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Form: Study Plan- Bachelors	Form Number	EXC-01-03-02A
	Issue Number and Date	2/3/24/2022/2963 2022/12/05
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	Number of Pages	29

1.	School	**Science**
2.	Department	Geology
3.	Program title (Arabic)	البكالوريوس في الجيولوجيا البيئية والتطبيقية
4.	Program title (English)	B. Sc. In Environmental and Applied Geology

5. Components of Curriculum:

The curriculum for the bachelor's degree in **Environmental and Applied Geology** consists of (139) credit hours distributed as follows

Number	Type of requirement	Credit Hours
First	University Requirements	27
Second	Faculty Requirements	21
Third	Specialty Requirements	91
Fourth		
Total		**139**

6. Numbering System:

A- Department number

Number	Department
Mathematics	1
Physics	2
Chemistry	3
Biological Sciences	4
Geology	5
Clinical Laboratory Sciences	8

Basic Sciences	9

B- Course number

Domain number	Domain title	Domain number	Domain title
General Geology and Palaeontology	0	Geochemistry	5
Practical and Field Geology	1	Hydrogeology and water	6
Mineralogy	2	Geophysics	7
Petrology	3	Environmental Sciences	8
Structural Geology, Remote Sensing, and GIS	4	Engineering sciences and statistics	9

C- Course number consists of 7 digits

School		Department		Level	Serial number	
0	3	0	5	2	3	1

First: University Requirements:

Preparation Program Requirements

All students admitted to the university must apply for a degree examination in Arabic and English and the computer is prepared or approved by the university to determine their level. Based on the results of the examinations, either the student will study one or more of the requirements of the preparatory program

(0 - 15 Credit Hours)

No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Community service	0700150	0		
2	Computer skills placement test	1902098	0		
3	Basics of computing	1932099	3	1902098	
4	Arabic Language (level 1)	3201001	3	3211098	
5	Arabic Language (level 2)	3201002	3	3201001	
6	English language (level 1)	3202001	3	3212098	
7	English language (level 2)	3202002	3	3202001	
8	Arabic placement test	3211098	0		
9	English placement test	3212098	0		

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Compulsory Requirements					
(18 Credit Hours)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Military sciences	2220100	3		
2	English language (level 3)	3202003	3	3202002	
3	National culture	3400100	3		
4	Ethics and Social Responsibility	3420100	3		
5	Entrepreneurship, Innovation, and Leadership	3420101	3		
6	Communication and Soft Skills (in English language)	3420103	3	3202003 or 3202103	

Electives (9 Credit Hours)					
Elective courses: (9) credit hours to be chosen from the first, second and third groups mentioned below. The student has to choose one course from each of the groups.					
(First Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Environmental culture and development	0359102	3		blended
2	Islamic culture	0400102	3		blended
3	Health Culture	0309100	3		blended
4	Legal culture	1000102	3		Face to face
5	Physical fitness culture	1100100	3		blended
6	Introduction to philosophy and critical thinking	3400103	3		online
7	Tourism culture	3400111	3		blended
(Second Group) (3 credits hour)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Islam and contemporary issues	0400101	3		blended
2	Social media	0309101	3		blended

3	Appreciation of arts	2000100	3		blended
4	Foreign language	2200103	3		blended
5	Arab-Islamic civilization	2300101	3		blended
6	Jordan: history and civilization	2300102	3		blended
7	Special subject	3400106	3		blended
8	Great books	3400107	3		blended
9	Jerusalem	3400108	3		blended
Electives (3) credits hour					
(Third Group)					
No.	Course Title	Course No.	Credit Hours	Prerequisites	Notes
1	Specialized Topics in Digital Skills	0309104	3	0309103	

Second: School courses: distributed as follows:

A. Obligatory school courses: (21) credit hours

B. Elective school courses: (0) credit hours

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

Course Number	Course Title	Type of learning (face-to-face | blended | online)	Contact Hours		Credit Hours	Pre-requisite
			Theoretical	Practical		
0319101	Calculus-1	Face-to-Face	3	-	3	-
0329101	General Physics-1	Face-to-Face	3	-	3	-
0339101	General Chemistry-1	Face-to-Face	3	-	3	-
0349101	General Biology-1	Face-to-Face	3	-	3	-
0305101	General Geology-1	Face-to-Face	3	-	3	-
0319131	Principles of Statistics	On Line	3	-	3	-
0309103	Modern Digital Skills	Blended	3	-	3	1932099

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

Course Number	**Course Title**	**Type of learning (face-to-face | blended | online)**	**Contact Hours**		**Credit Hours**	**Pre-requisite**
			Theoretical	**Practical**		

Third: Specialty courses: (91) credit hours distributed as follows:

A. Obligatory specialty courses: (73) credit hours

B. Elective specialty courses: (18) credit hours

A. Obligatory specialty courses: (73) credit hours:

* It is completed in one semester.

