



University of Mosul جامعة الموصل



First Cycle – Bachelor's degree (B.Sc.)

بكالوريوس العلوم البيئية - التغيرات المناخية



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1. Overview

This catalogue is about the courses (modules) given by the program of climate change to gain the Bachelor of Science degree. The program delivers (50) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظرة عامة

يتناول هذا الدليل وصف المواد الدراسية التي يقدمها برنامج العلوم البيئية/التغيرات المناخية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج ما يقارب (50) 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 2025-2026

Module 1

Code	Course/Module Title	ECTS	Semester
ENVC101	رياضيات Mathematics	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	78	47
Description			
The aim of this course is to give an introductory course on basics concepts of analysis, to teach limit, derivative, integral concepts and their applications. To develop problem solving skills and understanding of calculus theories through the application of techniques. The course will distributed as well Define basic functions, take the limit of functions and investigate their continuity, Take the derivatives of functions, using derivative a student can sketch and interpret the graph of functions, Solve maximum and minimum problems, Classify integrals, use techniques of integration, Define and classify improper integrals, In details, apply derivative and integral concepts. Define sequences, analyze the convergence of sequences, can recognize series and use convergence tests for series, can find Taylor and Maclaurin series expansion of given functions. Derivative and its applications-Chain rule, Mean Value theorem, Rolle's theorem. Curve sketching-Concavity, concave up, concave down, Maximum and minimum problems, Sequences and series-convergence and divergence. Introduction to integration, Definite integrals and fundamental theorem of			

calculus . Techniques of integration- Integration by parts, trigonometric integrals, integration of Rational functions, Improper integrals and Applications of integration. Sequences and series-convergence and divergence, Convergence tests for series- Integral test, comparison test, the root and ratio test, Alternating series, Taylor and Maclaurin series.

Module 2

Code	Course/Module Title	ECTS	Semester
ENVC102	مقدمة في التغيرات المناخية Introduction to climate changes	4	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	37
Description			
This course aims to provide students with a fundamental understanding of climate change by exploring its human and natural causes, as well as its environmental, social, and economic impacts. It covers concepts such as the global climate system, greenhouse gases, and the effects of human activities like fossil fuel burning and deforestation. The course also addresses adaptation and mitigation strategies, such as the use of renewable energy, and international policies like the Paris Agreement. The curriculum includes lectures, case studies, and interactive discussions, with a focus on developing environmental awareness and critical thinking skills. Students are assessed through quizzes, exams, and participation in practical activities, preparing them to contribute to sustainable solutions for climate challenges.			

Module 3

Code	Course/Module Title	ECTS	Semester
ENVC103	علم الاحياء العام Biology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
This course provides a comprehensive and in-depth study of the principles of general biology for undergraduate students, establishing a solid understanding of biological phenomena starting from the chemical and molecular levels. It examines the detailed structure of biological macromolecules and their biochemical functions, leading to the structural complexity of prokaryotic and eukaryotic cells, alongside the mechanisms of transport across cell membranes. The curriculum also focuses on enzyme kinetics and metabolic pathways responsible for energy production and transformation within the cell, as well as the mechanisms of cell division (mitosis and meiosis) and their roles in growth and			

reproduction.

Furthermore, the course covers the molecular foundations of genetics, ranging from Mendelian laws and their applications to DNA structure, replication mechanisms, and gene expression (transcription and translation). It explores biodiversity and the classification of organisms across different kingdoms, emphasizing the pivotal ecological role of microorganisms. Finally, the syllabus addresses fundamental plant biology and photosynthesis, key animal physiological systems and homeostasis, as well as ecosystem dynamics, environmental issues, sustainability, and biodiversity conservation.

