

# University of Baghdad

## جامعة بغداد



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

بكالوريوس – علوم الارض



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## 1. Overview

This catalogue is about the courses (modules) given by the program of Department of Geology to gain the Bachelor of Science degree. The program delivers (49) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظيره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج علوم الارض للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (49) مادة دراسية، على سبيل المثال، مع (6000) إجمالي ساعات حمل الطالب و 240 إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

## 2. Undergraduate Courses 2023-2024

### Module 1

Code	Course/Module Title	ECTS	Semester
GEO-111	Physical Geology	8.00	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	109	91
Description			
Physical geology is defined as one of the branches of earth science that specializes in the study of the solid, non-living features of the planet Earth and other planets. It is done by studying the various rocks, minerals and materials that formed the earth and the processes related to it through time, and employing scientific tools and combined techniques to find out the approximate ages of the rocks on and in the earth's interior, and using this information to determine the history of the earth and the terres it passed through.			

### Module 2

Code	Course/Module Title	ECTS	Semester
GEO-112	Crystallography	8.00	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	109	91
Description			
Crystals aims to define how minerals crystallize in nature and what are the methods of crystallization that occur in nature through which minerals will be formed and these minerals will form rocks in nature Training students on how to take field models and convert them into applied products used in making geological maps.			

### Module 3

Code	Course/Module Title	ECTS	Semester
GEO-113	Chemistry	7.00	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	96
<b>Description</b>			
<p>The course aims to provide students with a comprehensive understanding of classical titration methods in analytical chemistry. It covers the fundamental principles of acid/base titration, complexometric titration, redox titration, and precipitation titration. Students will delve into the theory behind these methods and explore their wide-ranging applications. In addition to theoretical knowledge, the course emphasizes practical skills. Students will learn how to calculate pH values for various acids, bases, salts, and buffers, enabling them to make accurate determinations in real-world scenarios. They will also develop the ability to evaluate and interpret the results obtained from titration experiments, enhancing their analytical capabilities. Throughout the course, selected classical quantitative analytical methods will be highlighted, giving students a deeper understanding of their importance and practical use. By the end of the course, students will have gained the necessary knowledge and skills to apply classical titration methods effectively in analytical chemistry, both in theory and practice.</p>			

#### Module 4

Code	Course/Module Title	ECTS	Semester
UOB-104	Democracy & Human Right	2.00	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
<b>Description</b>			
<p>This course deals with the basic concept of human rights &amp; democracy. Clarifying and training students on the most important principles of human rights and democracy. Organizing discussions and presentations on the most vital and basic topics affecting community building, related to human rights and democracy. Human rights guarantee the protection and respect of an individual's interests, even when he or she is not a majority. In a democratic climate, sustainable democratic power cannot be conceived without respecting, protecting and fulfilling human rights. Through their combined influence, they allow the individual a life based on the freedom of self-determination and collective. That is why the protection and realization of human rights truly form the basis of the democratic project.</p>			

#### Module 5

Code	Course/Module Title	ECTS	Semester
UOB-103	Arabic Language	2.00	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
<b>Description</b>			
<p>-تعلم مهارات الكتابة والاملاء والتعبير الصحيح خلال تطبيق قواعد اللغة العربية بشكل مفصل وتطبيقي على نصوص عربية. -لفهم الجمع وأنواع الاسماء وكيفية التعامل معها.</p>			

-لفهم العدد واستعماله بشكل صحيح من حيث المطابقة والمخالفة  
 -للتفريق بين الضاد والظاء.  
 -للتفريق ومعرفة استعمال التاء المربوطة والتاء الطويلة.  
 -التمييز بين العلامات الاصلية والفرعية.  
 -تعلم استعمال الأدوات وعمل كل أداة ومعناها في التعبير

#### Module 6

Code	Course/Module Title	ECTS	Semester
UOB-111	Computer I	3.00	1
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	2	32	43
Description			
<p>That's great to hear! Learning and studying computer science and related fields can open up a world of opportunities. Whether you're interested in programming, software development, artificial intelligence, data science, cybersecurity, or any other aspect of computer science, there are plenty of resources available to help you learn and grow in your chosen area.</p> <p>Here are some general steps you can take to start learning and studying computer science:</p> <ol style="list-style-type: none"> <li>1. Set your goals: Determine what specific areas of computer science you want to focus on or what specific skills you want to acquire. This will help you structure your learning journey effectively.</li> <li>2. Choose a programming language: It's important to pick a programming language to start with. Python is often recommended for beginners due to its simplicity and versatility, but there are other popular languages like Java, C++, and JavaScript. Once you become comfortable with one language, it becomes easier to learn others.</li> <li>3. Online courses and tutorials: There are numerous online platforms that offer computer science courses and tutorials. Websites like Coursera, edX, Udemy, and Khan Academy offer a wide range of courses, some of which are free or have free audit options. You can also find tutorial websites and YouTube channels dedicated to teaching programming and computer science concepts.</li> </ol>			

