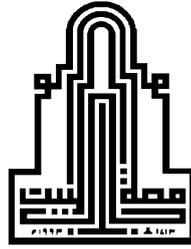


<b>Quality and Development Center</b>	
<b>No</b>	<b>Cent-QD-F 201</b>



**Al al-Bayt University**  
**Quality and Development Center**



**Al al-Bayt University**

**Faculty of Earth and Environmental Sciences**

**Bachelor Degree Study Plan Template**  
**of Applied Earth and Environmental Sciences**

**2022 - 2023**



## Guidance Plan for Undergraduate Students specializing in Applied Earth and Environmental Sciences

First Year							
First Semester				Second Semester			
Course No.	Course Title	Credits	Learning Type	Course No.	Course Title	Credits	Learning Type
-	Elective University Requirement	3	Blended	-	Compulsory University Requirement	3	Online
-	Compulsory University Requirement	3	Online	0403101	General Chemistry (1)	3	Blended
0401101	Calculus (1)	3	Blended	0801108	General Geology (2)	3	Face to Face
0801106	General Geology (1)	3	Face to Face	0801109	Practical General Geology (2)	1	Face to Face
0801107	Practical General Geology (1)	1	Face to Face	0801200	Crystallography and Mineralogy	2	Face to Face
-	-	-	-	0801201	Practical Crystallography and Mineralogy	1	Face to Face
-	-	-	-	0404101	General Biology (1)	3	Blended
-	-	-	-	0801161	Computer Applications in Earth Sciences	2	Face to Face
<b>Total</b>		<b>13</b>		<b>Total</b>		<b>18</b>	

Second Year							
First Semester				Second Semester			
Course No.	Course Title	Credits	Learning Type	Course No.	Course Title	Credits	Learning Type
-	Compulsory University Requirement	3	Online	-	Compulsory University Requirement	3	Online
-	Elective University Requirement	3	Blended	0402102	General Physics (2)	3	Face to Face
0402101	General Physics (1)	3	Blended	0401218	Introduction to Geological and Environmental Statistics	2	Blended
0401102	Calculus (2)	3	Blended	0801241	Surveying	2	Blended
0801202	Optical Mineralogy	2	Face to Face	0801204	Petrology	2	Face to Face
0801203	Practical	1	Face to	0801205	Practical	1	Face to Face

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	Optical Mineralogy		Face		Petrology		
0801213	Sedimentary Rocks	2	Blended	0801253	Hydrology	3	Face to Face
0801214	Practical Sedimentary Rocks	1	Face to Face	-	-	-	-
<b>Total</b>		<b>18</b>		<b>Total</b>		<b>16</b>	

Third Year							
First Semester				Second Semester			
Course No.	Course Title	Credits	Learning Type	Course No.	Course Title	Credits	Learning Type
-	Compulsory University Requirement	3	Online	-	Elective Specialty Requirements	3	Blended
0801221	Applied Geochemistry	2	Blended	0801369	Remote Sensing and Geographic Information Systems	3	Face to Face
0801222	Practical Applied Geochemistry	1	Face to Face	0801310	Geology of Jordan	3	Blended
0801243	Structural Geology	2	Face to Face	0801318	Management of Arid and Semi-Arid Lands	2	Blended
0801244	Practical Structural Geology	1	Face to Face	0801362	Paleontology	2	Blended
0801303	Stratigraphy	2	Face to Face	0801363	Practical Paleontology	1	Face to Face
0801304	Practical Stratigraphy	1	Face to Face	-	-	-	-
0801309	Industrial Rocks and Minerals	3	Face to Face	-	-	-	-
0801354	Hydrogeology	3	Face to Face	-	-	-	-
<b>Total</b>		<b>18</b>		<b>Total</b>		<b>14</b>	

Summer Semester			
Course No.	Course Title	Credits	Learning Type
0801366	Field Skills in Earth and Environmental sciences	3	Face to Face
<b>Total</b>		<b>3</b>	



Fourth Year							
First Semester				Second Semester			
Course No.	Course Title	Credits	Learning Type	Course No.	Course Title	Credits	Learning Type
-	Elective Specialty Requirements	3	Blended	0801453	Hydrochemistry	2	Face to Face
-	Elective Specialty Requirements	3	Blended	0801454	Practical Hydrochemistry	1	Face to Face
801337	Geophysics	3	Face to Face	-	Compulsory University Requirement	3	Online
0801407	Engineering Geology	2	Face to Face	0801493	Graduation Project	3	Face to Face
0801408	Practical Engineering Geology	1	Face to Face	-	Elective Specialty Requirements	3	Blended
0801410	Environmental Impact Assessment	2	Blended	-	Elective University Requirement	3	Blended
0801466	Petroleum Geology	3	Face to Face	-	-	-	-
<b>Total</b>		<b>17</b>		<b>Total</b>		<b>15</b>	

