

Alkarkh university of sciences جامعة الكرخ للعلوم



First Cycle – Bachelor's degree (B.Sc.) – environmental sciences
بكالوريوس علوم - علوم البيئة



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1. Overview

This catalogue is about the courses (modules) given by the program of environmental sciences 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 الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) 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
KUS1103	Fundamental of Computer Science	4	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	2.4
Description			
the study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information.			

Module 2

Code	Course/Module Title	ECTS	Semester
KUS1106	Arabic Language	4	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	4.4
Description			
This section includes a description of the module, 100-150 words			

Module 3

Code	Course/Module Title	ECTS	Semester
KUS1102	Mathematics	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	5.1
Description			
the study of basic and advanced mathematical concepts. Mathematics courses deal with theoretical knowledge about number systems, data handling, algebra, geometry, trigonometry, etc.			

Module 4

Code	Course/Module Title	ECTS	Semester
CRE1101	analytic chemistry	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	4
Description			
Study the principles of analytical chemistry and provides how these principles are applied in chemistry and related disciplines - especially in life sciences, environmental sciences and geochemistry.			

Module 5

Code	Course/Module Title	ECTS	Semester
CRE1104	physics	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	5.7
Description			
study of the natural world, covering the behavior of matter and energy. It explores the fundamental laws and principles that govern the universe, such as motion, energy, force, and gravity.			

Module 6

Code	Course/Module Title	ECTS	Semester
ENV1105	biology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	5.7
Description			
Biology is the study of life. This includes all living organisms from the simplest to the most complex. The anatomy, development, chemical characteristics, genetics, and evolution of a species are all part of the science of biology. And there are many biology subdisciplines, including biochemistry, genomics, physiology, ecology, and medicine.			

Module 7

Code	Course/Module Title	ECTS	Semester
KUS12012	English language	4	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	4.4
Description			
This section includes a description of the module, 100-150 words			

Module 8

Code	Course/Module Title	ECTS	Semester
KUS1209	Human Rights	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	2.8
Description			
<i>Human rights education builds knowledge, skills and attitudes prompting behavior that upholds human rights. It is a process of empowerment which helps identify human rights problems and seek solutions in line with human rights principles.</i>			

Module 9

Code	Course/Module Title	ECTS	Semester
CRE1207	organic chemistry	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	4
Description			
<p><i>Study the reactions chemists use to synthesize crazy carbon based structures, as well as the analytical methods to characterize them. We will also think about how those reactions are occurring on a molecular level with reaction mechanisms. Simply put, organic chemistry is like building with molecular Legos.</i></p>			

Module 10

Code	Course/Module Title	ECTS	Semester
CRE1208	Geology	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	69	4.7
Description			
<p><i>When you study geology, you look at the processes that change Earth, like volcanic eruptions, landslides, earthquakes, and floods. You also examine the products that Earth's materials produce, such as metals, ores, and petroleum. Why learn geology? Like many other scientific disciplines, geology helps us make sense of the world around us.</i></p>			

Module 11

Code	Course/Module Title	ECTS	Semester
ENV12010	ecology	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<p><i>Ecology courses offered through Coursera help learners gain knowledge on Ecology ecosystems and dynamics; how scientists study ecosystems; plant biology and biological research; what defines us as humans; the scientific, economic, and socio-political dimensions of ecosystems; and more.</i></p>			

Module 12

Code	Course/Module Title	ECTS	Semester
ENV12011	pedology	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<i>discipline within soil science which focuses on understanding and characterizing soil formation, evolution, and the theoretical frameworks for modeling soil bodies, often in the context of the natural environment.</i>			

Module 13

Code	Course/Module Title	ECTS	Semester
CER23013	principle renewable energy	4	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	2.4
Description			
<i>Understand and evaluate the operations and performance of renewable energy technologies. Explain how renewable energy systems integrate with electricity grid operations and market structures. Explore how issues such as electric vehicles, hydrogen, and storage will influence renewable energy, and assess future pathways for renewables.</i>			

Module 14

Code	Course/Module Title	ECTS	Semester
ENV23014	microbiology	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<i>microbiology, study of microorganisms, or microbes, a diverse group of generally minute simple life-forms that include bacteria, archaea, algae, fungi, protozoa, and viruses. The field is concerned with the structure, function, and classification of such organisms and with ways of both exploiting and controlling their activities.</i>			

