Academic Program Description Form

University Name: .....University of Baghdad.....

Faculty/Institute: .....College of Science.....

Scientific Department: .....Geology Department.....

Academic or Professional Program Name: ...Bachelor of Earth Science.....

Final Certificate Name: ..... Bachelor of Earth Science.....

Academic System: .....Semester System.....

Description Preparation Date: 1/10/2024

File Completion Date: 15/6/2025

Signature:

Head of Department Name:

Prof. Dr. Salam Ismail Marhoon

Date: 15-6-2025

Signature:

Scientific Associate Name:

Prof. Dr. Namir Ibrahim Abbas

Date 15.6.2025

The file is checked by:

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Prof. Dr. Israa Ali Zidan Israa

Date:

Signature:

Raed

Approval of the Dean

Dr Raed Falih Hassan

Academic Program Description

Geology Department

College of Science / University of Baghdad

2024 – 2025

1. Program Vision

Visions of the Department of Earth Sciences:

- Leadership and excellence in the fields of Earth Sciences, and providing the labor market with scientific competencies that align with modern technological and knowledge developments.

2. Program Mission

Mission of the Department of Earth Sciences:

- The mission of the academic program of the Department of Earth Sciences is to prepare professional graduates capable of conducting scientific research in various fields of Earth Sciences in alignment with labor market requirements. The program aims to graduate highly competent and skilled specialists characterized by professionalism, leadership, and teamwork abilities, by equipping them with the necessary knowledge and skills to serve the community. It also seeks to prepare geologists with a high level of education that integrates both theoretical and practical knowledge within the framework of sustainable development and in line with the national vision.

3. Program Objectives

The objectives of the academic program of the Department of Earth Sciences can be summarized in the following points:

1. Preparing graduates capable of keeping pace with local and global developments in alignment with labor market demands.
2. Adopting modern and contemporary teaching methods to achieve the desired educational goals, such as brainstorming, differentiated instruction, and feedback strategies, in a way that enhances students' creative thinking.
3. Encouraging the development and refinement of students' extracurricular skills and talents, as well as promoting voluntary and teamwork activities.
4. Developing and updating undergraduate and postgraduate curricula in various Earth Science specializations to meet global competitiveness standards.
5. Promoting and supporting scientific research in various geological fields and publishing research outcomes in reputable international journals, in addition to marketing applied research.
6. Advancing the Department of Earth Sciences by achieving specialized academic program accreditation.
7. Organizing scientific seminars, conferences, and other academic activities regularly to strengthen undergraduate and postgraduate students' confidence in their specialization and raise awareness of its importance through the attention of specialized academic institutions.
8. Providing field training opportunities through field trips with faculty members and familiarizing students with future work environments via summer training in government institutions, thus promoting the concept of partnership and cooperation with state institutions.
9. Encouraging academic collaboration between Earth Science disciplines and other fields such as physics, chemistry, biology, medicine, environmental sciences, astronomy, and engineering, contributing to the development of interdisciplinary research that serves the community.

4. Program Accreditation

- The Department of Earth Sciences is currently working on completing the requirements for program accreditation in accordance with the standards set by the Ministry of Higher Education and Scientific Research in Iraq, and in coordination with the Quality Assurance and University Performance Unit at the College of Science, University of Baghdad. The department strives to develop its academic plans, update its curricula, and enhance its educational and research capabilities in line with national and international accreditation standards, with the aim of achieving academic excellence and ensuring the quality of education to meet labor market demands and sustainable development requirements.

5. Other external influences

- Summer Training, Field Visits, Training Courses, Scientific Research, Laboratories, Library, Geological Field Trips

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	9	17	10%	
College Requirements	5	20	12%	
Department Requirements	37	132	78%	
Summer Training	2	-	-	
Other	-	-	-	