#### Model 7

Code	Course/Module Title	ECTS	Semester
GEO-124	Historical Geology	8.00	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	109	91
Description			
<p>Historical geology is the use of the principles of geology to reconstruct and understand the history of the Earth. It focuses on the geological processes that change the Earth's surface and core, and uses stratigraphy, structural geology, and paleobiology to identify the sequence of these events.2- Providing</p>			

students with an appropriate amount of information and expertise in the field of geoscience in a functional manner that contributes to the acquisition of a scientific culture and contributes to academic preparation and helps them to identify the natural resources in their country

#### Model 8

Code	Course/Module Title	ECTS	Semester
GEO-125	Mineralogy	8.00	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	109	91
Description			
<p>Mineralogy aims to introduce the student to this very important science, which has many applications, as rocks are composed in nature of minerals, and therefore the earth's crust will also be composed of minerals, which will affect many of the events that occur in the earth's crust, as well as the economic importance of minerals, which are included in Lots of industries</p> <p>Mineralogy also aims to recognize that minerals are the main source of chemical elements, which are considered the basic element of many sciences, especially chemistry, physics and engineering branches.</p>			

#### Module 9

Code	Course/Module Title	ECTS	Semester
GEO-126	Physics	5.00	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>A branch of science concerned with the nature and properties of matter and energy. The topic of general physics includes an introduction to physics, vector analysis, and Newton laws in motion. Also, gravitational force, work, energy, torque, angular momentum, laws of motion with a constant acceleration, fluids, particle stability, electric charge, electric field in electrical circuits and ray optics. Experimental general physics provides knowledge of some physical ideas and laws with their experimental applications such as gravity, flywheel moment of inertia, surface tension of water, viscosity, and refractive index of glass and the speed of sound. In addition to determining the wavelength of light emitted from a laser diode using a diffraction grating and finding the focal length of the lens.</p>			

#### Module 10

Code	Course/Module Title	ECTS	Semester
GEO-127	Mathematic	4.00	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	1	33	67
<b>Description</b>			
<p>The course will supply the students with basic concepts of differentiation (chain, product, quotient). Derivatives of standard functions (powers, polynomials, trigonometric). The exponential function: and logarithm as inverse. Derivatives of inverse functions via chain rule, local extrema and curve sketching.</p>			

#### Module 11

Code	Course/Module Title	ECTS	Semester
UOB-102	English Language	2.00	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
<b>Description</b>			
<p>A science-based article recently revealed that the number of scientific papers written in English is now outnumbering those written in the researcher's native language. Therefore, having an understanding of the English language opens up a vast amount of knowledge that can be drawn upon during their studies.</p>			

#### Module 12

Code	Course/Module Title	ECTS	Semester
UOB-121	Computer II	3.00	2
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	2	32	43
<b>Description</b>			
<p><b>Basic Functionality:</b> The aim is to provide students with a solid understanding of Excel's interface, navigation, and basic functionalities, enabling them to create, format, and manage spreadsheets effectively. The aim is to teach students how to enter data, apply formatting, and use cell formatting options, such as number formats, font styles, colors, and borders, to enhance the visual appeal and organization of their spreadsheets.</p> <p><b>Formulas and Functions:</b> The aim is to enable students to use formulas and functions in Excel to perform calculations, manipulate data, and automate tasks. They will learn how to write basic formulas, use functions like SUM, AVERAGE, and IF, and apply cell references.</p> <p><b>Data Analysis and Visualization:</b> The aim is to introduce students to Excel's data analysis and visualization tools, such as sorting, filtering, and conditional formatting. They will learn how to create charts, graphs, and pivot tables to present and analyze data effectively.</p>			