Module 15

Code	Course/Module Title	ECTS	Semester
ENV23015	climatology	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<i>Climatology as the name suggests is the study of climate, or in other words, the study of the average weather conditions over a given period of time. It is considered to be one of the 'atmospheric sciences' which are often subsumed under 'earth sciences'.</i>			

Module 16

Code	Course/Module Title	ECTS	Semester
ENV23016	environmental sustainability	3	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		27	1.8
Description			
<i>Study The principle of maintaining ecological integrity and ensuring that Earth's environmental systems remain balanced as natural resources such as air, water, soil, forests, and animals are being consumed by humans.</i>			

Module 17

Code	Course/Module Title	ECTS	Semester
ENV23017	biochemistry	5	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	4
Description			
<i>Biochemistry is a sub-discipline of Chemistry & Biology. Biochemistry deals with the chemical processes within living organisms. Biochemistry courses are available as undergraduate, postgraduate & doctoral programs in top universities.</i>			

Module 18

Code	Course/Module Title	ECTS	Semester
ENV2318	soil pollution	6	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<p><i>It is a serious environmental concern since it harbours many health hazards. For example, exposure to soil containing high concentrations of benzene increases the risk of contracting leukaemia. An image detailing the discolouration of soil due to soil pollution is provided below.</i></p>			

Module 19

Code	Course/Module Title	ECTS	Semester
KUS24021	Freedom and democracy	3	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	2.8
Description			
<p><i>We start with a survey of the major political theories of the Enlightenment: Utilitarianism, Marxism, and the social contract tradition. In each case, we begin with a look at classical formulations, locating them in historical context, but then shift to the contemporary debates as they relate to politics today.</i></p>			

Module 20

Code	Course/Module Title	ECTS	Semester
CRE24119	climate change	5	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	5.1
Description			
<p><i>Study the scientific evidence that demonstrates human-caused climate change. We will explore how greenhouse gases cause the Earth to warm, and why our recent warming is attributed to human activities. We will also discuss where our climate is headed, including anticipated future temperature, precipitation, and sea level. Learners will engage with the consequences of these changes on our ecosystems, infrastructure, and communities. We will also identify how political beliefs influence our attitudes about climate change, and apply that knowledge to become better climate communicators.</i></p>			

Module 21

Code	Course/Module Title	ECTS	Semester
ENV24020	Aquatic ecology	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	5.7
Description			
<p><i>investigate principles of ecology through examples from fresh water, marine, and other water environments. Content includes interactions among living organisms, energy flow within and among living communities, dynamics of adaptive evolution, and survival strategies.</i></p>			

Module 22

Code	Course/Module Title	ECTS	Semester
ENV24022	environmental chemistry	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	5.7
Description			
<p><i>focuses on the presence and impact of chemicals in soil, surface water, and groundwater. Environmental chemists study how chemicals - usually contaminants - move through the environment. This is referred to as chemical "fate and transport". They also study the effects of these contaminants on ecosystems, animals, and human health.</i></p>			

Module 23

Code	Course/Module Title	ECTS	Semester
ENV24023	Air pollution	6	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	5.7
Description			
<p><i>We all have to breathe to live. But the air we breathe is polluted both outdoors and indoors. Each year, this pollution costs 7 million lives across the globe – and a lot of suffering. 1 in 8 deaths is due to air pollution. This course will provide you with an introduction to the most recent research in the field of health effects of air pollution as well as a broader understanding of sources and spread of air pollution and what we should do about it.</i></p>			

Module 24

Code	Course/Module Title	ECTS	Semester
ENV24124	microbial ecology	4	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	3.4
Description			
<i>The study can help us improve our lives via the use of microbes in environmental restoration, food production, bio-engineering of useful products such as antibiotics, food supplements, and chemicals. It helps measure the effects of climate change and land usage.</i>			

Module 25

Code	Course/Module Title	ECTS	Semester
ENV35025	water pollution	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<i>teach an understanding of the basic principles of water pollution and water pollution issues on local, regional and global scales. The course will begin with a discussion of the basic chemical, physical and biological properties of water and water contaminants.</i>			