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours	
			theoretical	practical
Third Stage / First Semester	GEO3519	Micropaleontology	2	3
	GEO3520	Igneous Rocks	2	3
	GEO3521	Geotectonic	2	3
	GEO3522	Geophysics I (Gravity & Magnetic methods)	2	3
	GEO3523	Stratigraphy	2	3
	GEO3524	Sedimentary Rocks	2	3
Third Stage / Second Semester	GEO3625	Paleoecology	2	3
	GEO3626	Metamorphic Petrology	2	3
	GEO3627	Field Geology	2	3
	GEO3628	Geophysics II (Seismic & Electrical methods)	2	3
	GEO3629	Geology of Iraq	2	3
	GEO3630	Research Methodology	1	\
Fourth Stage / First Semester	GEO4832	Engineering Geology	2	3
	GEO4833	Subsurface Geology	2	3
	GEO4834	Geochemistry	2	3
	GEO4835	Environmental Geology	2	3
	GEO4836	Economic Geology	2	2
	GEO4836	Graduation Project	\	2
Fourth Stage / Second Semester	GEO4938	Water Resources	2	3
	GEO4939	Petroleum Geology	2	3
	GEO4940	Ore Geology	2	3
	GEO4941	Environmental Pollution	2	3

	GEO4942	Oil Exploration	2	2
	GEO4943	Field Geology Course	2	4
	-	Signal Processing	2	\
	-	Radiological Method	2	\

8. Expected learning outcomes of the program

A. Knowledge

1. Comprehensive understanding of fundamental geological theories 2. Analysis of the physical and chemical properties of rocks and minerals 3. Application of geological knowledge to solve environmental and industrial problems 4. Use of modern technologies in geological research	**Learning Outcomes Statement:** • Provide students with in-depth scientific knowledge of theories related to the origin, evolution, and internal structure of the Earth, as well as geological processes such as tectonics, volcanism, and sedimentation. • Understand the relationship between geological phenomena and geological time, including the ability to read and interpret geological maps. • Enable students to identify and classify minerals and rocks (igneous, sedimentary, and metamorphic) based on their physical and chemical properties, using laboratory tools and analytical techniques. • Understand the formation processes of natural resources (such as oil, groundwater, and mineral ores) and their sustainability. • Analyze environmental issues such as pollution, desertification, and natural disasters (earthquakes, floods) from a geological perspective. • Apply geological knowledge in fields such as geophysical exploration, petroleum geology, and geotechnical engineering to serve industrial sectors. • Master the use of modern technological tools, such as Geographic Information Systems (GIS), remote sensing, and geological software, for data collection and analysis. • Apply the scientific method in conducting field and laboratory research, and interpret results within theoretical and practical frameworks.

B. Skills

1. Fieldwork and geological survey skills 2. Laboratory and technical analysis skills	**Learning Outcomes Statement:**

3. Problem-solving and decision-making skills 4. Digital technology and geological software skills	1. **Mastery in conducting geological field surveys**, including: a. Collecting rock and sediment samples b. Reading topographic and geological maps and using a geological compass c. Accurately documenting geological features (strata, faults, folds) 2. **Ability to analyze field data and present clear scientific reports** a. Using specialized laboratory instruments such as: b. Petrographic microscopes for rock and mineral analysis c. Chemical analysis devices like XRD and XRF to identify mineral compositions d. Applying geophysical techniques (such as sonar, gravity, magnetism) in natural resource exploration 3. **Analyzing complex geological problems** (e.g., water pollution, earthquake risks, slope failures) and proposing practical solutions a. Assessing geological hazards in engineering projects (dams, tunnels, oil fields) using scientific methodologies b. Making informed decisions in exploration operations and sustainable natural resource management 4. **Proficiency in Geographic Information Systems (GIS) and remote sensing for spatial data analysis** a. Using specialized geological software such as Petrel, Surfer, and RockWorks for geological modeling and data storage b. Analyzing statistical and geological data using tools like Python or MATLAB, depending on program requirements
C. Ethics	
1. Promoting environmental awareness and responsibility toward natural resources **2.** Commitment to scientific and professional ethics **3.** Fostering teamwork and responsible leadership **4.** National belonging and contribution to sustainable development	**Learning Outcomes Statement:** • Instilling a sense of responsibility for preserving natural resources (water, oil, minerals) and ensuring their sustainability for future generations. • Deepening understanding of the importance of environmental balance and the geologist's role in addressing challenges such as desertification, pollution, and climate change.

	• Applying principles of integrity and accuracy in collecting and analyzing geological data (e.g., avoiding falsification of samples or results). • Respecting field and laboratory safety rules, and protecting colleagues and the community from potential hazards. • Committing to transparency standards in natural resource assessment reports (especially in the oil and mining sectors).