#### Description of Courses offered by the Department of Applied Earth and Environmental Sciences / Bachelor Degree in Applied Earth and Environmental Sciences

Course No.	(1) الجيولوجيا العامة	(3) Credits	Learning Type
0801106	General Geology (1)	Pre-requisite: -	Face to Face
Introduction to physical geology, Minerals, Rocks: plutonic and volcanic igneous rocks, sediments and sedimentary rocks; metamorphism and metamorphic rocks, Internal geological processes; earthquakes, volcanoes and plate tectonics, earth interior, crustal deformation and mountain building, and geological structures.			

Course No.	(1) الجيولوجيا العامة العملي	(1) Credits	Learning Type
0801107	Practical General Geology (1)	Pre-requisite: 0801106 or simultaneous	Face to Face
Identify the crystals, Crystallographic Systems, Elements of Symmetry, Minerals properties and classification of minerals, study of the most important types of igneous, sedimentary, and metamorphic rocks and their properties and classifications.			



Course No.	(2) الجيولوجيا العامة	(3) Credits	Learning Type
<b>0801108</b>	<b>General Geology (2)</b>	<b>Pre-requisite: 0801106</b>	<b>Face to Face</b>
External geological processes acting on the Earth's surface including: weathering and soil formation, downslope movement of earth materials under the influence of gravity, groundwater and running water as geological factors. Effect of wind, glacial ice, shorelines, seas, lakes and oceans as external geological factors. Natural sources of energy			

Course No.	(2) الجيولوجيا العامة العملي	(1) Credits	Learning Type
<b>0801109</b>	<b>Practical General Geology (2)</b>	<b>Pre-requisite: : 0801108 or simultaneous</b>	<b>Face to Face</b>
Basic principles of structural geology: completing outcrop pattern exposed on the ground, drawing contour maps, constructing cross sections and topographic profiles, building geological maps (horizontal and dipping strata), giving exercises show the main geological structures (Faults, Folds) and Relative dating (key principles and geologic time scale)			

Course No.	تطبيقات حاسوبية في علوم الأرض	(2) Credits	Learning Type
<b>0801161</b>	<b>Computer Applications in Earth Sciences</b>	<b>Pre-requisite: -</b>	<b>Face to Face</b>
The knowledge about using different computer applications and software's for geological applications. Learning how to enter the geological data, data processing and analyzing, data filtering and sorting, and data visualizing as maps, tables and graphs using different software's (for example: Microsoft Excel software, SURFER software, and Google Earth software).			

Course No.	علم البلورات و المعادن	(2) Credits	Learning Type
<b>0801200</b>	<b>Crystallography and Mineralogy</b>	<b>Pre-requisite: 0801106</b>	<b>Face to Face</b>
Crystals and crystallization, crystal systems and its classification, physical properties, chemical classification of minerals, non-silicates; sulfides, oxides, hydroxides, halides carbonates, nitrates, sulphates, phosphate, chromate, tengestates, silicates, rock-forming minerals, crystallographic properties of minerals using diffraction x-rays.			

Course No.	علم البلورات والمعادن العملي	(1) Credits	Learning Type
<b>0801201</b>	<b>Practical Crystallography and Mineralogy</b>	<b>Pre-requisite: : 0801200 or simultaneous</b>	<b>Face to Face</b>
Practical identification of crystal systems, polarized microscope components identification and its operation mechanism, various mineral associations and eye - minerals identification.			

Course No.	بصريات المعادن	(2) Credits	Learning Type
<b>0801202</b>	<b>Optical Mineralogy</b>	<b>Pre-requisite: 0801200</b>	<b>Face to Face</b>
Study the Properties of light ( Theories explaining light, Light waves, Reflection and Refraction light, Polariz and Unpolriz Light), Optical properties of Isotropic and anisotropic minerals (Optics of Minerals, Isotropic Indicatrix, Uniaxial and Biaxial, Retardation and birefringence, Monochromatic and Polychromatic Light), Optical Properties of Minerals under polarized microscope ( color, cleaveg, relief, twinning, extinction, Interference color and Interference Figure).			