Module 26

Code	Course/Module Title	ECTS	Semester
ENV35026	algal ecology	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<i>The course provides the underpinning knowledge and skills needed by all biotechnologists including: isolation, culturing and enumeration of algae, protistan physiology, microbial biodiversity, state-of-the-art molecular biological skills and bioinformatics, statistics and experimental design, as well as critical business, management and communication skills.</i>			

Module 27

Code	Course/Module Title	ECTS	Semester
ENV35027	molecular biology	6	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<p><i>Molecular biology is the study of proteins and nucleic acids and their role in the development, function, and replication of cells. Those cells may live within humans, animals, plants, or any other living organism. Molecular biologists work across a variety of disciplines, including vaccine development, biotechnology, and genetic modification. Their research and innovations can lead to medical breakthroughs in areas like disease prevention.</i></p>			

Module 28

Code	Course/Module Title	ECTS	Semester
ENV35028	ecological physiology	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		42	3.4
Description			
<p><i>is the study of how factors such as light, temperature, atmospheric carbon dioxide concentration, wind, relative humidity, soil water, and nutrients affect community function.</i></p>			

Module 29

Code	Course/Module Title	ECTS	Semester
ENV35029	Ecotoxicology	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	3.4
Description			
<p><i>The course deals with the effects of contaminants and other anthropogenic disturbances in both temperate and tropical ecosystems.</i></p>			

Module 30

Code	Course/Module Title	ECTS	Semester
ENV35030	statistical application	4	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	48	3.4
Description			
<i>involves analyzing data to help define and determine business needs. Modern workplaces are overwhelmed with big data and are looking for statisticians, data analysts, data scientists, and other professionals with applied statistics knowledge who can organize, analyze, and use data to solve real-world problems.</i>			

Module 31

Code	Course/Module Title	ECTS	Semester
ENV36031	remote sensing	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	5.7
Description			
<i>Acquire a thorough knowledge of remote sensing principles Spectral signatures Steps and knowledge of pre-processing satellite images: Geometric, Radiometric, Atmospheric corrections Get familiarized with present satellite remote sensing platforms How to create basic custom algorithms for any material being investigated Understand the physics of EM radiation Geospatial data access and software Understand the physical principles behind the interaction of EM radiation and multiple types of land cover (vegetation, water, minerals, rocks, etc.)</i>			

Module 32

Code	Course/Module Title	ECTS	Semester
ENV36032	scientific research methods	2	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		32	1.2
Description			
<i>This course focuses on research methodologies. the focus will be placed on qualitative and quantitative research methodologies, sampling approaches, and primary and secondary data collection. The course begins with a discussion on qualitative research approaches, looking at focus groups, personal interviews, ethnography, case studies and action research.</i>			

Module 33

Code	Course/Module Title	ECTS	Semester
ENV36033	water treatment	5	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	63	4.1
Description			
<p><i>The water treatment course is designed to provide students with the knowledge and skills necessary to treat water safely and effectively for drinking and other purposes. The course covers a wide range of topics, including water quality, treatment methods, and regulatory requirements.</i></p>			

Module 34

Code	Course/Module Title	ECTS	Semester
ENV36134	biodiversity	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<p><i>Biodiversity and Conservation explores natural landscapes, species and ecosystems and offers theories and practical methods to preserve environments and organisms. Biodiversity refers not only to endangered species but also to every organism, including microbes and fungi.</i></p>			

Module 35

Code	Course/Module Title	ECTS	Semester
ENV36035	noise pollution	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
<p><i>The propagation of noise that can have a harmful impact on the activities of humans and wildlife is known as noise pollution. The growing levels of environmental noise worldwide have caused multiple environmental and health problems, including sleep disturbance, annoyance and irritability, heart disease, or learning difficulties, among others</i></p>			

Module 36

Code	Course/Module Title	ECTS	Semester
ENV36036	green chemistry	6	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	63	4.1
Description			
<p><i>Green chemistry (sometimes referred to as sustainable chemistry) is the branch of chemistry that deals with the design and optimization of processes and products in order to lower, or remove altogether, the production and use of toxic substances. Green chemistry is not the same as environmental chemistry.</i></p>			