Course No.	Course Name	Type of learning (face-to-face | blended | online)	Weekly Hours		Credits	Prerequisite
			Theory	Practical		
0319102	Calculus - 2	Face to Face	3	-	3	0319101
0339102	General Chemistry - 2	Face to Face	3	-	3	0303101
0339106	General Chemistry Lab For Chemistry Students	Face to Face	1	3	2	0339102 أو متزامن
0305105	Historical Geology	Face to Face	3	-	3	0305101
0335111	General Geology Lab 1	Face to Face	1	3	1	0305101 أو متزامن
0305201	Stratigraphy	Face to Face	2	3	3	0305105
0305301	Invertebrate Palaeontology	Face to Face	2	3	3	0305201
0335211	Optical Mineralogy	Face to Face	1	3	1	0345222 أو متزامن
0345221	Mineralogy	Face to Face	3	3	4	0339101 و 035111
0335232	Igneous and Metamorphic Petrology	Face to Face	2	3	3	0345221 و 0335211
0305271	Fundamentals of Geophysics	Face to Face	2	3	3	0329101 و 0319101 و 0305101
0355322	Sedimentary Petrology	Face to Face	2	3	3	0305232 و 0305105
0305311	Field Geology	Face to Face	-	9	3	0335204 و 0355322
0305341	Structural Geology	Face to Face	2	3	3	0335322
0345351	Fundamentals of Geochemistry	Face to Face	3	-	3	0335232
0335361	Fundamentals of Hydrogeology	Face to Face	2	3	3	0335322
0335391	Engineering Geology	Face to Face	2	3	3	0305341
0305399	Career Preparation	Face to Face	6	-	6	Complete 90 Credit Hours
0335401	Geology of Jordan	Face to Face			3	0305341
0335441	Remote Sensing Techniques	Face to Face	2		3	0305341

0305463	Marine Geology	Face to Face	3	-	3	0335361
0365481	Environmental Geochemistry	Face to Face	3	-	3	0345351
0305497	Economic Geology	Face to Face	3	-	3	0355351 و 0305341
0355492	Petroleum Geology	Face to Face	2	3	3	0355322
0345412	Graduation Project*	Face to Face	2	-	2	Finish 90 credit hours

***Student must finish 90 credit hours**

B. Elective specialty courses: (18) credit hours:

Course Number	Course Name	Type of learning (face-to-face | blended | online)	Weekly Hours		Credit	Prerequisite
			Theory	Practical		
0335202	Geodesy and Surveying	Face to Face	3	-	3	0305101 و0329101
0305203	Meteorology	On Line	3	-	3	03051010
0305302	Fundamentals of Astronomy	Face to Face	3	-	3	0305101
0305281	Natural Disasters	Face to Face	3	-	3	0305105
0305303	Microfossils	Face to Face	3	-	3	0305301
0345312	Field Applications in Geotechnics	Face to Face	-	3	3	0305311
0305333	Sedimentary Environments	Face to Face	3	-	3	0355322
0305344	Geomorphology	Face to Face	3	-	3	0305322
0335372	Seismology	Face to Face	3	-	3	305271
0305382	Aqueous Geochemistry	Face to Face	3	-	3	345351
0345392	Geological Data Analysis	Face to Face	2	3	3	0319131 و 0305351
0335393	Rock and Soil Mechanics	Face to Face	3	-	3	335391
0305404	Plate Tectonics	On Line	3	-	3	305341
0335421	Mineral Exploration	Face to Face	3	-	3	355497
0345431	Industrial Earth Resources	Face to Face	3	-	3	355322
0345451	Biogeochemistry	Face to Face	3	-	3	345351
0335463	Water Resource Management and Legislation	Face to Face	3	-	3	335361
0345488	Environmental Impact Assessment	Face to Face	3	-	3	305105
0305486	Climate Change	Face to Face	3	-	3	335361
0345491	Dam and Reservoir Geology	Blended	3	-	3	305361
0335313	Analytical Methods in Geology	Face to Face	2	3	3	0339106 و 0305222
0365371	Applied Geophysics	Face to Face	2	3	3	305271
0335442	Geographic Information Systems (GIS)	Face to Face	2	3	3	1932099

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Transition Plan (Similar Courses)

Old Plan (2024)			New Plan (2025)		
Course Number	Course Name	C.H.	Course Number	Course Name	C.H.
0345102	Principles of Environmental Geology	3	0305105	Historical Geology	3
0305403	Plate Tectonics	3	0305404	Earth Tectonics	3
0335461	Water Resources Management	3	0335463	Water Resources Management and Legislation	3

Old Plan (2024)			New Plan (2025)		
Course Number	Course Name	C.H.	Course Number	Course Name	C.H.
0310102	Environmental Culture and Development	3	0359102	Environmental Culture and Development	3

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C. Fourth: Courses offered by geology department to other faculties and departments

Course No.	Course Name	Weekly Hours		Credits	Prerequisite
		Theory	Practical		
0319102	Calculus - 2	3	-	3	0319101
0339102	General Chemistry - 2	3	-	3	0303101
0339106	General Chemistry Lab	1	3	2	0339102 أو متزامن
0305105	Historical Geology	3	-	3	0305101
0335111	General Geology Lab 1	1	3	1	0305101 أو متزامن
0305201	Stratigraphy	2	3	3	0305105
0305301	Invertebrate Palaeontology	2	3	3	0305201
0335211	Optical Mineralogy	1	3	1	0345222 أو متزامن
0345221	Mineralogy	3	3	4	0339101 و 035111
0335232	Igneous and Metamorphic Petrology	2	3	3	0345221 و 0335211
0305271	Fundamentals of Geophysics	2	3	3	0329101 و 0319101 و 0305101
0355322	Sedimentary Petrology	2	3	3	0305232 و 0305105
0305311	Field Geology	-	9	3	0335204 و 0355322
0305341	Structural Geology	2	3	3	0335322
0345351	Fundamentals of Geochemistry	3	-	3	0335232
0335361	Fundamentals of Hydrogeology	2	3	3	0335322
0335391	Engineering Geology	2	3	3	0305341
0305399	Career Preparation *	6	-	6	90 Credit Hours
0335401	Geology of Jordan	3	-	3	0305341
0335441	Remote Sensing Techniques	2	3	3	0305341
0305463	Marine Geology	3	-	3	0335361
0365481	Environmental Geochemistry	3	-	3	0345351
0305497	Economic Geology	3	-	3	0355351 و 0305341
0355492	Petroleum Geology	2	3	3	0355322