Course No.	بصريات المعادن العملي	(1) Credits	Learning Type
0801203	Practical Optical Mineralogy	Pre-requisite: 0801202 or simultaneous	Face to Face
<p>Definition of Polarizing Microscope: Determination of the vibration direction of polarizer, Differentiation between opaque and transparent/ translucent minerals, Distinguish between isotropic and anisotropic minerals. Recognizing grains or crystal shape (form and habit). Study the properties of minerals under polarized Microscope, for plane polarizer light (PPL) such as cleavage, relief, extinction, and cross polarized light (XPL) such as Twining, interference color, Interference figure and alteration and zoning of minerals.</p>			

Course No.	علم الصخور	(2) Credits	Learning Type
0801204	Petrology	Pre-requisite: 0801202	Face to Face
<p>Study earth structure, distribution of rocks on earth; igneous rocks; shapes and mineral composition of intrusive rocks, classification, magma (physical properties, physical chemistry, differentiation), Type of igneous rock formation, texture and structure of igneous rocks, tectonic setting related with generation of magma. Study of sedimentary rocks; mechanical and different type of rocks, (such as carbonates and evaporate), Metamorphic rocks; Metamorphism, Factors controlling metamorphism, metamorphic rocks classification, Metamorphic rocks formation at earth's crust, metamorphic rocks textures.</p>			

Course No.	علم الصخور العملي	(1) Credits	Learning Type
0801205	Practical Petrology	Pre-requisite: 0801204 or simultaneous	Face to Face
<p>Identification of the rock forming minerals under polarizing Microscope, study the (intrusive and extrusive) mineral igneous rocks, identify the rock names and classification under polarizer microscope for igneous, sedimentary and metamorphic rocks, by using mineral composition and the texture. Classification of igneous rocks by using mode analyses, study the alteration and diagenesis produce to secondary minerals of igneous rocks. Training to prepare thin sections for studying minerals under microscope.</p>			

Course No.	الصخور الرسوبية	(2) Credits	Learning Type
0801213	Sedimentary Rocks	Pre-requisite: 0801202	Blended
<p>Physical properties of grains, sedimentary cycles and weathering, silicate and non-silicate sedimentary materials, sedimentary processes, sedimentation basins, sedimentary environments, the sedimentary rock textures and their different characteristics, sedimentary structures, classification of sedimentary rock and sediments; types sedimentary rock.</p>			

Course No.	الصخور الرسوبية العملي	(1) Credits	Learning Type
0801213	Practical Sedimentary Rocks	Pre-requisite: 0801213 or simultaneous	Face to Face
<p>Sedimentary rocks textures, sedimentary rocks structures, depositional environments, sedimentary rocks classifications, types and geo-structural interrelations, sedimentary rocks studying under microscope, naked eye identifications of sedimentary rocks, field study of sedimentary rocks, roundness and sorting, volumetric distribution for sediments, statistical parameters for sediment distributions.</p>			



Course No.	علم التربة	(3) Credits	Learning Type
0801215	Soil Science	Pre-requisite: 0801106	Blended

Definition of soil science and fundamental relationships, origin of soil, soil formation factors, soil components, solid phase, fluid phase, water percolation in unsaturated and saturated soil, gaseous phase, physical, chemical and biological characteristics of soil, soil classification, local water cycle.

Course No.	مقدمة في الإحصاء الجيولوجي والبيئي	(2) Credits	Learning Type
0801218	Introduction to Geological and Environmental Statistics	Pre-requisite: -	Blended

Introduction to geo-statistics aims to define the geological and environmental statistics and its applications, defining the sampling, and calculating mean, median, variance, standard deviation of samples, construct frequency and histogram of samples, statistical analyses steps, sampling, data processing and analyses, hypotheses tests, the prediction and results, geological case studies.

Course No.	الجيوكيمياء التطبيقية	(2) Credits	Learning Type
0801221	Applied Geochemistry	Pre-requisite: 0801204	Blended

Definition of Geochemistry, Geochemical composition and structure of the Earth, Mineral reactions and phase change; Earth interior and its structure; strata, density distribution, deep rocks; Magmatic behavior and igneous rocks; Geochemistry of sedimentation and sedimentary rocks, mineral composition and distribution in the different rocks, Geochemistry of Metamorphism and metamorphic rocks, Physiochemical factors in sedimentation.