Module 4

Code	Course/Module Title	ECTS	Semester
ENVC104	مدخل الى علم البيئة Ecology	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	63	62
Description			
Ecology is one of the fundamental scientific disciplines concerned with studying the interactions and interrelationships between living organisms and their surrounding environment. The course addresses the concept of the environment and its biotic and abiotic components, as well as the ways in which these components influence one another. It explains the levels of ecological organization, beginning with the individual, population, and biological community, and extending to the ecosystem and biosphere. The course also examines abiotic environmental factors, such as temperature, light, water, humidity, soil, salinity, and pH. It investigates the characteristics of populations, including population density, distribution, growth, birth rates, and mortality rates. The course further examines biological communities in terms of their structure, diversity, and interactions among organisms. It explains the concept of the ecosystem, its components, and the trophic relationships among living organisms. It addresses food chains and food webs, as well as the transfer of energy among different trophic levels. The course also explains major biogeochemical cycles, including the water, carbon, nitrogen, and phosphorus cycles. It examines interactions among organisms, such as predation, competition, parasitism, and symbiosis. The course covers ecological succession and the changes that occur in biological communities over time. It highlights the importance of biodiversity and its role in maintaining the stability and resilience of ecosystems. The course also addresses natural resources, their utilization, conservation, and sustainable management. In addition, it examines sources of environmental pollution and their impacts on air, water, soil, and living organisms. The course discusses climate change and its environmental impacts, including increasing temperatures, changes in precipitation patterns, and water scarcity. It also focuses on contemporary environmental problems and approaches to mitigating and managing their impacts. Students are introduced to environmental sampling techniques, ecological measurements, and the analysis of data related to ecosystems. The course contributes to developing students' ability to understand environmental problems and analyze their causes and impacts. It also promotes environmental awareness and reinforces the principles of environmental protection and natural resource conservation.			

vation.Overall, the course aims to prepare students to understand ecosystems, assess environmental changes, and contribute to achieving sustainable development.

Module 5

Code	Course/Module Title	ECTS	Semester
ENVC105	علم الأرض Geology	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
Earth science is a crucial subject for students in the Climate Change Department. Environmental scientists, at a minimum, need to understand the different types of minerals and rocks, their primary natural sources, mineral formation processes, the rock cycle, and climatic changes throughout geological time. This Earth science course will provide students with a suitable level of information and experience in the field, contributing to their scientific literacy and academic preparation. It will help them grasp the fundamental principles of Earth science, the formation processes of rocks and minerals, and their classification methods. The course covers theories of Earth's formation and its primary layers, the formation processes and abundance of elements, the basic principles of crystallography, mineralogy, rock types and classification methods, an overview of historical geology, mass extinctions, and the geological timescale.			

Module 6

Code	Course/Module Title	ECTS	Semester
UOM102	اللغة الإنكليزية	3	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
This unit is designed to develop students' fundamental English language skills, with a particular focus on reading, writing, listening, and speaking. The course introduces students to the basic grammatical structures and vocabulary necessary for effective communication in academic and everyday contexts. Students practice reading and understanding short texts, writing simple paragraphs, participating in basic conversations, and improving their pronunciation and listening comprehension. Particular attention is paid to scientific and environmental terminology that may support students in their future studies in environmental science and climate change. The unit also aims to enhance students' ability to use English language learning resources and express basic scientific ideas. Through classroom activities, exercises, assignments, and ongoing assessment, students gradually build a solid foundation for further English language development and academic study.			

Module 7

Code	Course/Module Title	ECTS	Semester
UOM104	ديمقراطية وحقوق انسان Democracy and human rights	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	33	17
Description			
This unit introduces students to the fundamental principles of democracy, citizenship, human rights, and social responsibility. It addresses the concepts of equality, justice, freedom, participation, and respect for human dignity, emphasizing the importance of protecting individual rights and responsibilities within society. The course also discusses democratic institutions, the rule of law, peaceful participation, and the role of citizens in fostering a stable and inclusive society. Students are encouraged to develop critical thinking and awareness of contemporary social issues through discussions and interactive activities. The unit underscores the importance of respecting diversity, promoting tolerance, and understanding the relationship between individual rights and collective responsibilities. Assessment may include class participation, assignments, quizzes, and other learning activities designed to enhance students' understanding of democratic values and human rights principles.			

Module 8

Code	Course/Module Title	ECTS	Semester
ENVC106	الفيزياء العامة Physics	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	82
Description			
General Physics is a fundamental course in the Climate Change Department that provides students with an understanding of the basic physical principles governing the natural environment and the Earth's climate system. The course introduces the fundamental concepts of mechanics, heat, thermodynamics, waves, electricity, magnetism, optics, and radiation and their applications to environmental and climatic processes. The course examines the physical laws that control the movement of air and water, the transfer and transformation of energy, and interactions between the Earth's surface and atmosphere. Particular emphasis is placed on temperature, pressure, heat transfer, atmospheric radiation, solar energy, and the Earth's energy balance, which are essential for understanding climate variability and climate change. In addition, General Physics develops students' abilities in measurement, data analysis, problem-solving, mathematical modeling, and interpretation of physical phenomena. Practical activities and laboratory experiments help students apply theoretical principles to real environmental situations.			