0345412	Graduation Project*	2	-	2	Finish 90 credit hours
0335202	Geodesy and Surveying	3	-	3	0329101و0305101
0305203	Meteorology	3	-	3	0305101
0305302	Fundamentals of Astronomy	3	-	3	0305101
0305281	Natural Disasters	3	-	3	0305105
0305303	Microfossils	3	-	3	0305301
0345312	Field Applications in Geotechnics	-	3	3	0305311
0305333	Sedimentary Environments	3	-	3	0355322
0305344	Geomorphology	3	-	3	0305322
0335372	Seismology	3	-	3	0305271
0305382	Aqueous Geochemistry	3	-	3	0345351
0345392	Geological Data Analysis	2	3	3	0305351 و 0319131
0335393	Rock and Soil Mechanics	3	-	3	0335391
0305404	Plate Tectonics	3	-	3	0305341
0335421	Mineral Exploration	3	-	3	0355497
0345431	Industrial Earth Resources	3	-	3	0355322
0345451	Biogeochemistry	3	-	3	0345351
0335463	Water Resource Management and Legislation	3	-	3	0335361
345488	Environmental Impact Assessment	3	-	3	0305105
305486	Climate Change	3	-	3	0335361
0345491	Dam and Reservoir Geology	3	-	3	0305361
0335313	Analytical Methods in Geology	2	3	3	0305222 و 0339106
0365371	Applied Geophysics	2	3	3	0305271
0335442	Geographic Information Systems (GIS)	2	3	3	1932099

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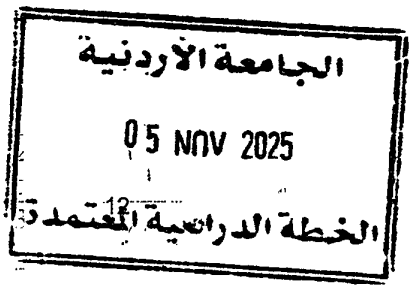
Fifth: Advisory Study Plan

First year

First Semester			Second Semester		
Course No.	Course Title	Credit hrs.	Course No.	Course Title	Credit hrs.
0319101	Calculus-1	3	0339102	General Chemistry -2	3
0305101	General Geology-1	3	0305105	Historical Geology	3
0339101	General Chemistry	3	0305111	Practical General Geology	1
-	University Requirements	3	0349101	General Biology-1	3
-	University Requirements	3	-	University Requirements	3
			-	University Requirements	3
Total		15	Total		16

Second year

First Semester			Second Semester		
Course No.	Course Title	Credit hrs.	Course No.	Course Title	Credit hrs.
0339106	General Chemistry lab	2	0305232	Igneous and Metamorphic Petrology	4
0305204	Stratigraphy	3	0305301	Invertebrate Palaeontology	3
0305222	Mineralogy	3	0305271	Fundamentals of Geophysics	3
0305211	Optical Mineralogy Lab	1	0319102	Calculus - 2	3
	Elective Specialization requirement	3		University Requirements	3
0329101	General Physics-1	3	-		
-	University Requirements	3	.	.	
			-		
Total		18	Total		16



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Third Year

First Semester			Second Semester		
Course No.	Course Title	Credit hrs.	Course No.	Course Title	Credit hrs.
0305351	Fundamentals of Geochemistry	3	0335391	Engineering Geology	3
0305361	Fundamentals of Hydrogeology	3	0335401	Geology of Jordan	3
0355322	Sedimentary Petrology	3		Elective Specialization requirement	3
0305341	Structural Geology	3	-	Elective Specialization requirement	3
	Elective Specialization requirement	3	-	University Requirements	3
-	University Requirements	3	-		
Total		18	Total		15

Third Year
Summer Semester

Summer Semester		
Course No.	Course Title	Credit hrs.
0305399	Career Preparation	6
Total	**6**	

Four year

First Semester			Second Semester		
Course No.	Course Title	Credit hrs.	Course No.	Course Title	Credit hrs.
0305463	Marine geology	3	0355492	Petroleum Geology	3
0305441	Remote Sensing techniques	3	0305497	Economic Geology	3
0305481	Environmental Geochemistry	3	0305412	Graduation Project	2
-	Elective Specialization requirement	3		Elective Specialization requirement	3
-	University Requirements	3	-	Elective Specialization requirement	3
Total		15	Total		14

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Course Description

Course Number	Course Title	Credit Hours
0300102	Environmental Culture and Development	3
Prerequisite: (None)		

Course Description

This course introduces the student to the rudiments of environmental science whose corner stone was laid in the second half of the 20th century. This is being accomplished by discussing the following topics: Earth and natural hazards; Ecosystems; Biogeochemical Cycles; Man and the Environment and the Natural Resources in the Solid Earth System; Air Pollution; Water Resources, management and Pollution; Solid Waste; Food and Health; Environmental Impact Assessment.

Course Number	Course Title	Credit Hours
0305101	General Geology 1	3
Prerequisite: (None)		

Course Description

This Course provides a base of general earth science knowledge, which would help the student, better understand the natural world of which we are an inseparable part. This course includes major topics as follows: Earth materials: Introduction; Minerals; Rocks (Igneous, Sedimentary, and metamorphic); Processes that shape the earth surface: Weathering and Soils; Mass wasting; Surface and ground water; Volcanic Activity; Wind and Deserts; The Evolving Earth: Rock Deformation; Earthquakes; Plate Tectonics; Geologic Time scale; Fluid spheres: Oceans; Atmosphere.