Course No.	الجيوكيمياء التطبيقية العملي	(1) Credits	Learning Type
0801222	Practical Applied Geochemistry	Pre-requisite: : 0801221 or simultaneous	Face to Face

Collection of geological samples, Preparation of samples for analysis (crushing, digestion, heating), method analyses samples [Atomic Absorption Spectroscopy (AAS) , XRF, RDD, Flam Photometer ,Ione Conductive Plasma ICP and titration] for major and trace elements, determination of humidity, organic matter, carbonate, phosphate in the geological samples.

Course No.	علم المساحة	(2) Credits	Learning Type
0801241	Surveying	Pre-requisite: -	Blended

Introduction (surveying branches and principles, fundamental definitions), measuring units and systems, The leveling, longitudinal and cross sections, The network balance and contouring line drawing, vertical and horizontal angles (directions, azimuths, deviations), areas and volumes (finding areas using straight lines and specified areas using curved lines), The using coordinates, universal coordinates systems (longitudes and latitudes), topographic surveys (fields data collection for preparing the topographic maps), water surveys and measuring streams fluxes, advanced survey equipment's, computer applications.



Course No.	الجيولوجيا التركيبية	(2) Credits	Learning Type
0801243	Structural Geology	Pre-requisite: 080109	Face to Face
<p>Definition, classification, causes of geologic structures. Concepts of force and stress – normal and shear stress, stress states, strain and deformation. Mohr circles of stress, mean and deviatoric stress, and the stress tensor. Homogeneous strain, heterogeneous strain and strain ellipsoid. Rheology, Hooke's law, Poisson's ratio, elastic-plastic behavior. Joints and veins, classification, data collection in the field, Faults and faulting, terminology, types, net-slip components, fault breccias, Riedel shears, fault-related folding. Evidences for faults, fault systems. Folds and Folding, fold anatomy, fold classification, kinematic models of folding.</p>			

Course No.	الجيولوجيا التركيبية العملي	(1) Credits	Learning Type
0801244	Practical Structural Geology	Pre-requisite: 0801243 or simultaneous	Face to Face
<p>Learning about the parts of the geological compass and how to use it, training students in measuring the attitudes of planes and lines in the laboratory and methods of representing readings of dip, strike, plunge and rake angles, training students in drawing cross sections of geological maps and methods of drawing layer outcrops on geological maps containing folds, faults and unconformities, stereographic projection (Schmid's net) planes and lines, statistical analysis of fractures, methods for calculating and measuring stress and strain in rocks.</p>			

Course No.	الجيومورفولوجيا	(3) Credits	Learning Type
0801247	Geomorphology	Pre-requisite: 0801106	Blended
<p>Geomorphology and earth's structures: regional and in-situ relationships, debris movement on slopes, landforms produced by volcanic activity, landforms associated with rock types, landforms associated with erosion, The river erosion and the associated terrains, The coastal erosion and associated landforms. The human and his role in forming landscape.</p>			

Course No.	علم المياه السطحية	(3) Credits	Learning Type
0801253	Hydrology	Pre-requisite: 0801108	Face to Face
<p>Definition of hydrology; hydrological cycle; hydrological budget; types of precipitation, distribution, measuring; losses water: evaporation, transpiration, infiltration; river flow: Properties of water basins, water curves, groundwater superficial relationship, methods of measurement; and standard specifications. Determination of water divide for catchment area using topographical maps and aerial photographs and satellite images, determination of geometrical and hydrological properties for water basins, contour mapping for elements of the hydrological cycle, ways to complete and correct records of precipitation, methods of calculating rates of evaporation and evaporation – transpiration, estimation of infiltration indices and values of surplus rain, coefficient runoff, identify discharge into waterways, methods of hydrograph separation, unit hydrograph, curves of rainfall intensity and the duration of recurrence, and methods of calculating volumes of flooding.</p>			

Course No.	علوم الأرض وتكنولوجيا المعلومات	(3) Credits	Learning Type
0801261	Earth Sciences and Information Technology	Pre-requisite: 0801106	Blended
<p>Definitions, introduction in the development of information technology systems, definition of problems, feasibility and systems analysis, methods of preparing systems for analysis purposes, introduction to information strategies, methods used in strategies.</p>			



Course No.	الجيولوجيا البيئية	(3) Credits	Learning Type
0801302	Environmental Geology	Pre-requisite: 0801106	Online
Introduction, geological frameworks, earth structure and minerals; hazardous geological processes: estimate and identify geological hazards, earthquakes, lava, large sea waves, landslides and traffic blocks, flood risk, seas, climate, meteorites falling; nature earth's resources: introduction, types of land resources; human impact on the environment; climate change; medical geology.			