Module 37

Code	Course/Module Title	ECTS	Semester
KUS47042	ethics of Job	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	2.8
Description			
<p><i>An ethics background offers a strong framework and analytical skills, needed to understand the implications and consequences of medical procedures and treatment decisions in the fields of Healthcare and Bioethics</i></p>			

Module 38

Code	Course/Module Title	ECTS	Semester
ENV47037	environmental legislation and laws	3	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	1.8
Description			
<p><i>Environmental Law course is concerned with rules and regulations for protecting the Environment from any kind of harm and focus on Environmental issues legally. Environmental policy and regulations, pollution control, climate change, and natural resources law are some topics covered under Environmental Law courses.</i></p>			

Module 39

Code	Course/Module Title	ECTS	Semester
ENV47038	environmental impact assessment	5	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	43	4.1
Description			
<p><i>Environmental Impact Assessment (EIA) is a process of evaluating the likely environmental impacts of a proposed project or development, taking into account inter-related socio-economic, cultural and human-health impacts, both beneficial and adverse.</i></p>			

Module 40

Code	Course/Module Title	ECTS	Semester
ENV47039	waste management	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	79	4.7
Description			
<p><i>The education needed to be a waste management specialist is normally a bachelor's degree. Waste management specialists usually study environmental science, business or biology. 61% of waste management specialists hold a bachelor's degree.</i></p>			

Module 41

Code	Course/Module Title	ECTS	Semester
ENV47040	graduation project	7	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	92	5.5
Description			
<p>This section includes a description of the module, 100-150 words</p>			

Module 42

Code	Course/Module Title	ECTS	Semester
ENV47041	community ecology	6	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	63	5.8
Description			
<p>ecology is the study and theory of how populations of organisms interact with each other and react to their non-living surroundings. As a subset of the general study of ecology, this field of specialization explores the organization and functioning of biological communities.</p>			

Module 43

Code	Course/Module Title	ECTS	Semester
ENV48043	sustainable development	3	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	48	1.8
Description			
<p>Sustainable development is the holistic, systems-based approach to ensuring sustainability. In the famed Brundtland Commission report, sustainable development is defined as “the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future.</p>			

Module 44

Code	Course/Module Title	ECTS	Semester
ENV48044	environmental engineering	7	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	94	5.4
Description			
<p>Environmental engineering is a professional engineering discipline related to environmental science. It encompasses broad scientific topics like chemistry, biology, ecology, geology, hydraulics, hydrology, microbiology, and mathematics to create solutions that will protect and also improve the health of living organisms and improve the quality of the environment.</p>			

Module 45

Code	Course/Module Title	ECTS	Semester
ENV48045	planning and environmental management	4	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	3.4
Description			
<p>The Environmental Planning and Management focuses on the relationships between environmental engineering/science and public policy analysis and the role of economic factors in the environmental management and water resources planning using decision-making tools.</p>			

Module 46

Code	Course/Module Title	ECTS	Semester
ENV48046	epidemiology	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	5.1
Description			
<p>Often called “the cornerstone” of public health, epidemiology is the study of the distribution and determinants of diseases, health conditions, or events among populations and the application of that study to control health problems, students will understand the practice of epidemiology as it relates to real life and makes for a better appreciation of public health programs and policies. This course explores public health issues like cardiovascular and infectious diseases – both locally and globally – through the lens of epidemiology</p>			

Module 47

Code	Course/Module Title	ECTS	Semester
ENV48047	environmental technologies	6	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	79	4.7
Description			
Environmental Technology and Management prepares students to be on the frontline of protecting our environment. This STEM major (Science, Technology, Engineering and Mathematics) combines the study of chemistry, ecology, pollution prevention, technology and management systems			

Module 48

Code	Course/Module Title	ECTS	Semester
ENV48048	radiopllution	5	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		48	5.1
Description			
Radioactive Pollution is defined as the increase in the natural radiation levels caused by human activities. It is estimated that about 20% of radiation we are exposed to is due to human activities. The human activities that can release radiation involve activities with radioactive materials such as mining, handling and processing of radioactive materials, handling and storage of radioactive waste, as well as the use of radioactive reactions to generate energy (nuclear power plants), along with the use of radiation in medicine (e.g. X-rays) and research. But what about microwaves, cell phones, radio transmitters, wireless devices, computers, and other common commodities of today's life.			

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