Course Number	Course Title	Credit Hours
0335111	General Geology Lab 1	3
Prerequisite: (simultaneous with 0305101)		

Course Description

Students study 14 laboratory sessions that cover the following topics: Identification of minerals and their physical properties with emphasis on rock-forming minerals; Introduction to the three rock types (igneous, sedimentary, and metamorphic), identifying most common rocks of each type and the processes involved in their formation; topographic maps; geologic maps and earth structures. This lab requires a one-day field trip to apply the basics of using maps and identifying rocks in the field.

Course Number	Course Title	Credit Hours
0305105	Historical Geology	3
Prerequisite: (0305101)		
Course Description		

This course covers the principles required to study historical geology. It starts with an introduction and a review of basic principles such as rock cycle, relative geologic time scale, index fossils, stratigraphy, absolute geologic time scale, sedimentary rocks environment, isotopes, plate tectonics and mountain building, among other topics. The student learns about the history of earth through the study of the formation and evolution of the lithosphere, hydrosphere, atmosphere, and biosphere. Major geologic events, orogenies, and evolutionary events in each era: Palaeozoic, Mesozoic and Cenozoic. This course requires and multiple one-day field trips.

Course Number	Course Title	Credit Hours
0335202	Geodesy and Surveying	3
Prerequisite: (0305101)		

Course Description

Introduction, Shape of the Earth, Subdivisions of Geodesy, Classical, dynamic, Spatial, Earth Datum , Topographic surface, Physical surface - The Geoid, Mathematical Surface - The Ellipsoid, deviation of the Vertical, The coordinates, elements of Triangulation & Trilateration, Concept of Altitude, modern positioning systems, Inertial positioning system IPS, Satellites and Global positioning system GPS, Geodetic Networks, The National Jordanian Geodetic Network, Elevation determination, DTM, use of Radar interferometry, Applications of geodesy and surveying, geological, geophysical, tectonic applications, Case studies, dams monitoring, deformations, subsidence and sinkholes related to the Dead Sea lowering, Elements of Map Projections, Cylindrical, Azimuthal, Conical projections, essential map proprieties.

Course Number	Course Title	Credit Hours
0305203	Meteorology	3
Prerequisite: (None)		

Course Description

The course studies the basics of meteorology: climate and weather. Composition and evolution of the atmosphere, structure of the atmosphere, sun radiation and its budget on Earth. Temperature and pressure: measurement and distribution on Earth, temperature and pressure maps for a selected area, factors affecting the changes in pressure and temperature. Water vapor: measurement, cloud formation and types of precipitation. Winds: terminology, speed measurement and the relation between wind speed and pressure maps. Air masses and air fronts. Drawing, reading and interpretation of weather maps. Certain problems in the atmosphere: global warming. Tornados, hurricanes, El Nino, La Nina, paleoclimate and future climate of our part of the world.

Course Number	Course Title	Credit Hours
0305204	Stratigraphy	3
Prerequisite: (0305201)		
Course Description		

In this course, students study the laws, conditions, and different processes that control and formation of different geologic strata and facies, and their time and space distribution. Topics covered in this course include: sediments and sedimentary rocks (their genesis, types, distribution, and alteration); clastic transport and fluid flow; depositional environments; lithostratigraphy and facies relationships; correlation of strata; geochronology and chronostratigraphy; unconformities; branches of stratigraphy (lithostratigraphy, biostratigraphy, sequence stratigraphy, chronostratigraphy, etc.); stratigraphy as a tool in mineral, water, and petroleum exploration. The course requires three hours lab each week, and one-day field trips.

Course Number	Course Title	Credit Hours
0305302	Basics of Astronomy	3
Prerequisite: (none)		

Course Description

Students are introduced to the importance of astronomy; history of astronomy; developments in astronomy through time; celestial object and how to study them; the solar system: its formation and evolution; planetary geology; stars: types, properties and evolution; galaxies: types and evolution; constellations; other branches of astronomy and cosmology; the origin of the Universe.

Course Number	Course Title	Credit Hours
0335211	Optical Mineralogy Lab	1
Prerequisite: (0345222 أو متزامن)		

Course Description

This lab introduces students to the techniques of identifying rock-forming minerals using optical microscopy. This is achieved through the measurement of a set of optical properties of minerals such as: form, color, pleochroism, interference colors, types of extinction, interference figures: uniaxial and biaxial minerals and the 2V angle. The theoretical basis for these properties will be given as introduction to the labs. This is a semester-long lab, taught as a three-hours lab weekly.

Course Number	Course Title	Credit Hours
0345222	Mineralogy	4
Prerequisite: (0335111)		

Course Description

Students study the fundamentals of mineralogy such as: processes of mineral origin and formation; classification of minerals; their distribution; crystallographic structures; their physical and chemical properties; methods and techniques used in mineralogy. Students study the different mineral groups: native elements, sulfides, oxides, hydroxides, halides, carbonates, nitrates, borates, sulfates, phosphates, etc., with emphasis on the silicates (orthosilicates, chain silicates, sheetsilicates, and framework silicates). The course includes 3-hours lab in which exercises in crystallography are given, in addition to the study of mineral specimens from the different mineral groups.