Course No.	علم الطبقات	(2) Credits	Learning Type
0801303	Stratigraphy	Pre-requisite: 080213	Face to Face
The laws/principles governing the stratigraphic and faunal successions, relative ages of rocks and sediments types, stratigraphic relationships: lateral and vertical, conformable and unconformable surfaces; The litho-stratigraphic units: the bases of their division, their various divisions with mention of the local examples, the bio-stratigraphic units: their different biozones, types, levels; the chrono-stratigraphic units: their concept, relationship to geological time units; the magneto-stratigraphic units, their concept, their subdivisions; Geological systems and the geological time scale, its different divisions, correlation, concept and different methods; Well records, their importance in stratigraphy, their various methods.			

Course No.	علم الطبقات العملي	(1) Credits	Learning Type
0801304	Practical Stratigraphy	Pre-requisite: 0801303 or simultaneous	Face to Face
The vertical geological profiles, normal and closed litho-correlation, recognition of unconformity surfaces through correlation, identification of the pinch-out phenomena, weathering, and texture profiles through correlation, identification the areas of the sea transgression and regression through correlation and vertical sections, Well records and identification of subsurface layers through them, bio-correlation; Stratigraphical maps and others			

Course No.	المعادن والصخور الصناعية	(3) Credits	Learning Type
0801309	Industrial Rocks and Minerals	Pre-requisite: 0801205	Face to Face
Introduction, difference between ore deposits and industrial rocks & minerals, overview of the industrial minerals (characteristics of the industrial minerals sector, classification of industrial minerals and rocks, world distribution of industrial minerals deposits, international trade in industrial minerals, mine safety and health law environmental law for industrial minerals and rocks sustainable development and industrial minerals), markets and uses (absorbents and desiccants , construction uses, cosmetics, electronic and optical materials, environmental uses, fertilizers, refractories, nanomaterials, well drilling materials.. etc.), industrial rocks & minerals in Jordan.			

Course No.	جيولوجيا الأردن	(3) Credits	Learning Type
0801310	Geology of Jordan	Pre-requisite: 0801303	Blended
Knowing the regional geological setting of Jordan and the exposures of the Arabian-Nubian Shield rocks, the basement rocks, the geological sequences in the different Paleozoic, Mesozoic and Cenozoic Eras and their divisions into Groups and Formations, volcanic rocks, the structural setting of Jordan and the theories of the origin of the Dead Sea transform fault and the main structures in Jordan, a scientific trip to Aqaba and southern Jordan, and a scientific report on that..			



Course No.	إدارة الأراضي الجافة وشبه الجافة	(2) Credits	Learning Type
0801318	Management of Arid and Semi-Arid Lands	Pre-requisite: -	Blended
Introduction: definition and characteristics of arid and semi-arid lands global distribution and causes of dry lands: deserts and desertification, geologic processes in arid climates, landforms in arid and semi-arid environments, arid land resources management: water resources, livestock resources, vegetation and plant resources, energy resources. Industrial production in arid regions: resource extraction and mining strategy. Residents of arid regions (bedouin). Rainfed agriculture, irrigation, livestock. Urban centers and arid regions			

Course No.	الجيوفيزياء	(3) Credits	Learning Type
0801337	Geophysics	Pre-requisite: 0402101	Face to Face
Geophysics definition, Introduction, relationship of geophysics with geology and other sciences, Types of geophysical methods. Gravity method, Basic theory, Field measurements, gravity reduction and anomalies, data interpretation. Magnetic methods, Basic theory, earth magnetism, measurements and data interpretation. Seismic methods, Reflection and Refraction, fundamental principles, field measurements, data analyses and interpretation. Electrical and Electromagnetic methods, Their types, electrical resistivity, Basic theory, field measurements and data interpretation. Assignments and applications			

Course No.	جيولوجيا الزلازل	(3) Credits	Learning Type
0801338	Earthquakes Geology	Pre-requisite: 0801243	Blended
Introduction to seismology aiming at defining the seismology development and its uses. Earthquake causes and consequences, seismic waves, Seismometer and instrumentations, seismic monitoring and earthquake parameters, ray paths and gravity acceleration. Earth's interior structure using seismic data. Jordan transform fault seismicity and Arabian plate. Historical earthquakes. Pale-seismology and Dead Sea Transform fault.			