5. Teaching and Learning Strategies

Geology programs at universities typically employ a variety of strategies and teaching methods to ensure the effectiveness of the educational process and to achieve learning objectives. Among these strategies and methods are:

1. **Interactive lectures**: Interactive lectures allow students to actively participate in the educational process through discussions and exchanges with the instructor and among themselves. Students are encouraged to ask questions and participate in solving complex problems.
2. **Practical lessons and laboratory work**: Practical sessions in laboratories and fieldwork are organized to enhance practical understanding of geological concepts, enabling students to interact with geological samples and geophysical data.
3. **Case studies and research projects**: Case studies and research projects provide students with an opportunity to apply theoretical concepts to real-world scenarios, enhancing their understanding of geological challenges and developing their research and analytical skills.
4. **Effective use of technology in education**: This includes the use of multimedia such as educational videos, computer simulations, and geomatics software to offer interactive and engaging learning experiences.
5. **Discussions and workshops**: Discussion sessions and workshops are organized to allow students to exchange ideas and opinions, and to collaboratively solve complex geological problems, helping them build critical thinking and problem-solving skills.
6. **Diagnostic and interactive assessment**: Continuous diagnostic assessment methods are used to measure students' progress and understanding, with constructive feedback provided to help them improve their performance and deepen their understanding.
7. **Cooperative learning**: This type of learning encourages cooperation among students in small groups to solve problems and complete projects, fostering social interaction and promoting a mutual understanding of the course material.

6. Evaluation methods

Below are some common methods of assessment and their implementation throughout all stages of a geology program:

1. **Diagnostic Assessment:**
   - This type of assessment is used in the initial phase to determine the level of knowledge and skills of students before beginning the course.
   - Diagnostic assessment includes short quizzes, questionnaire-based questions, and personal interviews.
2. **Formative Assessment:**
   - Formative assessment is carried out at specific intervals during the academic term, aimed at evaluating students' progress in different subjects.
   - This type of assessment involves tests, assignments, and short projects.
3. **Continuous Assessment:**
   - Continuous assessment is conducted throughout the academic term to constantly evaluate students' development in understanding and skills.
   - This type of assessment includes student participation in class discussions, group activities, report submissions, and term projects.
4. **Summative Assessment:**
   - Summative assessment is conducted at the end of the academic term or at the end of a course unit, designed to evaluate the comprehensive understanding of the subjects.
   - This type of assessment involves final exams, large-scale projects, and individual research work.

5. **Self-Assessment:**
   - Self-assessment encourages students to evaluate their own performance and understanding of the material, and can be part of the continuous assessment process.
   - Students can use concepts like self-observation and personal reporting to evaluate their progress and identify strengths and weaknesses.
6. **Participation-Based Assessment:**
   - Participation-based assessment involves evaluating students' performance during class discussions, workshops, and group projects.
   - This type of assessment focuses on the level of participation, interaction, and collaboration among students.

7. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/ Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr. Salam Ismail Marhoon	Geology	Stratigraphy and Paleontology			53	
Prof. Dr. Iyad Ali Hussein Ali	Geology	Stratigraphy and Paleontology				
Prof. Dr. Hamed Hassan Abdullah	Geology	Engineering Geology				
Prof. Dr. Saleh Mohammed Awad	Geology	Geochemistry				
Prof. Dr. Ali Maki Hussein Al-Rahim	Geology	Geophysics				
Prof. Dr. Qusay Yassin Salman	Geology	Water Resources				
Prof. Dr. Kamal Kareem Ali	Geology	Geophysics				
Prof. Dr. Manal Shaker Ali	Geology	Geologist				
Prof. Loay Sameer Shaker	Geology	Paleontology				
Asst. Prof. Dr. Afrah Hassan Saleh	Geology	Stratigraphy and Paleontology				
Asst. Prof. Dr. Buraq Adnan Hussein	Geology	Petroleum Geology				
Asst. Prof. Dr. Inaam Juma Abdullah	Geology	Geochemistry				
Asst. Prof. Dr. Sahar Younis Jasim	Geology	Organic Paleontology				
Asst. Prof. Dr. Firas Mudhafar Abdul-Hussein	Geology	Geochemistry				
Asst. Prof. Dr. Mahmood Abdul-Ameer Salman	Geology	Structural Geology				
Asst. Prof. Dr. Murtadha Jabbar Issa	Geology	Geochemistry				
Asst. Prof. Dr. Maysoon Omar Ali	Geology	Petrology and Mineralogy				
Asst. Prof. Dr. Najah Abdul-Hassan Abd	Geology	Geophysics / Seismology				
Asst. Prof. Dr. Mustafa Ali Hassan	Geology	Hydrogeochemistry				
Asst. Prof. Dr. Atheer Aidan Khalil	Geology	Geomorphology, Structural Geology, and Remote Sensing				