Course Number	Course Title	Credit Hours
0335232	Igneous and metamorphic petrology	3
Prerequisite: (0345221)		

Course Description

This course covers the essentials of hard rocks petrology. In igneous petrology part, students study magmas (their origin, formation, properties, chemical composition, properties); binary phase diagrams; igneous structures; igneous petrography and classification; tectonics and igneous processes. In the metamorphic petrology part, students study agents, types, processes, and conditions of metamorphism; structures, textures, and mineral assemblages; metamorphic facies and reactions; metamorphic phase diagrams. The course requires three hours of lab work on weekly basis to study specimens and thinsections of rocks. A field trip to the south of Jordan and Aqaba is required.

Course Number	Course Title	Credit Hours
0305271	Fundamentals of Geophysics	3
Prerequisite: (0305102)		

Course Description

Fundamental concepts of coordinates; the Earth's gravitational field and gravimetric prospecting; the Earth's magnetic field and magnetic method; electrical methods; role of electrical resistivity and potential methods in exploration; elements of radioactivity methods; geothermal energy; seismic methods: refraction, reflection; integrated geophysical methods.

Course Number	Course Title	Credit Hours
0305281	Natural Hazards	3
Prerequisite: (None)		

Course Description

In this course, students study natural hazards whether they are geologic hazards (e.g., earthquakes, volcanic eruptions, floods, landslides, and sinkholes), weather and climate hazards (e.g., hurricanes, tornadoes, ice storms, lightning strikes, wildfires, heat waves, drought, and global warming); and extraterrestrial hazards (e.g., meteorite impacts, solar flares, and gamma ray bursts). Students study the science behind the hazard itself to understand their mechanisms and causes, know their primary and secondary hazards, how to monitor and predict their occurrence, methods and actions required to limit and minimize the damage.

Course Number	Course Title	Credit Hours
0305301	Invertebrate Palaeontology	3
Prerequisite: (0305204)		

Course Description

In this course, students learn the principles of palaeontology. Students are introduced to the major fossil groups (both vertebrate and invertebrate), their preservation, occurrence, and use as indices of environment and paleoclimate, their biology, taxonomy, evolution, and extinction. The course includes three hours lab each week.

Course Number	Course Title	Credit Hours
0305303	Microfossils	3
Prerequisite: (0305201)		

Course Description

This course is intended to deepen the knowledge on the stratigraphically important groups of microfossils (e.g. acritarchs, chitinozoans, conodonts, foraminifers, radiolarians, diatoms, spores and pollen). Topics covered in the course include the diversity, morphology and facial dependence of microfossils; ecological preferences of ancient organisms; modern research methods in micropaleontology; sample preparation; their use in stratigraphy, correlation, palaeogeographical and palaeoecological reconstructions. The student studies the different microfossils according to their composition: carbonaceous (foraminifera and coccolith), phosphatic (e.g. conodonts and remnants of vertebrate skeletons); siliceous microfossils (e.g. diatoms and radiolarians); and organic microfossils (spores and pollen).

Course Number	Course Title	Credit Hours
0305311	Field Geology	3
Prerequisite: 0355322 و 0335204 -		

Course Description

In this course, students learn the principles of geological mapping and surveying; e.g. data collection, field descriptions, note taking, structural measurements using a compass, sketching columnar- and cross- sections, thickness and distance measurements, and fault and fold characterization, etc.). A detailed geological map and report for a selected area are needed at the end of the semester. This course requires 9 hours of fieldwork per week; these can be on one day or two separate days if the student schedule does not permit.

Course Number	Course Title	Credit Hours
0345312	Field Geotechnical Applications	3
Prerequisite: (0305311 and 0335391)		

Course Description

Each student is assigned a case study of slope stability, which requires geotechnical field measurements; preparation of cross sections; sampling and laboratory tests; mathematical analysis; then, a technical report is required at the end of the semester. This course requires 9 hours of fieldwork per week; these can be on one day or two separate days if the student schedule does not permit.

Course Number	Course Title	Credit Hours
0335313	Instrumental Analyses in Geology	1
Prerequisite: (0339106 and 0335231)		

Course Description

This lab introduces the geology student to the techniques of instrumental analyses used in the study of Earth's material (minerals, rocks, water chemistry etc.). Each lab is preceded by an introduction on the theoretical basis of the technique to be discussed. The lab will focus on the following techniques and instruments: X-ray diffraction, X-ray fluorescence, flame photometer, atomic absorption spectroscopy, inductively coupled plasma, and mineral separation using gravimetric and magnetic methods, staining, and scanning electron microscopy. This lab is semester-long, and requires 3 hours a week.

Course Number	Course Title	Credit Hours
0355322	Sedimentary Petrology	3
Prerequisite: (0335231)		

Course Description

This course covers the fundamentals required to study the different types of sedimentary rocks (clastic, chemical, and biochemical). Students study topics like: description and identification of the different sedimentary rocks, their textures, geochemistry, sedimentary structures, depositional environments, processes that play role in their formation and alteration, and the tectonic control on their distribution. The course includes 3-hours lab weekly, and multiple one-day field trips.

Course Number	Course Title	Credit Hours
0305333	Depositional Environment	3
Prerequisite: (0355331)		

Course Description

Depositional environments course is concerned with the study of modern and ancient depositional environments including: continental environments: alluvial fans, braided rivers, meandering rivers, lakes, deserts, glacial environments; marginal marine environments: deltas, marine shorelines, barrier beaches, tidal flats, estuaries; and marine environments: shallow marine shelves, epeiric seas, continental margins, and deep-water basins.