**Module 13**

Code	Course/Module Title	ECTS	Semester
GEO-238	Invertebrate I	6.00	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	71
Description			
<p>Invertebrate zoology is the branch of biology that focuses on the study of invertebrates, which are animals that lack a backbone or vertebral column. This vast group of animals includes a diverse array of organisms such as insects, spiders, crustaceans, mollusks, worms, and more.</p> <p>Invertebrates make up the majority of animal species on Earth and play crucial roles in various ecosystems. They occupy a wide range of habitats, from the depths of the oceans to terrestrial environments. Invertebrates display remarkable adaptations and strategies for survival, reproduction, and feeding.</p> <p>The study of invertebrates involves examining their anatomy, physiology, behavior, ecology, evolution, and classification. Scientists investigate their diversity, distribution, and interactions with the environment. Research in invertebrate zoology contributes to our understanding of fundamental biological processes and helps inform conservation efforts.</p>			

**Module 14**

Code	Course/Module Title	ECTS	Semester
GEO-239	Optical Mineralogy	6.00	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	71
Description			
<p>Optical mineralogy is a branch of mineralogy that focuses on the study of minerals using various optical techniques. It involves the examination of minerals under a polarizing microscope to understand their properties and characteristics based on the interaction of light with the mineral's crystal structure.</p> <p>The polarizing microscope is an essential tool in optical mineralogy. It consists of two polarizing filters, called polarizer and analyzer, that can be rotated independently. By manipulating these filters and observing how light interacts with a mineral sample, several properties can be determined, including: Refractive Index, Birefringence, Pleochroism, Extinction and Interference colors.</p> <p>By combining these techniques and observations, optical mineralogy allows mineralogists to identify minerals and make inferences about their composition, crystal structure, and geological context. It is a valuable tool used in geology, petrology, and other fields to understand the formation, properties, and processes associated with minerals in rocks and geological materials.</p>			

**Module 15**

Code	Course/Module Title	ECTS	Semester
GEO-2310	Structural geology I	6.00	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	3	79	71
<b>Description</b>			
<p>Structural geology is a subdiscipline of geology that focuses on the study of the deformation and arrangement of rocks and geological features within the Earth's crust. It investigates the forces and processes that have shaped and modified the Earth's crust over geological time.</p> <p>Some key concepts and topics in structural geology include:</p> <p>Stress and Strain: Stress refers to the forces acting on rocks, and strain describes the resulting deformation. Structural geologists examine how rocks respond to stress and the subsequent changes in shape, volume, and orientation.</p> <p>Shear Zones: Shear zones are regions of intense deformation where rocks have been subjected to significant shear stress. They often exhibit distinctive structures and mineral assemblages, providing insights into the conditions and mechanisms of deformation.</p> <p>Geologic Maps and Cross-Sections: Structural geologists create geologic maps and cross-sections to represent the spatial distribution and relationships of rock units and structures. These maps are essential for understanding the geological history and identifying potential geological hazards.</p>			

#### Module 16

Code	Course/Module Title	ECTS	Semester
GEO-2311	Geomorphology	5.00	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
<b>Description</b>			
<p>Geomorphology is the scientific study of landforms, their origin, evolution, and the processes that shape the Earth's surface. It examines the physical features of the Earth's landscapes, including mountains, valleys, rivers, coastlines, and glaciers, and investigates the forces and processes that shape them over various timescales.</p> <p>Geomorphology has applications in various fields, including geology, environmental science, civil engineering, and natural resource management. It helps in understanding landform development, predicting and mitigating natural hazards like landslides and flooding, assessing soil erosion and sedimentation, and studying the impacts of human activities on landscapes.</p> <p>By studying landforms and the processes that shape them, geomorphologists contribute to our understanding of Earth's dynamic surface and its response to natural and anthropogenic influences.</p>			

#### Module 17

Code	Course/Module Title	ECTS	Semester
GEO-2312	Computer I	3.00	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	2	32	43
<b>Description</b>			
<p>Learning ArcGIS (Geographic Information System) can be a valuable skill for working with spatial data</p>			



and conducting geographic analysis. ArcGIS is a powerful software suite developed by Esri that allows users to visualize, analyze, and manage geographic information.

Remember that learning ArcGIS is an iterative process, and practice is key to developing proficiency. Start with the basics, gradually build your knowledge and skills, and continually explore new features and tools as you progress. With time and dedication, you can become proficient in using ArcGIS for spatial analysis and mapping.