Course No.	الهيدروجيولوجيا	(3) Credits	Learning Type
0801354	Hydrogeology	Pre-requisite: 0801106	Face to Face
Introduction to groundwater, the basic physical principles of the water cycle, geological formations and aquifers, types of aquifers, groundwater tables, groundwater contour maps and groundwater flow direction, wells and springs, physical properties of aquifers, Darcy's law, introduction to groundwater quality and main parameters affecting groundwater quality, introduction to pumping tests (concept and used methods), hydrogeology of Jordan.			

Course No.	إدارة المخلفات الصلبة	(3) Credits	Learning Type
801356	Solid Waste Management	Pre-requisite: 0801106	Blended
Definition of solid waste, the emergence and development of solid wastes, factors affecting the rate of quantity and quality of solid waste, solid waste types and properties, history of solid waste management, the purpose of solid waste management, transport, sorting and treatment of wastes (incineration, direct disposal, recycling), landfills (how to choose landfill location, design, processing, landfill), and hazardous solid waste (sources, characteristics, storage, transportation and disposal).			



Course No.	معالجة المياه العادمة	(3) Credits	Learning Type
0801357	Wastewater Treatment	Pre-requisite: 801106	Blended
<p>Definition of the concept of wastewater, types, components, physical, chemical and biological properties, sewage systems, factors on which the design of sewage systems, wastewater systems and their benefits, calculation of wastewater flow, wastewater treatment objectives, types of wastewater treatment (physical, chemical and Biological), pre-primary, secondary and advanced stages of wastewater treatment, activated sludge and disposal methods, sterilization, factors on which the design of treatment plants and the choice of appropriate treatment methods depend, wastewater management in Jordan, treatment plants in Jordan and treatment methods, water reuse Exhaust treatment in Jordan.</p>			

Course No.	علم الأرصاد الجوية	(3) Credits	Learning Type
0801360	Meteorology	Pre-requisite: 0801253	Blended
<p>Composition, measurement of atmospheric elements: heat, humidity, solar radiation, pressure, wind, rain, cloud physics, radiation in the atmosphere, basics of forecasting weather changes, optical phenomena in the atmosphere; radar and satellite meteorology.</p>			

Course No.	علم المتحجرات	(2) Credits	Learning Type
0801362	Paleontology	Pre-requisite: 0801213	Blended
<p>Defining the fossil, the importance of studying fossils, the relationship of fossils to the geological history, methods of fossil preservation, methods of classifying fossils into kingdoms, phylum, families, classes and orders, reaching to the genera and species, and clarifying the concept of each of them, identifying the common fossil groups, especially the following groups: trilobites, graptolites, brachiopods, gastropods, bivalves, cephalopods, and others.</p>			

Course No.	علم المتحجرات العملي	(1) Credits	Learning Type
0801363	Practical Paleontology	Pre-requisite: 0801362 or simultaneous	Face to Face
<p>The practical part includes identifying the different physical features of the fossils such as symmetry, size, morphology, and using them to identify some common fossils, the use of catalogues and descriptive tables prepared in an ideal and sequential manner to identify some fossils by comparison, classification processes and the assigned of some species to their phylum, families and genera, Collecting some fossils from sedimentary rocks in the field, separated the microscopic fossils in laboratory and photographed them using a Scanning Electron Microscope (SEM), using the various obtained information and data to identify and classify them.</p>			

Course No.	اقتصادات الموارد الطبيعية والبيئة	(3) Credits	Learning Type
0801365	Natural Resources and Environmental Economics	Pre-requisite: -	Online
<p>Resources types, nature of resource markets, scarcity of standards and their impact on development, examples of natural and renewable resources, methods of investment of natural resources, natural resources in Arab countries and economic impacts, environmental pollution, role of economy in resources and environment study, natural and environmental conservation</p>			



Course No.	مهارات ميدانية في علوم الارض والبيئة	(3) Credits	Learning Type
0801366	Field Skills in Earth and Environmental sciences	Pre-requisite: 0801310	Face to Face

Identify some of the outcrops of Groups and Formations that represent the different geological ages in northern Jordan. Training in using the geological compass to measure the dip and strike of different geological structures such as faults, joints, folds, and bedding planes; training in drawing horizontal and vertical geological sections; Training in the use of a GPS device for positioning, training in methods of taking rock samples (sedimentary and igneous) for various laboratory tests; Training in the geological mapping mechanism and producing geological maps by means of field surveys and aerial photos, and assigning students to make a scientific report and discuss it with them.