Course Number	Course Title	Credit Hours
0335232	Igneous and Metamorphic Petrology	3
Prerequisite: (0335231)		

Course Description

This course covers the basics studied in the prerequisite in more details. Among these topics: magmatic differentiation; magma mixing; binary and ternary phase diagrams; the distribution of igneous activities and the role of plate tectonics; igneous geochemistry and isotopes. Students

will use computer software to process geochemical data from igneous rocks, and apply the processed data in interpreting the petrogenesis of the rocks. The weekly 3-hours lab will include macroscopic and microscopic study of igneous rocks, processing of geochemical data. A field trip to Aqaba and south of Jordan is required.

Course Number	Course Title	Credit Hours
0335334	Metamorphic Petrology	3
Prerequisite: (0335231)		

Course Description

This course covers the basics studied in the prerequisite in more details, with focus on topics like metamorphic facies and minerals assemblages; metamorphic reactions; metamorphic textures and structures with focus on foliated and deformed rocks to infer stress – temperature – pressure – time relations and curves; role of fluids (H_2O and CO_2) in metamorphic processes; case studies. In the weekly 3-hours lab, students will study hand specimens and thin sections from studied areas, and use geochemical, isotopic, and field data and measurements to infer the petrogenesis of these rocks. A field trip to Aqaba and south of Jordan is required.

Course Number	Course Title	Credit Hours
0305341	Structural Geology	3
Prerequisite: (0335231)		

Course Description

Students study the structures of earth, processes involved in rock deformation, and resultant features. The course covers topics like rock mechanics (forces, stress and strain diagrams); brittle deformation (faults and joints, their analyses and interpretation); ductile deformation (folds and flexures, their description, analyses and interpretation); sequence of structural events; salt tectonics; global tectonics; three hours' lab each week combined with field trips are required.

Course Number	Course Title	Credit Hours
0305342	Geomorphology	3
Prerequisite: (0305341)		

Course Description

Geomorphology course is concerned with the study of landforms and the processes that produce and modify them. The course includes endogenic geomorphic processes; structural landforms; physical properties of rocks; soil and water; weathering; mass wasting; slopes; fluvial processes and landforms; eolian processes and land forms; periglacial morphology; glacial processes; glacial landforms.

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Course Number	Course Title	Credit Hours
0345351	Principles of Geochemistry	3
Prerequisite: 0335232		

Course Description

Overview of the formation of the solar system and the synthesis of chemical elements; chemical equilibrium; acids and bases; distribution and geochemical classification of elements; salts and aqueous geochemistry; chemical weathering and mineral equilibria; introduction to thermodynamics; oxidation-reduction reactions; isotope geochemistry: radioactive, radiogenic, and stable isotopes and their applications. This course includes three hours lab.

Course Number	Course Title	Credit Hours
0335361	Principles of Hydrogeology	3
Prerequisite: (0355331)		

Course Description

This course covers essential topics in hydrogeology including precipitation (spatial and temporal distribution, measurements, equipment); evaporation (measurement and distribution); surface runoff (base and flood flows, hydrographs, discharge measurements, guage stations); groundwater (infiltration, formation, movement, permeability and porosity, groundwater wells, well hydraulics); water chemistry; water in Jordan; three hours' lab each week is required.

Course Number	Course Title	Credit Hours
0365371	Applied Geophysics	3
Prerequisite: (0305271)		

Course Description

The course covers topics like he seismic refraction and reflection, resistivity and magnetic methods in exploration for: oil, gas, groundwater, mineral ores; travel-time equations of refracted waves from subsurface layers of constant velocities; dipping and faulted layers; seismic record sections: computer-processing techniques, analysis and interpretation of seismic reflection data, geophysical and geological interpretation; field and lab application.

Course Number	Course Title	Credit Hours
0335372	Seismology	3
Prerequisite: (0305271)		

Course Description

The course covers basic topics in seismology and its applications like earthquakes and plate tectonics; seismographs and seismological stations; earthquakes parameters; seismic phases;

seismology and internal structure of Earth; earthquake deformations and seismic hazards; seismicity of Jordan: assessment and mitigation of earthquake hazards.

Course Number	Course Title	Credit Hours
0305382	Aqueous Geochemistry	3
Prerequisite: (0345351)		
Course Description Topics covered in this course include chemical equilibrium; activity models for solutes; pH as a master variable; Eh-pH diagrams; mineral solubility; aqueous complexes; ion exchange; carbonate system; weathering reactions; acid rain; chemical reactions that control surface and groundwater evolution in natural and engineered settings; computation methods and the use of computer programs for calculation of speciation and mass balance. The course includes 3-hours lab on weekly basis.		

Course Number	Course Title	Credit Hours
0335391	Engineering Geology	3
Prerequisite: (0305341)		
Course Description This course covers different topics in geotechnics, soil mechanics, rock mechanics, field measurements and observations: boreholes and excavations, sampling, rock and soil mechanical tests in situ, and in laboratory. Geophysical methods in site investigations. Foundations; settlement, consolidation, slopes, water pressures, leakages, grauting, water/rock and grout rock interactions.		

Course Number	Course Title	Credit Hours
0345392	Data Analysis in Geology	3
Prerequisite: (0319131 and 0345351)		
Course Description The course introduces students to applications of statistical data analysis in geologic problems, both using computer software and manually. Students learn various types of statistical tests used in geology and related sciences, and explore the uses and pitfalls of statistical techniques and when certain tests should be done and how to interpret results of tests.		

Course Number	Course Title	Credit Hours
0335393	Soil and Rock Mechanics	3
Prerequisite: (0335391)		
Course Description		

Topics covered in this material include engineering classification of rocks, exploitation, mechanical properties, deformation, in situ strength; rock mass properties: discontinuity analysis; rock slope stability; geomechanical classification for different purposes. Soil: genesis and structure, physical properties, engineering characteristics, site investigation, in situ testing, engineering classification; shear strength and effective stress concepts; slope stability; verification of foundation stability on cohesive and granular soils; geologic factors in the design and construction of engineering projects as dams, tunnels...etc. The course requires 3-hours lab on weekly.