Asst. Prof. Dr. Thaer Thamer Al-Taif	Geology	Engineering Geology				
Asst. Prof. Dr. Osama Saad Sahib	Geology	Geophysics				
Asst. Prof. Dr. Muaid Jasim Rasheed	Geology	Geomorphology				
Lect. Dr. Ahmed Kadhem Obeid	Geology	Tectonic Geology				
Lect. Dr. Anwar Kadhem Mousa	Geology	Stratigraphy and Paleontology				
Lect. Dr. Iman Ahmed Mohammed	Geology	Water Resources				
Lect. Dr. Thamer Abdullah Mahdi	Geology	Stratigraphy with Petroleum Applications				
Lect. Dr. Jinan Mansour Koreel	Geology	Structural Geology				
Lect. Dr. Harith Ismail Mustaf	Geology	Petrology and Mineralogy				
Lect. Dr. Yasmeen Khudair Ibrahim	Geology	Paleontology				
Lect. Dr. Rasha Fawzi Faisal	Geology	Petroleum Geology				
Lect. Dr. Rana Abbas Ali	Geology	Geochemistry				
Lect. Dr. Zainab Dhamad Hassan	Geology	Geomorphology and Remote Sensing				
Lect. Dr. Safaa Adeeb Saleh	Geology	Petrology and Mineralogy				
Lect. Dr. Imad Jasim Mohammed	Computer Science	Networks				
Lect. Dr. Omar Fityan Rasheed	Computer Science	Network Security				
Lect. Dr. Lamees Nazar Abdul-Karim	Geology	Seismic Geophysics				
Lect. Dr. Hassan Katouf Jasim	Geology	Petrology and Mineralogy				
Lect. Dr. Mohammed Hassan Nasser	Geology	Engineering Geology				
Lect. Dr. Hiba Saadoun Mohsen	Geology	Petroleum Geology				
Lect. Dr. Hind Fadhel Abdullah	Geology	Water Resources				
Lect. Dr. Lama Jasim Mohammed	Geology	Petroleum and Reservoirs				
Lect. Dr. Liqaa Faleh Oudah	Arabic Language	Arabic Language				
Lecturer Shatha Fathi Hassan	Geology	Engineering Geology				
Asst. Lect. Hadi Salem Obeid	Geology	Water Resources / Groundwater				
Asst. Lect. Abdallah Adel Ibrahim	Computer Science	Computer Science				
Asst. Lect. Laith Sabah Abdul-Ali	Geology	Geophysics				
Asst. Lect. Aya Ali Hameed	Geology	Structural Geology				
Asst. Lect. Neam Omar Farhan	Geology	Geochemistry				
Asst. Lect. Ansam Hassan Rasheed	Geology	Geophysics				

Asst. Lect. Sally Hussein Ahmed	Geology	Structural Geology, Remote Sensing, and Geomorphology				
Asst. Lect. Zahraa Iyad Hadi	Geology	Geochemistry				
Asst. Lect. Asmaa Abbas Hameed	Astronomy and Space	Astronomy and Space				

8. Development

Mentoring new faculty members

The process for guiding new, visiting, full-time, and part-time faculty members at the institutional and departmental level includes the following steps in brief:

1. **Providing an introduction to the institution and department**: A comprehensive introduction is given about the institution, its educational environment, goals, and institutional values, along with an explanation of the department's role in achieving these goals.
2. **Orientation on policies and procedures**: Administrative and academic policies and procedures related to teaching, research, and community service are explained, including evaluation and promotion procedures, handling student matters, and more.
3. **Providing academic and teaching support**: Support and guidance are offered on curriculum development, lesson planning, use of educational technology, and implementation of modern teaching methods.
4. **Introducing available resources**: Highlighting the resources available to faculty members, such as libraries, laboratories, research facilities, funding opportunities, and ongoing training.
5. **Social and cultural orientation**: This includes guidance on university life and cultural and social activities within the institution and the local community, including cultural, sports, and social events.
6. **Offering networking and socialization opportunities**: Encouraging the building of networks and collaboration among new and existing faculty, students, and administrative staff to foster communication and share experiences.