#### Module 18

Code	Course/Module Title	ECTS	Semester
GEO-2313	Statistic	4.00	3
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	67
Description			
<p>Learning statistics can be a valuable skill for data analysis, decision-making, and understanding quantitative information. Here are some steps to help you get started with learning statistics, understand the Basics which begin by familiarizing yourself with the fundamental concepts of statistics, such as data types (numerical and categorical), variables, populations and samples, measures of central tendency (mean, median, mode), measures of dispersion (range, variance, standard deviation), and probability theory.</p>			

#### Module 19

Code	Course/Module Title	ECTS	Semester
GEO-2414	Invertebrate II	6.00	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	71
Description			
<p>Invertebrates are a diverse group of animals that do not possess a backbone or vertebral column. They make up the majority of animal species on Earth and can be found in various habitats, including oceans, freshwater ecosystems, and terrestrial environments.</p> <p>These are just a few examples of the vast diversity of invertebrates. Invertebrates play critical roles in ecosystems as pollinators, decomposers, predators, and prey. They contribute to nutrient cycling, ecological balance, and are essential components of food webs. Studying invertebrates helps scientists understand their ecology, behavior, physiology, and evolutionary history, contributing to our knowledge of biodiversity and the functioning of ecosystems.</p>			

#### Module 20

Code	Course/Module Title	ECTS	Semester
GEO-2415	Petrology	7.00	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)

2	3	79	96
Description			
<p>Petrology is the branch of geology that focuses on the study of rocks, their composition, origin, formation, and classification. It involves examining rocks at various scales, from the microscopic level to outcrop and regional scales, to understand their mineralogy, texture, and geological history. Petrologists use a combination of field observations, laboratory analyses, and microscopic examination to unravel the story of rocks and the processes that formed them.</p> <p>Petrology plays a crucial role in understanding Earth's history, geological processes, and the formation of mineral resources. It has applications in various fields, including mineral exploration, natural resource assessment, geological mapping, and understanding the behavior of rocks in engineering and construction projects.</p>			

### Module 21

Code	Course/Module Title	ECTS	Semester
GEO-2416	Structural geology II	6.00	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	71
Description			
<p>The primary goal of structural geology is to understand the structures and their geometries, including folds, faults, joints, and shear zones, as well as their relationships to each other and the surrounding rocks. By studying these structures, geologists can gain insights into the tectonic history, stress distribution, and mechanical behavior of the Earth's crust.</p> <p>Some key concepts and topics in structural geology include:</p> <p>Folds: Folds are bends or curves in rock layers, often formed due to compressional forces. Structural geologists study the geometry, types, and origins of folds to understand the tectonic forces that caused them.</p> <p>Faults: Faults are fractures along which there has been movement of rock masses. Structural geologists investigate the types, displacement, and relationships of faults to unravel the history and kinematics of faulting.</p> <p>Joints: Joints are fractures in rocks without significant displacement. They play a crucial role in controlling the behavior of fluids in the Earth's crust and can affect the stability and permeability of rock formations.</p> <p>Structural geology plays a vital role in various fields, including petroleum exploration, mining, engineering geology, and understanding natural hazards like earthquakes and landslides. By analyzing rock structures and their evolution, structural geologists contribute to our understanding of Earth's dynamic processes and the formation of geological features.</p>			

### Module 22

Code	Course/Module Title	ECTS	Semester
GEO-2417	Remote Sensing	6.00	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	71

Description
<p>Remote sensing is a technology that involves the collection and interpretation of information about the Earth's surface from a distance, typically using sensors mounted on aircraft or satellites. It allows us to gather data and images of the Earth's features and phenomena without direct physical contact. Remote sensing has applications in various fields, including geography, environmental science, agriculture, forestry, urban planning, and natural resource management.</p> <p>Remote sensing provides a valuable tool for monitoring and understanding the Earth's dynamic processes, enabling better decision-making in various fields. It allows for large-scale and repetitive data collection, providing a historical record and facilitating the detection of changes over time.</p>

### Module 23

Code	Course/Module Title	ECTS	Semester
GEO-2418	Computer II	3.00	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
	2	32	43
Description			
<p>Learning the basics of Python is a great way to start programming and unlock a wide range of applications in data analysis, web development, machine learning, and more.</p> <p>Remember, learning Python is a gradual process. Don't be afraid to make mistakes and experiment with different code snippets. Practice regularly and apply Python to real-world projects to develop a strong foundation in programming.</p>			

### Module 24

Code	Course/Module Title	ECTS	Semester
UOB-202	English Language	2.00	4
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2		33	17
Description			
<p>One of the primary benefits of learning English is that it is often considered the language of global business. The international business community often uses it for communication, even among people who do not speak the same native language. Speaking and understanding English can let a person more easily communicate with others and find more job opportunities not only in his or her home country, but around the world as well. There are also many professional informative publications printed in English, which means it is often an essential language for anyone working in science or research.</p>			