Course Number	Course Title	Credit Hours
0335401	Geology of Jordan	3
Prerequisite: (0355331and 0305341)		

Course Description

This course concentrates on the geologic evolution of Jordan from the Precambrian until now. It introduces students to the stratigraphy of the geological column from the Precambrian, Palaeozoic, Mesozoic, and Cenozoic; tectonics and major structures in Jordan, with emphasis on the Dead Sea Transform fault; mineral and energy resources; water budget of Jordan especially for the Jordan River Basin. A 3-4 days' field trip to Aqaba and south of Jordan is required.

Course Number	Course Title	Credit Hours
0305402	Methods of teaching Earth and environmental sciences	3
Prerequisite: (0355331)		

Course Description

This course deals recent approaches to science teaching and in particular Earth and environmental sciences; e.g. how to teach using critical thinking, scientific reasoning and discussions with the class room rather than narrative teaching. How to use illustrations: fossils, rock and mineral specimens, maps, compass, ...etc. Encouraging the teacher to conduct field trips and to get his samples from the local environment nearby his school. How to evaluate the students through teaching them the various types of examination questions? Working in groups and its importance, how to conduct an experiment and write its report, how to write report in general, present and discuss it, student file for their activities throughout the year.

Course Number	Course Title	Credit Hours
0305403	Earth tectonics	3
Prerequisite: (0305341)		

Course Description

The course introduces topics like a historical review of plate tectonics; basics of plate tectonics theory; the structure of the Earth; types and characteristics of plate boundaries; the driving force of plates; movements of plates and measurements of their relative motions; the African plate and

the history of its movements; the Arabian plate a detailed investigation; a detailed investigation of the Dead Sea- Transform; discussion and the applications of plate tectonics theory.

Course Number	Course Title	Credit Hours
0305412	Graduation Project	2
Prerequisite: (0305341)		
Course Description The students select a topic in coordination with a staff member, then he conducts literature review in the library (Internet). The topic will include sample collection, and lab analyses. The obtained results will be interpreted and the present in a technical report.		

Course Number	Course Title	Credit Hours
0335422	Mining Geology	3
Prerequisite: (0345351)		
Course Description This course provides a comprehensive introduction to Mining Geology, focusing on the geological principles that control the formation, distribution, and geological characteristics of ore materials. Students will explore the principles of mineral and geochemical exploration, gaining insights into the techniques used to discover and evaluate ore deposits. The course covers critical topics such as ore genesis, mineral exploration techniques, mining methods, mineral processing and the evaluation of mineral resources. Emphasis is placed on the integration of geological, geochemical, and mineralogical data in understanding the development and exploitation of these resources. The lectures and case studies are designed to equip students with the essential knowledge and skills, particularly in the evaluation of ore deposits and the geological considerations in mining operations..		

Course Number	Course Title	Credit Hours
0345431	Industrial Geomaterials	3
Prerequisite: (0355331)		
Course Description Classification of industrial Earth's materials (rocks and minerals); origin of industrial rocks and minerals; cycles of principal elements of industrial materials in nature; deposits of industrial minerals; deposits of industrial rocks; deposits of building raw materials; prospecting for industrial Earth's materials; gemstones: classification, properties, origin and uses.		

Course Number	Course Title	Credit Hours
0335441	Remote Sensing Techniques	3
Prerequisite: (0305341)		
Course Description		

This course introduces students to the basics of remote sensing, physical principles of the visible, infrared and microwave section of the electromagnetic spectrum, remote sensing platforms and sensors, data acquisition, storage and processing, image processing and analysis, remote sensing applications in geosciences.

Course Number	Course Title	Credit Hours
0335442	Introduction to Geographic Information Systems	3
Prerequisite: 1932099		

Course Description

Students study the principles of Geographic Information Systems, covered topics include: fundamentals of GIS; introduction to modern spatial data and structures; input of Geospatial data; functions of geographic information systems; spatial Analysis; coordinate transformation and map projection; interpolation techniques; relations between GIS and remote sensing; and applications of geographic information systems to a variety of environmental and geologic issues.

Course Number	Course Title	Credit Hours
0345451	Biogeochemistry	3
Prerequisite: (0345351)		

Course Description

In this course, students study an introduction to biogeochemical cycles in the environment. The course is concerned with discussing the processes and reactions governing cycles in the atmosphere, lithosphere, terrestrial ecosystems, freshwater wetlands and lakes, river estuaries, and the oceans. The global cycles of water, carbon, nitrogen, phosphorus, and sulfur are discussed in details. Current topics in anthropogenic alterations of natural cycles that lead to ecosystem degradation will be highlighted.

Course Number	Course Title	Credit Hours
0335461	Water Resources Management	3
Prerequisite: (0335361)		

Course Description

Water resources, demands, supplies, planning, and development. Reuse and disposal of reused water. Economic valuation techniques and impact analysis. Human resources development. Social aspects of water resources development. Institutional, environmental, and legal aspects.

Course Number	Course Title	Credit Hours
0305462	Marine geology	3
Prerequisite: (0335361)		
Course Description		

The course provides a broad overview of the origin, structure and evolution of ocean basins and their margins. It covers a range of topics, including the geology and tectonics of the ocean floor, seafloor spreading, and the physical and chemical properties of seawater. Additionally, the course explores waves and currents, sources and composition of marine sediments, sedimentary and geochemical processes within the ocean basins, sea-level fluctuations, coastal geological processes, natural marine resources, and the role of oceans in global processes and cycles. The course required a field trip to the Gulf of Aqaba.