Module 9

Code	Course/Module Title	ECTS	Semester
ENVC107	الكيمياء العامة	7	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	4	93	82
Description			
The "General Chemistry" course, designed for first-year students, focuses on establishing the fundamental scientific principles of chemistry. The curriculum includes the basic laws of matter, an explanation of the structural differences between the various states of matter, and simple reactions. It also emphasizes enabling students to apply mathematical calculations related to atomic weights and percentages of components, ultimately leading to the ability to accurately distinguish between different types of chemical bonds in common compounds.			

Module 10

Code	Course/Module Title	ECTS	Semester
ENVC108	علم الخرائط Cartography	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	78	47
Description			
This course provides a comprehensive introduction to cartography. Students will learn the concept of maps and their historical development, then move on to studying basic map elements such as the title, scale, legend, frame, directions, coordinate grid, and sources. The course also covers different types of maps according to scale, purpose, representation method, and production materials, from general and topographic maps to modern digital maps. A significant portion of the course is dedicated to the study of coordinate grids and lines of longitude and latitude, as well as geographic projection systems such as cylindrical, conical, and Universal Medium (UTM) projections. Students will also learn about the Global Positioning System (GPS), its components, the factors affecting its accuracy, and its various applications in geographical studies. On the practical side, students will gain hands-on experience in drawing contour, topographic, and climatic maps, calculating coordinates, and converting climatic data into maps using modern software such as NASA Power and ArcGIS. They will also learn how to download temperature and rainfall data from free platforms and convert it into digital maps showing isotherms and isobars. Thus, the course combines theoretical academic aspects with practical application, providing the student with a solid scientific foundation and modern technical skills in producing maps and analyzing geographic and climatic data using geographic information systems.			

Module 11

Code	Course/Module Title	ECTS	Semester
ENVC109	المناخ والتنوع البيولوجي Climate and biodiversity	6	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	78	72
Description			
This course offers an integrated study of the complex interplay between climate change and biodiversity across diverse ecosystems. It examines the global climate system alongside both natural and anthropogenic drivers of climate change, focusing on how global warming and climatic shifts impact the distribution, behavior, and survival of living organisms. The curriculum explores biodiversity across its three core dimensions—genetic, species, and ecosystem diversity—while evaluating major threats such as habitat loss, extinction risks, and disrupted food webs. Furthermore, the course highlights the adaptive mechanisms organisms employ to cope with climate stress, as well as the vital role healthy ecosystems play in climate mitigation through carbon sequestration. Finally, it addresses environmental conservation policies, sustainability strategies, and international frameworks designed to protect global biodiversity and enhance ecological resilience.			

Module 12

Code	Course/Module Title	ECTS	Semester
UOM1031	علم الحاسوب Computer II	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			
The Computer course for first-year students is an educational subject designed to provide students with fundamental knowledge and skills in the field of computer and information technology. It introduces students to computer hardware and software components, operating systems, file and folder management, and basic computer applications such as word processing, spreadsheets, and presentation software. The student will learn how to navigate Windows 10, how to access and navigate the internet, and how to stay connected with email. The student will be introduced to Microsoft Office 2010, enabling them to create documents in Word, spreadsheets in Excel, and presentations in PowerPoint.			

The student will learn how to keep information secure through specific guidelines on security and privacy. The course also covers the fundamentals of the Internet, computer networks, and information security, with an emphasis on utilizing computers and digital technologies in academic and practical fields. It aims to develop students' abilities to search for, organize, process, and present information in a scientific and effective manner.

Module 13

Code	Course/Module Title	ECTS	Semester
UOM1011	اللغة العربية I Arabic Language I	2	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	1	33	17
Description			
This unit aims to develop students' fundamental Arabic language skills and enhance their ability to communicate effectively in academic and professional contexts. The course focuses on improving reading, writing, grammar, spelling, and grammatical expression. Students learn the basic grammatical and linguistic rules that support accurate oral and written communication. The unit also focuses on developing academic writing skills, including organizing ideas, constructing paragraphs, and using language effectively in formal and scientific contexts. Particular attention is paid to enhancing students' ability to understand, analyze, and summarize various types of texts. Through lectures, practical exercises, written assignments, and continuous assessment, students gain greater confidence and proficiency in using Arabic as a primary tool for communication, learning, and academic development.			