### Module 25

Code	Course/Module Title	ECTS	Semester
GEO-3519	Micropaleontology	6.00	5

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
Description			
<p>Micropaleontology is the branch of paleontology that focuses on the study of microscopic fossils. It involves the examination and analysis of fossilized remains of microorganisms, such as foraminifera, diatoms, radiolarians, and other small organisms that are typically smaller than 1 millimeter in size. These microfossils are preserved in sedimentary rocks and provide valuable insights into past environments, climate changes, and evolutionary history.</p> <p>Micropaleontology is a multidisciplinary field that combines aspects of paleontology, geology, biology, and environmental sciences. It provides valuable insights into Earth's history, evolution, and past environmental conditions. The study of microfossils continues to contribute to our understanding of the planet's past and its implications for the future.</p>			

### Module 26

Code	Course/Module Title	ECTS	Semester
GEO-3520	Igneous and Metamorphic Rocks	6.00	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
Description			
<p>Igneous and metamorphic rocks are two of the three main types of rocks found on Earth, the third being sedimentary rocks. Let's explore each of these rock types in more detail:</p> <p><b>Igneous Rocks:</b> Igneous rocks are formed from the solidification and crystallization of molten rock material, known as magma or lava. This process occurs either beneath the Earth's surface (intrusive igneous rocks) or on the surface (extrusive igneous rocks).</p> <p><b>Metamorphic Rocks:</b> Metamorphic rocks are formed from pre-existing rocks (igneous, sedimentary, or other metamorphic rocks) that have been subjected to high temperature, pressure, and/or chemical changes. These alterations occur deep within the Earth's crust under intense geological conditions.</p>			

### Module 27

Code	Course/Module Title	ECTS	Semester
GEO-3521	Geotectonic	4.00	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	36
Description			
<p>Geotectonics, also known as tectonics or plate tectonics, is the scientific study of the processes and movements that shape the Earth's lithosphere (the rigid outer layer of the Earth) and the resulting landforms. It involves the study of tectonic plates, their interactions, and the geological phenomena</p>			

associated with plate movements.

Understanding geotectonics is essential for studying the Earth's dynamic processes, including the formation of mountains, earthquakes, volcanic activity, and the evolution of continents and oceans. It provides insights into the geological history of our planet and aids in the prediction and mitigation of natural hazards associated with plate tectonics.

### Module 28

Code	Course/Module Title	ECTS	Semester
GEO-3522	Geophysics Gravity & Magnetic method	6.00	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
Description			
<p>Gravity and magnetic methods are two geophysical techniques used to investigate subsurface structures and properties of the Earth. Let's explore each method in more detail:</p> <p><b>Gravity Method:</b> The gravity method is based on measuring variations in the Earth's gravitational field caused by variations in the density of subsurface materials. Gravity surveys are conducted using specialized instruments called gravimeters, which measure the acceleration due to gravity at different locations.</p> <p><b>Magnetic Method:</b> The magnetic method measures variations in the Earth's magnetic field caused by variations in the magnetic properties of subsurface materials. Magnetic surveys are conducted using magnetometers, which measure the strength and direction of the magnetic field.</p>			

### Module 29

Code	Course/Module Title	ECTS	Semester
GEO-3523	Stratigraphy	6.00	5
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
Description			
<p>Stratigraphy is a branch of geology that focuses on the study and interpretation of rock layers (strata) and their arrangement in the Earth's crust. It involves the analysis of the sequence, distribution, and characteristics of different rock layers to understand the geological history of an area.</p> <p>By examining the characteristics and relationships of rock layers, stratigraphy provides insights into the Earth's past environments, the processes that have shaped the Earth's surface, and the evolution of life over time. It is a fundamental tool for geologists and plays a crucial role in many geological investigations and interpretations.</p>			

### Module 30

Code	Course/Module Title	ECTS	Semester
GEO-3524	Research methodology	1.00	6

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
1		17	8
<b>Description</b>			
<p>Research methodology refers to the systematic approach and techniques used in conducting scientific research. It involves the overall plan and strategy for conducting research, collecting data, analyzing information, and drawing conclusions.</p> <p>Research methodology provides a systematic and structured approach to conducting research, ensuring rigor, validity, and reliability. By following a well-defined methodology, researchers can effectively contribute to existing knowledge, answer research questions, and make informed conclusions.</p>			