Course No.	الاستشعار عن بعد و نظم المعلومات الجغرافية	(3) Credits	Learning Type
0801369	Remote Sensing and Geographic Information Systems	Pre-requisite: 0801161	Face to Face

Introduction to Remote Sensing, electromagnetic radiation and its characteristics, the types and characteristics of remote sensors, elements of remote sensing and the remote sensing process, satellites, image processing and analysis, supervised and unsupervised classification, remote sensing applications in different disciplines. Introduction to Geographical Information System (GIS), GIS components, maps projections and coordinate systems, types of data in GIS, spatial data accuracy in GIS, data management in GIS, vector data analysis, data visualization.

Course No.	الجيولوجيا تحت السطحية وجس الآبار	(3) Credits	Learning Type
0801405	Subsurface Geology and Well Logging	Pre-requisite: 0801337	Blended

This course involves the geophysical exploration methods. Seismic layers, well logging and petro-physical analyses. Subsurface layering analyses. Core sample description. Seismic data processing. 2D and 3D seismic data interactive interpretation. Preparing and analyses subsurface structural map. Build subsurface models for sedimentary basins.

Course No.	قراءات مختارة في علوم الأرض	(3) Credits	Learning Type
0801406	Selected Topics in Earth and Environmental Sciences	Pre-requisite: 0801106	Blended

In this course a new and specific topics oriented to earth and environment field is selected according to the local and regional problems, the students must write a report and present the results.

Course No.	الجيولوجيا الهندسية	(2) Credits	Learning Type
0801407	Engineering Geology	Pre-requisite: 0801243	Face to Face

Soil and Rocks: nature and engineering geological properties, effecting factors and variables, uses; Constructions: site investigations, foundations; Dams: types and structure, grouting and materials used, primary studies and investigations, reservoirs, problems; sedimentation engineering; landslides and solutions; Geophysical methods; Rocks and construction material; tunnels; Bridges and highways.



Course No.	الجيولوجيا الهندسية العملي	(1) Credits	Learning Type
0801408	Practical Engineering Geology	Pre-requisite: 0801407 or simultaneous	Face to Face
Evaluation of physical properties of rocks and soils, Pore space percent, Mechanical properties, Soil's engineering classification, Typical engineering names for rocks and soils, Calculations of slope stability, Force analysis on slopes, Safety factor, Projection of slopes, joints and faults on Schmidt's net			

Course No.	تقييم الأثر البيئي	(2) Credits	Learning Type
0801410	Environmental Impact Assessment	Pre-requisite: 801354	Blended
Introduction and Principles: Processes: Preliminary Studies, Mitigation, Assessment and Environmental Impact Forecast, The Participation, The Submission and Review, Monitoring and Audit; After Decision, The Assessment and New Consolidations, Expectations: Improving the Impact of Projects, Environmental Assessment Strategy, Environmental Legislations, Definition, Source, Responsible Actors, Their Application, Assessment, Integrated Pollution Control, The Conservation of Nature, Environmental Policies and Legislation in Jordan.			

Course No.	هندسة البيئة	(3) Credits	Learning Type
0801416	Environmental Engineering	Pre-requisite: 801410	Blended
Air pollution control, introduction, pollution measuring, General ideas of air pollution control, the control of preliminary pollutants, the control of volatile organic compounds and ferrous, nitrogen oxides, vehicles motor problems, the control of water pollution, water quality, biological and chemical variables, water treatment methods in natural systems, the role of runoff in organic residuals degradation, engineering systems for water treatment, wastewater treatment and its disposal, environmental and water engineering systems design, water pumping and wastewater.			

Course No.	بيئات العصر الرباعي	(3) Credits	Learning Type
0801417	Quaternary Environments	Pre-requisite: 801303	Blended
The Quaternary record, the geomorphological characteristics, Lithological characteristics: introduction, glacial deposits, Paleo-soil, lakes, wind deposits and the carbonate rocks, deep deposits and ice, The biological characteristics, introduction, Analyses of pollen, algae, plants, mollusks and pryoza (unit cell), geochronology, Stratigraphy and correlation, The last glacial and inter-glacial cycle.			