Module 14

Code	Course/Module Title	ECTS	Semester
ENVC210	الطقس والمناخ Weather and Climate	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
The aim of this course is to give an introductory course on fundamental concepts of atmospheric science, meteorology, and climatology. To teach atmospheric structure, energy radiation balances, thermodynamic processes, and general circulation patterns. To develop analytical and practical skills in meteorological observation, synoptic chart analysis, and environmental application through key theoretical concepts and practical techniques. The course will cover defining the thermal architecture and composition of the atmosphere, investigating radiative transfer mechanisms including scattering and absorption, analyzing global pressure gradient and Coriolis forces driving three-cell atmospheric circulation, evaluating cloud			

formation mechanics and precipitation processes, applying the Köppen system for global climate classification, and interpreting weather maps, isolines, and Skew-T Log-P thermodynamic diagrams.

In details, study the vertical layers of the atmosphere including the troposphere, stratosphere, mesosphere, and thermosphere alongside compositional balances. Solar insolation, radiative balances, Rayleigh, Mie, and nonselective scattering, and atmospheric absorption by ozone, water vapor, and greenhouse gases. Earth's heat budget, diurnal, seasonal, and spatial temperature variations, and natural versus anthropogenic climate drivers. Global pressure distributions, geostrophic wind, Hadley, Ferrel, and Polar circulation cells, and atmospheric stability dynamics. Atmospheric moisture, lifting mechanisms (orographic, frontal, convective), cloud types, and precipitation processes. Frontal systems, air masses, mid-latitude cyclones, and severe weather hazards including convective storms and tropical systems. In-situ and remote sensing observations, surface weather chart symbols, isobars, isotherms, isohyets, station models, and thermodynamic diagram analysis. Köppen climate groups, temperature and precipitation thresholds, and regional biome distribution patterns.

Module 15

Code	Course/Module Title	ECTS	Semester
ENVC211	الموارد الطبيعية وإدارتها Natural Resources and Their Management	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
Natural Resources and Their Management is an important academic course concerned with the study, utilization, conservation, and sustainable management of resources obtained from the natural environment. It examines major categories of natural resources, including forest, water, soil, land, wildlife, mineral, and energy resources. Students learn to distinguish between renewable and non-renewable resources and understand the factors responsible for their depletion and degradation. The course discusses the principles and methods of natural resource assessment, planning, conservation, and sustainable utilization. Particular attention is given to forest management, watershed management, soil conservation, biodiversity conservation, and sustainable land-use practices. It also examines environmental problems such as deforestation, soil erosion, desertification, pollution, habitat destruction, biodiversity loss, and climate change. The course introduces different approaches to resource management, including ecosystem-based management, integrated resource management, and community-based conservation. Students are also introduced to the role of environmental policies, legislation, institutions, and local communities in achieving effective resource management. Emphasis is placed on balancing economic development with environmental protection and the long-term conservation of natural resources.			

By completing the course, students are develop the knowledge and skills necessary to contribute to the responsible and sustainable management of natural resources.

Module 16

Code	Course/Module Title	ECTS	Semester
ENVC212	الزراعة المستدامة Sustainable Agriculture	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
This course provides a comprehensive introduction to the principles, concepts, and practices of sustainable agriculture. It focuses on the sustainable management of agricultural resources, particularly soil, water, crops, and biodiversity, while maintaining productivity and protecting the environment. The course examines sustainable farming systems, organic fertilizers, integrated pest management, water-use efficiency, soil conservation, crop diversification, and the recycling of agricultural wastes. It also addresses the environmental, economic, and social dimensions of agricultural sustainability, with emphasis on reducing environmental impacts, enhancing ecosystem resilience, and supporting long-term food security. The course aims to develop students' understanding of sustainable agricultural practices and their role in addressing current and future environmental challenges.			

Module 17

Code	Course/Module Title	ECTS	Semester
ENVC213	نظم المعلومات الجغرافية GIS	6	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72
Description			
This module introduces students to the fundamental concepts, principles, and applications of Geographic Information Systems (GIS) in environmental and climate change studies. The course provides students with an understanding of spatial data, geographic coordinates, map projections, spatial databases, and the main components of GIS. Students learn how to acquire, organize, manage, visualize, and analyze spatial and non-spatial data using GIS software. The module covers essential GIS operations, including data input and editing, coordinate systems, spatial data representation, thematic mapping, spatial queries, and basic spatial analysis. Particular			

emphasis is placed on the application of GIS in environmental monitoring and climate change studies, including the analysis of land-use and land-cover changes, environmental resources, climatic variables, and spatial patterns of environmental phenomena.