Professional development of faculty members

The academic and professional development plan for faculty members includes several key elements:

1. **Offering Workshops and Training Courses**: Workshops and training courses are organized to develop faculty members' skills in modern teaching and learning areas, such as educational technology, assessment techniques, and active teaching.
2. **Individual Mentoring and Critical Review**: Individual mentoring sessions and critical reviews of faculty performance are provided, focusing on strengthening their skills, addressing weaknesses, and identifying opportunities for improvement.
3. **Participation in Conferences and Seminars**: Faculty members are encouraged to participate in local and international conferences, workshops, and seminars to exchange experiences and ideas, and to benefit from new developments in the field.
4. **Research and Academic Publication:** Faculty members are encouraged to continue scientific research and publish results in peer-reviewed journals, which enhances their professional development and contributes to the overall quality of education.
5. **Participation in Community Service Activities**: Faculty members are encouraged to engage in community service activities and collaborate with external institutions, extending their impact and enriching their professional development.
6. **Continuous Evaluation and Feedback**: Continuous evaluation of faculty performance is conducted, along with regular feedback to help improve their performance and develop their skills.
7. **Providing Technical and Advisory Support**: Technical and advisory support is offered to faculty members in various areas such as instructional design, curriculum development, and the use of technology in education.

9. Acceptance Criterion

The college admission criteria typically involve a set of systems and procedures related to application and enrollment:

1. **Academic Requirements:** These requirements include the necessary academic qualifications for college admission, such as a high school diploma or its equivalent, and prior academic results.
2. **Student Application Form:** Applicants must submit a student application form containing personal and academic information, along with any additional required information.

3. **Health and Behavioral Standards:** School or university rules may include health and behavioral standards that applicants must adhere to.
4. **Application Deadlines:** The institution or college sets deadlines for submitting admission applications, and applicants must comply with them.
5. **Tuition Fees and Financial Aid:** Applicants should understand the tuition fees and the available options for financial aid or student loans.

10. The most important sources of information about the program

The key sources of information about the academic program in the Geology Department at the College of Science, University of Baghdad, include:

1. University Website:
   - The university's website provides comprehensive information about the available academic programs and the requirements for applying and enrolling in the College of Science, including Geology.
2. College Website:
   - The college's website contains detailed information about the Geology program, such as curriculum plans, requirements, and the courses offered.
3. Academic Program Handbook:
   - An academic program handbook for Geology is available, which contains detailed information about the curriculum, requirements, and academic opportunities.
4. Campus Visits:
   - Prospective students interested in enrolling in the Geology program can visit the campus and talk to department officials, faculty members, and current students to gather additional information.
5. Direct Communication:
   - Students can directly communicate with the department administration or academic advisors to request additional information and answer their queries.
6. Social Media Platforms:
   - The university or college's social media accounts may offer useful information and opinions from current students about the academic program.
7. Student Forums:
   - Students can explore online student forums to gain insights and opinions from past and current students about the Geology program.

11. Program Development Plan

Vision: To be a leading Geology department in geology education and research at the national and regional levels, and to contribute to graduating outstanding alumni who will play a role in advancing our society and understanding the natural world.

Goals:

1. Updating the Curriculum:
   - Review and update the curriculum to keep pace with scientific and technological developments in the field of geology.
   - Add new courses that reflect current challenges and needs in the field of geology.
2. Enhancing Practical Experiences:
   - Provide more opportunities for hands-on learning through field trips, workshops, and advanced laboratory experiments.
   - Invest in virtual reality and augmented reality technologies to enhance the learning experience.
3. Strengthening Scientific Research:
   - Provide financial support and resources for scientific research in various fields of geology.
   - Encourage faculty and students to participate in conferences and publish research in scientific journals.
4. Enhancing Industry Engagement:
   - Develop partnerships with private sector companies and institutions to provide training and employment opportunities for students.
   - Organize seminars and workshops in collaboration with industry to share knowledge and promote interaction.
5. Developing Personal and Social Skills:
   - Provide training programs aimed at developing personal skills such as leadership, communication, and problem-solving.