Course No.	الاستكشاف الجيوكيميائي	(3) Credits	Learning Type
0801426	Geochemical Exploration	Pre-requisite: 0801221	Blended
Define Geochemical Exploration, Geochemical Environment) Syngenetic & Epigenetic Patterns(, Geochemical Survey, Geochemical Anomalies, Element of Geochemical Survey, Classification of Methods of Geochemical Survey, Type of Geochemical Survey, regional and detail, Methods of Geochemical Survey: Rock, Soil, Stream sediment, Heavy minerals and Statistical Treatments of Geochemical Data, How to Draw the Geochemical Maps, Geochemical interpretation and Geochemical right report.			



Course No.	الجيوفيزياء الهندسية	(3) Credits	Learning Type
0801437	Engineering Geophysics	Pre-requisite: 0801337	Blended
Seismic refraction method and its field applications, subsurface and soil profile investigation for engineering and environmental applications using seismic methods. Cavity, slope stability and site selection studies. Electrical methods and their applications: Groundwater exploration, Karstification and old mines excavation. Exploring and follow up dam seepage. Investigating groundwater contamination and landfill plumes. Magnetic, electromagnetic and gravity methods and their environmental and engineering applications. Field work and writing reports.			

Course No.	الصفائح التكتونية	(3) Credits	Learning Type
0801445	Plate Tectonics	Pre-requisite: 0801243	Blended
Introduction, Earth's interior, The geophysical techniques in tectonic studies, tectonic characteristics of the earth, plate tectonic theory, its movement, causes, Divergent boundaries and trenches, Transform faults, Convergent boundaries, geology and tectonic of Triple junction, collision, mountain building structures, neo-tectonics, regional mountain zones, scientific methods and plate tectonic revolution.			

Course No.	الهيدروكيمياة	(2) Credits	Learning Type
0801453	Hydrochemistry	Pre-requisite: 0403101	Face to Face
Water cycle in nature, chemical composition of water, types of chemical bonds, the mole, chemical and physical properties of water, natural water components (rain, sea, oceans, rivers and groundwater, origin of water components, environmental problems resulting from water pollution, environmental isotopes and their benefits, chemical processes and chemical solutions and interpretation, chemical equilibrium.			

Course No.	الهيدروكيمياة العملي	(1) Credits	Learning Type
0801454	Practical Hydrochemistry	Pre-requisite: 0801453 or simultaneous	Face to Face
Sampling (sampling techniques, its maintain and transport means), physical characteristics test of samples (knowing the concentration of Ammonia, anion and cation in hydrous solution, error calculation, know the used instrumentation and its operation work, graphical representation of results and interpretation).			

Course No.	حفر وإدامة الآبار	(3) Credits	Learning Type
0801455	Well Drilling and Sustainability	Pre-requisite: 0801354	Blended
Groundwater and aquifer characteristics, groundwater exploration, shallow and deep borehole drilling methods, fluids used in the drilling, filters and sediments volume, pumps and their types, experimental pumping processes and results evaluation, wells protection and sustainability, The groundwater table monitoring, alternatives utilities of wells and filters.			

Course No.	جيولوجيا البترول	(3) Credits	Learning Type
0801466	Petroleum Geology	Pre-requisite: 0801354	Face to Face
The origin of petroleum sediments and the organic and inorganic theories. The genesis of petroleum and the thermal maturation processes of organic matter. The physical and chemical properties of the oil and the natural gas. Hydrocarbon groups and their chemical properties. Subsurface environments and their impact on the hydrocarbons matters in terms of formation and migration (subsurface water, subsurface heat, subsurface pressures, subsurface fluid dynamics). The reservoir and its physical properties (porosity and permeability). Cap or seal rocks. Migration and movement of the hydrocarbons compounds. Natural and industrial production methods. Hydrocarbon traps and their types. Deep well drilling. Drilling problems, properties of drilling fluid and methods of treatment. The tasks entrusted to the site geologist.			



Course No.	مشروع تخرج	(3) Credits	Learning Type
0801493	Graduation project	Pre-requisite: Department Approval	Face to Face
<p>Preparing a scientific research in the subject related to the earth and environmental sciences under a direct supervision of the course instructor. Students select the study area and carry out all analyses related to the subject outlines. Writing a scientific research to be presented to students in the presence of the supervisor and faculty members of the department.</p>			