Practical sessions enable students to develop skills in creating digital maps, managing spatial datasets, performing basic spatial analyses, and interpreting geographic information. Through lectures, laboratory exercises, assignments, and practical projects, students develop the technical and analytical skills necessary to use GIS as an effective tool for environmental assessment, spatial analysis, decision-making, and climate change research.

Module 18

Code	Course/Module Title	ECTS	Semester
ENVC217	الزراعة والتغير المناخي Agriculture and Climate Change	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
This course examines the complex relationship between agriculture and climate change, focusing on how climate variability and changing environmental conditions affect agricultural production, soil health, water resources, ecosystems, and food security. It introduces the major climate-related challenges facing agricultural systems, including increasing temperatures, drought, water scarcity, changing precipitation patterns, soil degradation, and extreme weather events. The course also focuses on climate-smart agriculture, sustainable land and water management, and appropriate adaptation and mitigation strategies. It highlights the role of modern agricultural technologies, efficient irrigation, conservation practices, renewable energy, and improved crop and soil management in reducing greenhouse gas emissions and enhancing the resilience of agricultural systems. The course aims to provide students with an academic understanding of the role of agriculture in addressing climate change and supporting sustainable and resilient food systems.			

Module 19

Code	Course/Module Title	ECTS	Semester
UOM2032	علم الحاسوب II Computer II	3	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1	2	48	27
Description			

This course provides students with a broad foundation in essential computer concepts and contemporary information technologies. It combines theoretical instruction with practical activities to develop students' digital literacy, technical problem-solving abilities, and understanding of the role of computing technologies in modern society.

The course begins with the fundamentals of computer networks, including network types, basic components, network security principles, and common cybersecurity threats. Students are also introduced to electronic commerce and digital banking services, including ATM and debit-card services, online banking, mobile banking, SMS banking, and electronic payment systems. The course develops practical computer troubleshooting skills. Students learn how to identify and resolve common hardware and software problems using basic diagnostic techniques and troubleshooting tools. A major component focuses on Artificial Intelligence (AI). Students study the definition, history, techniques, and principal approaches of AI, together with its key characteristics, benefits, limitations, and ethical implications.

Students explore AI applications across education, healthcare, transportation, marketing, advertising, finance, robotics, and industrial automation. The course also considers AI's wider influence on society, international relations, employment, and the future of humanity, with particular attention to privacy, surveillance, responsible AI, ethical decision-making, and the impact of automation on the labour market. The course concludes with an examination of recent AI research, emerging technologies, and expected future developments. Through its combined theoretical and practical sessions, students gain the knowledge needed to understand, evaluate, and responsibly use modern computer and AI technologies.

Module 20

Code	Course/Module Title	ECTS	Semester
ENV214	كيمياء بيئية Environmental Chemistry	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
The Environmental Chemistry course, designed for second-year students, focuses on establishing the fundamental scientific principles of environmental science. The curriculum includes an introduction to environmental chemistry, highlighting its importance and benefits in our lives. It then covers the types of environmental pollutants and their health effects on humans, as well as natural cycles. Finally, a brief introduction to the atmosphere, its components, and some natural phenomena that affect the environment is provided.			

Module 21

Code	Course/Module Title	ECTS	Semester
UOM2022	اللغة الإنكليزية II English II	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		30	20
Description			
This module is designed to further develop students' English language proficiency by strengthening the four essential language skills: listening, speaking, reading, and writing. The course builds upon the knowledge and skills acquired in English Language I and focuses on improving students' ability to communicate effectively in academic, scientific, and everyday contexts. The module covers selected grammatical structures, vocabulary development, reading comprehension, paragraph writing, and oral communication. Students are encouraged to express their ideas, participate in discussions, understand written texts, and develop greater accuracy and fluency in using English. Particular attention is given to expanding scientific and environmental vocabulary relevant to students' academic specialization and enabling them to understand basic scientific texts and learning resources written in English.			