- Promote teamwork and social interaction through collaborative projects and cultural and social activities.

Proposed Actions:

1. Establish an Academic Development Committee responsible for implementing the plan and monitoring progress.
2. Form specialized working groups to update the curriculum and provide recommendations.
3. Provide continuous training for faculty on the latest teaching and research methods.
4. Launch marketing campaigns to attract talented and interested students to geology.

Offer academic support programs for students to enhance their academic success and help them achieve their career goals.

Program Skills Outline														
Year/ Level	Course Code	Course Name	Basic or optional	Required program Learning outcomes										
				Knowledge				Skills				Ethics		
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
UGIII / Semester 1	**GEO3519**	Micropaleontology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3520	Igneous Rocks	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3521	Geotectonic	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3522	Geophysics I (Gravity & Magnetic methods)	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3523	Stratigraphy	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3524	Sedimentary Rocks	Core	√	√	√	√	√	√	√	√	√	√	√	√
UGIII / Semester 2	**GEO3625**	Paleoecology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3626	Metamorphic Petrology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3627	Field Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3628	Geophysics II (Seismic & Electrical methods)	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3629	Geology of Iraq	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO3630	Research Methodology	Core	√	√	√	√	√	√	√	√	√	√	√	√
UGIV / Semester 1	**GEO4832**	Engineering Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4833	Subsurface Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4834	Geochemistry	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4835	Environmental Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4836	Economic Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4837	Graduation Project	Core	√	√	√	√	√	√	√	√	√	√	√	√
UGIV / Semester 2	**GEO4938**	Water Resources	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4939	Petroleum Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4940	Ore Geology	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4941	Environmental Pollution	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4942	Oil Exploration	Core	√	√	√	√	√	√	√	√	√	√	√	√
	GEO4943	Field Geology Course	Core	√	√	√	√	√	√	√	√	√	√	√	√
	-	Signal Processing	Selective	√	√	√	√	√	√	√	√	√	√	√	√
	-	Radiological Method	Selective	√	√	√	√	√	√	√	√	√	√	√	√

Micropaleontology – Third Stage / First Semester

1. Course Name:
Micropaleontology
2. Course Code:
GEO3519
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Yasamin Kh Ibrahim Email: yasamin.ibrahim@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	To give the student an idea about the diagnostic details of fossils that could not be studied without a microscope, in addition to their stratigraphical and paleoecological importance in the geological studies.

9. Teaching and Learning Strategies	
Strategy	1- Introductory lectures to give students a comprehensive overview of the subject matter 2- Covering the theoretical aspect by giving lectures or using modern technologies in presenting academic courses 3- Using microscopes and stereoscopes as means of teaching and clarification 4- Assigning students to solve assignments on specific topics and then discussing them during the lesson to demonstrate the extent of their familiarity with the acquired knowledge and so that they become capable of scientific research. 5- Assigning students to visit the library and websites to obtain academic knowledge of various geological sciences

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Preparation of Microfossils	Collecting and studying Microfossils	Theoretical explanation	Discussion
2	2	Small Foraminifera	Foraminifera: Introduction	=	=
3	2	Small Foraminifera:	Wall Structure, Chamber shape	=	=
4	2	foraminifera	chamber arrangement	=	=

			Apertures and openings, Pores,		
5	2	exam	exam		
6	2	Biological physical chemical	Foraminifera ecology	Theoretical explanation and practical application	=
7	2	Families fusulnidae	larger Foraminifera	=	=
8	2	Nummultidae	larger Foraminifera	=	=
9	2	Ostracoda: Introduction	Ostracoda	=	=
10	2	Ostracoda: Shape	Ostracoda:	=	=
11	2	Muscle scars	=	=	=
12	2	pores	=	=	=
13	2	Hingement	=	=	=
14	2	Ecology, and Adaptive morphology	=	=	=
15		Exam	Exam		
Practical Curriculum					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Small Foraminifera	Foraminifera: Introduction	Examine the slides under a microscope	=
2	2	Small Foraminifera: - Shape of the chambers. - Shape of the test	Wall Structure, Chamber shape and chamber arrangement	=	=
3	2	- Arrangement of chambers. - The apertures.	Apertures and openings, Pores, and.	=	=
4	2	Ornamentation and suture line	Ornamentation and suture line	Examine the slides under a microscope	Follow up on students' understanding and application correctly
5	2	Study of thin sections from different ages to distinguish families of larger Foraminifera.	larger Foraminifera	=	=
6	2	: Families Orbitoididae, Discocyclinidae, and Miogypsinidae	larger Foraminifera	=	=
7		Exam			exam
8	2	Ostracoda: - Shape.	Ostracoda: Introduction Outer	Examine the slides under a	Follow up on students'

