcomes. This module is divided into15 theoretical lectures and 15 practical lectures. Students are expected to learn topics related with concepts, mechanisms, applications, input, output and future of soil and aquatic microbiology.			

Module 33

Code	Course/Module Title	ECTS	Semester
BIO36133	Animal Physiology	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
This module deals with simple introduction of physiology and focuses on the body functions as well as how the human body work to maintain homeostasis. In fact, this module emphasizes the purpose of body process and underlying the mechanisms by which this process occurs in terms of cause and effect of physical and chemical processes. In this module, experiences and skills that students acquired through laboratory practice (2-hours/ weekly) as well as theoretical lectures will employed in the diagnosis of different physiological conditions and diseases.			

Module 34

Code	Course/Module Title	ECTS	Semester

BIO36134	Antibiotics	٦	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	١٧
Description			
The module will begin with a brief introduction outlining the module's goals, content, evaluation criteria, and learning outcomes. The module is divided into topics and sub-topics to facilitate better learning about antibiotics with basic definitions and an overview of antimicrobials, their classification, and, their use. Introduce the student to the science behind the problem of antibiotic resistance and will learn how antibiotic resistance develops and spreads and look at the issues surrounding antibiotic resistance.			

Module 35

Code	Course/Module Title	ECTS	Semester
BIO36135	Development and Biodiversity	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
This module typically refers to a course or program that focuses on the study of the variety of life in the world, including the diversity of species, ecosystems, and genetic diversity. The module may cover topics such as the concept of biodiversity and its levels, evolution, the reproductive isolations, species concept, biodiversity and sustainability, environmental balance and biodiversity.			

Module 36

Code	Course/Module Title	ECTS	Semester
BIO36036	Methodology	١	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	0	18	3
Description			
This course will present an overview of research methodology including basic concepts employed in quantitative and qualitative research methods. Research techniques and methods will be examined for the formulation of hypotheses, development of testable objectives, experimental design, subject selection, data collection, data analysis and interpretation, and report preparation. This course will focus also on laboratory-based methods and simple statistical procedures for the analysis of data. Students will apply the concepts and methods in laboratory exercises.			

Module 37

Code	Course/Module Title	ECTS	Semester
BIO47037	Molecular Biology and Bacterial Genetics	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
This system begins with giving an overview of the basic structure of the genetic material and the processes it undergoes such as replication, transcription, translation, and how it is transmitted by clarifying everything related to it in prokaryotic organisms and comparing it briefly with eukaryotic organisms. Laboratory sessions of 2-hours duration will give practice for some important techniques in molecular biology and bacterial genetics.			

Module 38

Code	Course/Module Title	ECTS	Semester
BIO47138	Food Microbiology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
In this course, the module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive food spoilage and foodborne diseases. In this context, we will also examine how such knowledge might help with detection of the causative agents of food deterioration and Food Preservation and Control Strategies. Laboratory sessions of a 2-hour duration will give active practice in a variety of food microbiology methodologies in tandem with lecture topics.			

Module 39

Code	Course/Module Title	ECTS	Semester
BIO47139	Embryology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The student will have a knowledge about the embryonic origins of the tissues and organs of the living organisms and how the organism develop from one cell until becomes adult with functional and structural organs.			

Module 40

Code	Course/Module Title	ECTS	Semester
BIO47140	Clinical Analyses	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. The module include topics about the basic principles of various pathological and serological analysis, specimens collection, microscopic examination, culturing and laboratory diagnosis of infectious diseases like: upper respiratory tract infections, diagnosis of gastrointestinal tract infections, diagnosis of urinary tractinfections and laboratory diagnosis of sexually transmitted infections (STDs).			

Module 41

Code	Course/Module Title	ECTS	Semester
BIO47041	Medical Helminthology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	15
Description			
Study of the pathogenicity and extent of harm caused by the helminthes. Study methods of treatment and means of prevention. Directing the student to spread the healthy culture in his environment and his family.			

Module 42

Code	Course/Module Title	ECTS	Semester
BIO47042	Research Project	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
0	2	0	100
Description			
The research project provides hands-on research experience under the supervision of a Department of Biology member. This might be an essay based on a literature review or research in which the student collects and synthesizes primary empirical data. The research project enables students to combine and apply knowledge acquired through the bachelor's program while also developing research and scientific writing abilities. A literature review, methodology, results and discussion, and conclusion will be included in the dissertation.			

Module 43

Code	Course/Module Title	ECTS	Semester
BIO48143	Genetic Engineering	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive genetic material. In this context, we will also examine how such knowledge might help with genetic modification through genetic enginering, cloning, and diagnosis diseases, sequencing. Laboratory sessions of 2-hours duration will give extra knowledge about the practical techniques and methodologies in tandem with lecture topics.			

Module 44

Code	Course/Module Title	ECTS	Semester
BIO48144	Virology	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key pathways that drive pathogenesis. In this context, we will also examine how such knowledge might help with viral specimens' diagnosis, prevention, and prophylaxis ways. Laboratory sessions of a 2-hour duration will give active practice in a variety of viral methodologies in tandem with lecture topics.			

Module 45

Code	Course/Module Title	ECTS	Semester
BIO48045	Comparative Anatomy	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	64	17
Description			
The module will begin with a brief introduction outlining the module's goals, content, and evaluation criteria, as well as the learning outcomes. Following that, the module material is divided into separate themes, offering the key of chordate classification. In this context, we will also examine how such knowledge might help chordate class identification, special adaptation to environment and identification the evolutionary differences. Laboratory sessions of 2-hours duration will give active practice in a variety of chordates from cephalochordates to mammals identification and differences in their organs according to their habitat.			

Module 46

Code	Course/Module Title	ECTS	Semester
BIO48046	Biotechnology	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2		
Description			
Biotechnology module covers a wide range of topics at 30 weeks, starting with brief introduction outlining the module's aims, content, evaluation criteria, and the learning outcomes. This module is divided into15 theoretical lectures and 15 practical lectures. Students are expected to learn topics related with concepts, techniques, applications, input, output and future of biotechnology.			

Module 47

Code	Course/Module Title	ECTS	Semester
BIO48047	English Language	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		32	18
Description			
This course aims to build and further improve language proficiency. At the end of English XI, I should be competent enough to: understand the general and specific points of clear standard input on general situations. deal with situations probable to happen in an area where English is spoken. produce connected text (written and oral) on topics which are familiar and of general interest.			

Module 48

Code	Course/Module Title	ECTS	Semester
BIO48048	Research Project	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
0	2		
Description			
The research project provides hands-on research experience under the supervision of a Department of Biology member. This might be an essay based on a literature review or research in which the student collects and synthesizes primary empirical data. The research project enables students to combine and apply knowledge acquired through the bachelor's program while also developing research and scientific writing abilities. A literature review, methodology, results and discussion, and conclusion will be included in the dissertation.			

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