Course Number	Course Title	Credit Hours
0365481	Environmental Geochemistry	3
Prerequisite: (0345351)		

Course Description

Topics covered in this course include the geochemistry of the atmosphere and the terrestrial environment; material cycles; chemistry of continental waters; major and minor ions chemistry of the oceans; global climate change; cycles of carbon, sulphur, nitrogen, and phosphorous; chlorofluorocarbons, stratospheric ozone, and SMOG formation; soil geochemistry; reactions; and pollutants; collection of the required data on each environmental component of a project or problem; evaluation and comparison of the collected data, with the standards and regulations; prediction of the impacts on the biotic and abiotic parameters; mitigation measures to minimize or eliminate impacts; impacts monitoring during and after the project execution. Live examples of EIA of air, climate, archaeological sites, and dam projects will be reviewed.

Course Number	Course Title	Credit Hours
0345483	Environmental Impact Assessment	3
Prerequisite: (0345351)		

Course Description

This course introduces the methodology of environmental impact assessment (EIA) as a vital tool for sound environmental decision-making. It introduces the concepts, methods, issues and various stages of the EIA process. The various stages of the EIA process, such as screening, scoping, EIA document preparation, public involvement, review and assessment, monitoring and auditing, appeal rights and decision-making are examined.

Course Number	Course Title	Credit Hours
0305484	Climate Change	3
Prerequisite: (0335361)		

Course Description

This course explores the science of climate change. Students will learn how the climate system works; what factors cause climate to change and how those factors interact; how climate has

changed in the past; how scientists use models, observations and theory to make predictions about future climate; and the possible consequences of climate change for our planet. Students will learn about modern techniques used in monitoring climate change. Finally, the course looks at the connection between human activity and the current warming trend and considers some of the some of the potential social, economic and environmental consequences of climate change.

Course Number	Course Title	Credit Hours
0305491	Economic Geology	3
Prerequisite: (0345351)		

Course Description
Introduction, Earth Resources Industry, Types and Origin of Mineral Resources, Ores Geochemistry, Resource Forming Systems, Magmatic Ores, Magmatic Hydrothermal Ores, Continental Volcanism Ores, Marine Volcanic Ores, Metamorphic Ores, Sedimentary Ores Energy Resources, Mineral Exploration, Industrial Minerals.

Course Number	Course Title	Credit Hours
0355492	Petroleum Geology	3
Prerequisite: (0305341)		

Course Description
Origin of oil and gas; source rock geochemistry; oil and gas migration and accumulation; role of groundwater movement in oil migration and formation of oil fields; reservoir rocks and oil traps; exploration for oil: surface and subsurface methods, drilling rigs and drilling mud, well logging; geologic cross-sections; sample description; stratigraphic logs and well correlation; isopach maps. The course requires a three hours lab each week.

Course Number	Course Title	Credit Hours
0345491	Geology of Dams and Water Reservoirs	3
Prerequisite: (0335391)		

Course Description
This course introduces the student to the geology of dams and reservoirs. This includes topics like evaluating the geological setting of the site where a dam is to be constructed by studying the rocks and formations in the site, possible landslides, present structures (faults, folds, joints, etc.), surface and subsurface rocks. Students are introduced to geophysical methods used in the evaluation of the site, and hydrological methods used in evaluating the availability of water, and the geotechnical methods needed to judge the suitability of the foundation for a safe and stable dam.

Course Number	Course Title	Credit Hours
0345399	Career Preparation	6

Prerequisite: Completing 90 Credit Hours	
Course Description course is designed to prepare students for entering the job market by integrating theoretical knowledge with practical experience. The course includes lectures and workshops on job search strategies, resume writing, and interview techniques, as well as field training at actual geological sites. The field training involves data collection and analysis, allowing students to apply academic concepts in real-world settings. The course focuses on developing research and analytical skills, as well as enhancing communication and teamwork abilities in professional environments.	

Inclusion rates in the program:

A. Courses that will be taught on the principle of full online:
Total average hours that will be taught on the principle of full online in this program: (12 hour).
The percentage achieved for the subjects that will be taught on the principle of full online in this program: (9%)

B. Subjects to be taught on the blended learning principle:
Total average hours that will be taught on the blended learning principle in this program: (21 hour).
The percentage achieved for the subjects that will be taught on the blended learning principle in this program: (15 %)

C. Subjects to be taught on the face-to-face learning principle: 106 credit hours

Percentage	Number of Hours	Elective Specialty Requirement	Obligatory Specialty Requirement	Obligatory School Requirement	Elective University Requirement	Obligatory University Requirement	
76%	106	12	73	15	0	6	Face – to - face
9%	12	3	0	3	0	6	On line
15%	21	3	0	3	9	6	Blended
100%	139	18	73	21	9	18	Number of Hours

الخطة الإنتقالية لقسم الجيولوجيا

الخطة القديمة			الخطة المحدثة (2024)		
رقم المادة	اسم المادة	الساعات المعتمدة	رقم المادة	اسم المادة	الساعات المعتمدة
0345102	مبادىء الجيولوجيا البيئية	3	0305105	الجيولوجيا التاريخية	3
0305403	نظرية الصفائح	3	0305404	تكتونية الأرض	3
0335461	ادارة الموارد المائية	3	0335463	ادارة الموارد المائية وتشريعاتها	3