### Module 31

Code	Course/Module Title	ECTS	Semester
GEO-3625	Paleoecology	6.00	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
<b>Description</b>			
<p>Paleoecology is a branch of ecology that studies ancient ecosystems and the interactions between organisms and their environments throughout geological time. It combines principles from paleontology (the study of fossils) and ecology to reconstruct past ecological systems and understand how they have changed over time.</p> <p>Paleoecology plays a vital role in reconstructing the Earth's ecological history and understanding how ecosystems have evolved and responded to environmental changes over time. By integrating paleontological and ecological approaches, paleoecologists shed light on the interactions between organisms and their environments in the past, providing valuable context for understanding current and future ecological dynamics.</p>			

### Module 32

Code	Course/Module Title	ECTS	Semester
GEO-3626	Sedimentology and Sedimentary Rocks	6.00	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
<b>Description</b>			
<p>Sedimentology is the branch of geology that studies the processes, transportation, deposition, and lithification (compaction and cementation) of sediments to form sedimentary rocks. It focuses on understanding the origin, composition, texture, and structure of sedimentary deposits and the geological history they represent. Sedimentary rocks are formed through the accumulation and lithification of sediments, which are particles derived from the weathering and erosion of pre-existing rocks or the remains of organisms.</p> <p>Sedimentology and the study of sedimentary rocks contribute to understanding Earth's history,</p>			

deciphering past environments, and identifying valuable resources. They help reconstruct past landscapes, study ancient climates, and provide insights into the processes that shape the Earth's surface. Sedimentary rocks are widely distributed on Earth's surface and serve as archives of Earth's geological past, making them crucial for various fields of study, including geology, paleontology, and environmental science.

### Module 33

Code	Course/Module Title	ECTS	Semester
GEO-3627	Field Geology	4.00	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	2	64	36

#### Description

Field geology is a branch of geology that involves conducting geological investigations and collecting data directly in the field. It is a hands-on approach that allows geologists to observe, measure, and interpret geological features and processes in their natural settings. Field geology plays a critical role in understanding the Earth's geology, mapping geological formations, and conducting geological research. Field geology is an integral part of geological research, exploration for mineral resources, environmental studies, and geological hazard assessment. It allows geologists to directly observe and analyze geological features, providing valuable insights into Earth's history, the processes that shape the Earth's surface, and the resources and hazards that exist within the Earth's crust.

### Module 34

Code	Course/Module Title	ECTS	Semester
GEO-3628	Geophysics Seismic & electrical methods	6.00	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86

#### Description

Geophysics is a branch of geology that utilizes physical principles and measurements to study the Earth's structure, composition, and processes. Seismic and electrical methods are two commonly used techniques in geophysics for investigating subsurface properties. Here's an overview of seismic and electrical methods in geophysics:

#### Seismic Methods:

**Seismic Reflection:** This method involves generating seismic waves (usually by using a controlled source, such as an energy source or explosives) and recording the reflected waves at the surface. By analyzing the time it takes for the waves to travel and the characteristics of the reflected waves, geophysicists can infer the subsurface structure and identify geological features such as rock layers, faults, and reservoirs.

**Seismic Refraction:** In seismic refraction, seismic waves are generated and recorded at various positions along a profile. The waves refract or bend when they encounter subsurface boundaries with

different seismic velocities. By analyzing the travel times and angles of refraction, geophysicists can determine the velocity structure and depth of different layers in the subsurface.

**Seismic Tomography:** Seismic tomography involves collecting seismic data from multiple sources and receivers to create detailed images of subsurface structures. By combining data from various angles and locations, tomographic techniques can generate three-dimensional models of subsurface properties, such as seismic velocity variations and density anomalies.

**Electrical Methods:** Electrical Resistivity, Induced Polarization and Ground Penetrating Radar (GPR). Seismic and electrical methods in geophysics are powerful tools for investigating the subsurface properties and geological structures. These techniques are widely used in various applications, including mineral exploration, groundwater studies, engineering site investigations, and oil and gas exploration. By interpreting the collected data, geophysicists can gain valuable insights into the subsurface characteristics, helping to understand the Earth's subsurface and inform geological and engineering decisions.