		- Inner margin and outline.	lamella, Shape, outline	microscope	understanding and application correctly
9	2	Ostracoda: - Muscle scars	Ostracoda: - Muscle scars	=	=
10	2	Hingement	Studying Hingement of Ostrocoda shell	=	=
11	2	Ostrocoda shell ornamentation	Studying ornamentation and distinguishing between different types in practical application	=	=
12	2	Ostrocoda shell Orientation	Practical application of how to orientation the Ostrocoda shell	=	=
13	2	distinguish between the left and right valve of ostrocoda shell	Practical application of how to distinguish between the left and right valve of ostrocoda shell	=	=
14	2	Ecology, and Adaptive morphology	Ecology, and Adaptive morphology	=	=
15		Exam			exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

first midterm exam grade: 10
Second midterm exam grade: 10
Attendance and participation grade: 10
Reports 10
Final Practical exam 20
Final theoretical exam grade: 40

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Raup, D. and Stanley, S.; 1971; Principles of Paleontology
Main references (sources)	Brenchley, P. and Harper, D.; 2004; Palaeoecology
Recommended books and references (scientific journals, reports...)	-Moore, R.C. (ed.); 1961; Treatise on Invertebrate Paleontology, Pt.Q, Arthropoda -Van Morkhoven, P.; 1962; Post-Paleozoic ostracoda, Vol. 1. -Haq, B. and Boersma, A.; 1998; Introduction to Marine Micropaleontology, 2nd ed. -Armstrong, H. and Brasier, M.; 2005; Microfossils, 2nd ed.
Electronic References, Websites	https://education.nationalgeographic.org/resource/paleontology/

Igneous Rocks – Third Stage / First Semester

1. Course Name:
Igneous Rocks
2. Course Code:
GEO-3520
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Lec. Dr. Harith Esmaeel Mustaf Email: harith.aljubury@sc.uobaghdad.edu.iq **Name: Lec. Dr. Rana Abas Ali Email: Rana.Ali@sc.uobaghdad.edu.iq** **Name: Ass. Lec. Neaam Omar Farhan Email: neaam.o@sc.uobghdad.edu.iq**

8. Course Objectives	
Course Objectives	**Teaching the subject of Igneous Petrology, which aims to achieve several specific goals, including:** **1. Contributing to the process of scientific progress, raising the level of education, and providing the labor market with graduates to work in all fields of investing in the country's mineral and other geological applications.** **2. Training students on how to take field models and convert them into various applied products used in making various geological maps and analyses.** **3. Cooperating with state institutions to provide scientific consultations and conduct various tests to complete scientific research in all different geological fields.** **4. Conducting scientific research that serves the community in various geological fields**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.**

	5. **Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications.** 6. **Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively.** 7. **Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning.** 8. **Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Introduction to igneous petrology	Definition of terms and introduction	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	2	• Classification of acidic and intermediate igneous rocks	Diagnosing minerals and calculating their percentages in igneous rocks	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2	• Classification of mafic and ultramafic igneous rocks	Diagnosing minerals and calculating their percentages in igneous rocks	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2	• Forms of volcanic and subterranean igneous structures	Studying the forms of subterranean and volcanic igneous rocks appearing on the Earth's surface	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2	• Fabrics of plutonic igneous rocks	Studying the shapes, size, and distribution of mineral grains that make up rocks and the relationships between them	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2	• Theoretical and practical exam	Midterm Exam 1	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2	• Plutonic igneous rock textures	Studying the shapes, size, and distribution of mineral grains that make up rocks and the relationships between them	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	2	• Volcanic igneous rock textures	Studying the shapes, size, and distribution of mineral grains that make up rocks and the relationships between them	Theoretical explanation and practical application.	Practical Exam
9	2	• Chemical relationships of	Study of the chemical composition and behavior	Theoretical explanation and	Interactive participation +