Module 22

Code	Course/Module Title	ECTS	Semester
UOM2050	جرائم حزب البعث Crimes of the Ba'ath Party	2	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	0	30	20
Description			
This module introduces students to the historical and legal dimensions of crimes and human rights violations committed under the Ba'ath Party regime in Iraq. The course examines the political and social context of the period and addresses major violations affecting individuals and communities, with emphasis on principles of human rights, justice, accountability, and the preservation of historical memory. Students study selected historical events and documented cases through lectures, discussions, and academic materials, while developing the ability to analyze historical evidence and understand the consequences of authoritarian practices on Iraqi society. The module also highlights the importance of recognizing victims' experiences, promoting awareness of human rights, and strengthening the principles of justice and responsible citizenship. Through lectures, discussions, reading activities, assignments, and continuous assessment, students develop a broader understanding of this period of Iraqi history and its social, legal, and humanitarian implications.			

Module 23

Code	Course/Module Title	ECTS	Semester
ENVC215	جيولوجيا بيئية Environmental Geology	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			

Module 24

Code	Course/Module Title	ECTS	Semester
ENVC216	هيدرولوجي Hydrology	5	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			

Module 25

Code	Course/Module Title	ECTS	Semester
ENVC217	الزراعة والتغير المناخي Agriculture and Climate Change	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			

Module 26

Code	Course/Module Title	ECTS	Semester
ENVC218	علم الغلاف الجوي Atmospheric Science	5	2

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
The aim of this course is to provide a foundational scientific framework for understanding Earth's atmosphere as a dynamic physical and chemical system. Moving beyond descriptive weather observations, the curriculum emphasizes quantitative reasoning, thermodynamics, atmospheric composition, radiative transfer, and physical motion. The course will cover planetary gas envelopes, retention mechanics (gravity, escape velocity), and vertical scale heights. Students will study the evolution of Earth's atmosphere, including primordial hydrogen loss, volcanic outgassing (H_2O, CO_2, N_2), ocean formation, and the Great Oxygenation Event. The curriculum explores major versus trace atmospheric constituents, residence time calculations, anthropogenic modifications, ideal gas laws ($P = \rho R_d T$), dry air molecular weight (28.97 g/mol), and scale height derivations. Furthermore, topics include hydrostatic equilibrium ($dP/dz = -\rho g$), pressure gradient forces, latent heat of vaporization (L_v), evaporative cooling mechanics, and vapor pressure dynamics. In detail, the course examines surface energy balance partitioning, sensible versus latent heat fluxes, and Bowen ratio dynamics ($B = H/LE$). Fundamental concepts of photochemistry will be analyzed, including solar actinic flux, Planck's Law ($E = h\nu$), photolysis rates (J-values), radical generation, hydroxyl radical (OH) oxidation pathways, the stratospheric Chapman cycle, and tropospheric ozone pollution. The syllabus also addresses aerosol size distributions (nucleation, accumulation, coarse), primary versus secondary aerosol formation, $PM_{2.5}/PM_{0.1}$ health impacts, radiative forcing (Mie scattering vs. black carbon absorption), cloud condensation nuclei (CCN), acid deposition chemistry, atmospheric turbulence, boundary layer dynamics, scalar mixing processes, and air pollution dispersion mechanisms.			

Module 27

Code	Course/Module Title	ECTS	Semester
ENVC219	الإحصاء البيئي Environmental Statistics	5	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47
Description			
The aim of this course is to develop statistical competence by providing students with a solid foundation in descriptive and inferential statistics, enabling them to summarize, analyze, and interpret environmental and biological data effectively. It enhances data analysis skills by training students to collect, organize, and visually represent data using modern statistical tools such as Excel, SPSS, and R for applied research purposes. It also applies probability and statistical modeling to introduce students to probability theory and statistical distributions, helping them model uncertainty and variation in environmental and biological studies. Furthermore, it strengthens research and decision-making skills by enabling students to use hypothesis testing, regression analysis, and experimental design to address real-world challenges in the fields of environment and public health. The course enhances multidisciplinary applications by supporting the integration between environmental statistics and other disciplines such as ecology,			

epidemiology, public health, and conservation sciences, thereby encouraging collaboration across disciplines. It also develops problem-solving and critical thinking skills by encouraging students to use the statistical approach and analytical thinking to solve environmental problems, assess risks, and support sustainability efforts. It prepares students for career paths by equipping graduates with the analytical skills necessary to work in environmental agencies, research institutions, public health organizations, and data-driven sectors. Finally, it ensures alignment with international educational standards by aligning the curriculum with the Bologna Process guidelines to ensure international recognition and academic excellence.