### Module 35

Code	Course/Module Title	ECTS	Semester
GEO-3629	Geology of Iraq	6.00	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	64	86
Description			
<p>Studying the geology of Iraq involves delving into various aspects of the country's geological history, formations, and resources. Here's a suggested approach for studying the geology of Iraq:</p> <ol style="list-style-type: none"> <li><b>Geological Formation and Structure:</b> Study the geological formation and structure of Iraq, including the presence of sedimentary basins, mountains, and fault lines. The Zagros Fold and Thrust Belt and the Mesopotamian Basin are particularly important features to understand.</li> <li><b>Stratigraphy:</b> Explore the stratigraphic units and formations found in Iraq, ranging from the Paleozoic to the Cenozoic era. Become familiar with the different rock types, their ages, and the environments in which they were deposited.</li> </ol> <p>Remember to approach the study of the geology of Iraq with an open and inquisitive mindset. Building a solid foundation of knowledge through literature, maps, field experiences, and interactions with experts will deepen your understanding of Iraq's geology and its geological significance.</p> <p>It is important to note that the geology of Iraq is complex and has been influenced by both ancient and ongoing tectonic processes. The region's geological features, including its fold belts, sedimentary basins, and petroleum resources, have significant implications for its geology, economy, and natural resources.</p>			

### Module 36

Code	Course/Module Title	ECTS	Semester
UOB-302	English Language	2.00	6
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	1	32	18
Description			
<p>An additional language will increase your creativity levels. In the fifth benefit on our list, we pointed out the fact learning a second language can make the brain becomes more flexible thereby making it easier</p>			



to switch between different tasks, promoting creativity Learning English Can Help students In Academia

### Module 37

Code	Course/Module Title	ECTS	Semester
GEO-4730	Summer Field Geology Course	6.00	7
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	5	107	43
Description			
<p>A field geology course is a valuable opportunity to gain practical experience and skills in geological fieldwork. Such courses typically involve hands-on fieldwork, data collection, mapping exercises, and geological interpretation in real-world settings.</p> <p>By carefully considering these aspects, you can find a field geology course that aligns with your interests, learning objectives, and logistical requirements. Participating in a field geology course will enhance your understanding of geological processes, develop your fieldwork skills, and provide practical experience essential for a career in geology.</p>			

### Module 38

Code	Course/Module Title	ECTS	Semester
GEO-4831	Engineering Geology	5.00	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Engineering geology is a branch of geology that focuses on the application of geological knowledge and principles to engineering projects. It involves studying the geological conditions of a site and assessing their impact on engineering design, construction, and environmental considerations.</p> <p>Engineering geology plays a crucial role in various engineering disciplines, including civil engineering, geotechnical engineering, mining engineering, and environmental engineering. By integrating geological knowledge into engineering practices, engineers can make informed decisions, mitigate geological risks, and design sustainable and resilient infrastructure.</p>			

### Module 39

Code	Course/Module Title	ECTS	Semester
GEO-4832	Subsurface Geology	5.00	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			

Subsurface geology refers to the geological features, structures, and materials that exist beneath the Earth's surface. It involves the study of rock and sediment layers, their composition, arrangement, and physical properties, as well as the processes that shape them over time. Subsurface geology is important in various fields, including petroleum exploration, groundwater management, geotechnical engineering, and environmental assessments.

By studying subsurface geology, geologists and scientists gain a better understanding of Earth's history, the formation of geological features, and the distribution of Earth's resources. The information derived from subsurface geology investigations is crucial for a wide range of applications, from resource exploration to infrastructure development and environmental management.

#### Module 40

Code	Course/Module Title	ECTS	Semester
GEO-4833	Geochemistry	5.00	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Geochemistry is the branch of geology that focuses on the study of the chemical composition, distribution, and behavior of elements and compounds in Earth materials, such as rocks, minerals, water, soil, and the atmosphere. It seeks to understand the processes that govern the chemical reactions and transformations in the Earth's crust and how these processes contribute to the formation and evolution of Earth's systems.</p> <p>Geochemistry is an interdisciplinary field that draws upon concepts and techniques from chemistry, physics, geology, and environmental sciences. It provides valuable insights into Earth's composition, history, and processes, contributing to our understanding of Earth's past, present, and future.</p>			

#### Module 41

Code	Course/Module Title	ECTS	Semester
GEO-4834	Environmental Geology	5.00	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Environmental geology is a branch of geology that focuses on the interactions between humans and the Earth's environment. It involves studying the geological processes, materials, and hazards that impact the environment and how human activities affect geological systems. Environmental geologists work to understand and mitigate the environmental impacts of human activities and promote sustainable practices.</p> <p>Environmental geology encompasses the integration of geological knowledge with environmental sciences, engineering, and policy. By understanding the geological factors that influence environmental processes and human activities, environmental geologists work towards a more sustainable and resilient future.</p>			

#### Module 42

Code	Course/Module Title	ECTS	Semester
UOB-402	English Language	2.00	9
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	-	32	18
Description			
<p>The English language is a widely spoken and influential language that originated in England and has spread to become a global lingua franca. It is the official language of numerous countries, and it serves as a means of communication, commerce, and cultural exchange around the world.</p> <p>Learning English can open up opportunities for communication, education, travel, and career advancement. It is a versatile and adaptable language that continues to evolve and adapt to the needs of its speakers in an increasingly interconnected world.</p>			

### Module 43

Code	Course/Module Title	ECTS	Semester
GEO-4835	Research Project I	3.00	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
-	4	62	13
Description			
<p>Here's an example of a research project suitable for an undergraduate level:  Title: "The Impact of Social Media on Mental Health: A Study of College Students"  Report Writing: Compile the research findings and recommendations into a comprehensive report. Include an introduction, methodology, results, discussion, and conclusion sections. Use proper referencing and citation formats.  Presentation: Prepare a presentation summarizing the research project's key findings and recommendations. Deliver the presentation to an audience, such as classmates, faculty members, or relevant stakeholders.  Remember to consult with your academic advisor or supervisor to tailor the research project to your specific academic program and requirements. They can provide guidance on selecting a suitable topic, refining the methodology, and ensuring the project meets the necessary academic standards.</p>			

### Module 44

Code	Course/Module Title	ECTS	Semester
GEO-4936	Water Resources	5.00	9
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Water Resources is a field of study that focuses on the assessment, development, management, and conservation of water as a vital natural resource. It involves understanding the hydrological cycle, water</p>			

availability, water quality, and the sustainable use of water for various purposes such as drinking water supply, agriculture, industry, and environmental conservation.

#### Module 45

Code	Course/Module Title	ECTS	Semester
GEO-4937	Petroleum Geology	5.00	9
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Petroleum Geology is a branch of geology that focuses on the study of hydrocarbon deposits, specifically oil and natural gas, and the geological processes involved in their formation, migration, accumulation, and extraction. It involves understanding the sedimentary basins, source rocks, reservoir rocks, traps, and the exploration and production of petroleum resources.</p>			

#### Module 46

Code	Course/Module Title	ECTS	Semester
GEO-4938	Ore Geology	5.00	9
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Ore Geology is a branch of geology that focuses on the study of mineral deposits, specifically economically valuable minerals and ores. It involves the understanding of the geological processes that form mineral deposits, the identification and characterization of ore minerals, and the exploration and extraction of mineral resources.</p>			

#### Module 47

Code	Course/Module Title	ECTS	Semester
GEO-4939	Environmental Pollution	5.00	9
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	46
Description			
<p>Environmental Pollution is a field of study that focuses on the contamination and degradation of the environment by various pollutants, including air pollutants, water pollutants, soil pollutants, and noise pollution. It involves understanding the sources, distribution, transport, and effects of pollutants on</p>			

ecosystems, human health, and the environment as a whole.

#### Module 48

Code	Course/Module Title	ECTS	Semester
GEO-4840	Oil Exploration	6.00	8
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	79	71
Description			
<p>Oil exploration, also known as petroleum exploration or hydrocarbon exploration, is the process of searching for underground accumulations of oil and natural gas in order to identify potential reserves for future production. It involves various geological, geophysical, and engineering techniques to assess the presence, extent, and commercial viability of oil and gas deposits.</p>			

#### Module 49

Code	Course/Module Title	ECTS	Semester
GEO-4941	Research Project II	2.0	9
Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
-	4	62	13
Description			
<p>Here's an example of a research project suitable for an undergraduate level:            Title: "The Impact of Social Media on Mental Health: A Study of College Students"            Report Writing: Compile the research findings and recommendations into a comprehensive report. Include an introduction, methodology, results, discussion, and conclusion sections. Use proper referencing and citation formats.            Presentation: Prepare a presentation summarizing the research project's key findings and recommendations. Deliver the presentation to an audience, such as classmates, faculty members, or relevant stakeholders.            Remember to consult with your academic advisor or supervisor to tailor the research project to your specific academic program and requirements. They can provide guidance on selecting a suitable topic, refining the methodology, and ensuring the project meets the necessary academic standards.</p>			