		the minerals forming igneous rocks	of chemical elements with each other in magma and during the crystallization process of minerals	practical application.	Practical exercise
10	2	• Chemical relationships of the minerals forming igneous rocks	Study of the chemical composition and behavior of chemical elements with each other in magma and during the crystallization process of minerals	Theoretical explanation and practical application.	Interactive participation + Practical exercise
11	2	• Practical and theoretical exam	Midterm Exam 2	Theoretical explanation and practical application.	Interactive participation + Practical exercise
12	2	• Types of magma forming igneous rocks	The type of magma, whether it is underground or surface, represented by volcanoes	Theoretical explanation and practical application.	Interactive participation + Practical exercise
13	2	• Magma formation mechanism	How magma is formed and generated during geological time	Theoretical explanation and practical application.	Interactive participation + Practical exercise
14	2	• Tectonic effect of magma evolution	Studying the relationship of tectonic movements to the formation and development of magma	Theoretical explanation and practical application.	Interactive participation + Practical exercise
15	2	• Practical and theoretical exam	Midterm Exam 3	Theoretical explanation and practical application.	Practical Exam

11. Course Evaluation

- Attendance and participation grade: 10
- First midterm exam grade: 10
- Second midterm exam grade: 10
- Third midterm exam grade: 10
- Final practical exam grade: 20
- Final theoretical exam grade: 40

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	\
Main references (sources)	\
Recommended books and references (scientific journals, reports...)	\
Electronic References, Websites	1. 1. Essentials of Igneous and Metamorphic Petrology. 2. Principles of Igneous and Metamorphic Petrology Second Edition. 3. THE PETROLOGY OF THE IGNEOUS ROCKS.

Geotectonic – Third Stage / First Semester

1. Course Name:	
Geotectonic	
2. Course Code:	
GEO3521	
3. Semester / Year:	
Semester 1 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Dr. mahmood A. Salman alsaadi ASSIST. PROF. Dr. Thair Thamer Al-Samarrai	
8. Course Objectives	
Course Objectives	**1 - Basic knowledge of the principles of geotectonic** **2 - Identify the basic concepts and perceptions of the branches of earth science** **3- Introduction to the applied aspects of some basic concepts and their relationship to the formation of various structural phenomena, surface and subsurface.** **4- Explaining all the theories that explained the formation of all surface and subsurface structural phenomena of various kinds on Earth.** **5- Understanding the relationship of earth science and its connection to geotectonic and other branches of earth science**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies depend on a variety of methods and methods that aim to achieve educational goals effectively, including:** **1. Active learning: Encouraging students to actively participate in the learning process through practical activities such as group discussions, practical experiments, and research projects.** **2. Cooperative learning: Encouraging students to work together as a team to solve problems and complete tasks, which enhances social interaction, cooperation and communication skills.** **3. Self-learning: Empowering students to be responsible for their learning process by providing the resources and tools necessary for self-learning and motivating them to use them effectively** **4. Investigative learning: Encouraging students to actively explore topics and concepts through inquiry, self-research, and data collection, which enhances critical and creative thinking skills.** **5. Technological learning: Using technology in the learning process to provide diverse and stimulating learning experiences, including the use of multimedia and interactive applications.** **6. Continuous evaluation: Providing continuous feedback and evaluation of students'**

	performance to help them improve their performance and better achieve learning goals. **7. Blended learning: Integrating a variety of educational methods and means into the educational process, such as traditional lectures with practical activities and online learning.** **8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, and solving puzzles and interactive tasks.** **Employing these strategies appropriately can contribute to enhancing the learning experience and achieving maximum benefit for students in various educational contexts.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Define the geotectonic	Introduction to geotectonic	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	2	Study the Dynamic of earth	Dynamic of the earth	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2	• Understanding the types of views in ArcMap and how to switch between them. • Effectively using each type of view.	The continental drift theory	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2	• Understanding different selection methods in ArcMap and using them to select items efficiently.	Convection current theory	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2	• Understanding layer properties in ArcMap and how to customize and format them.	Sea floor spreading theory	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2	• Deepening understanding of layer properties and utilizing more options and customizations.	Paleomegnetism theory	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2	• Introduction to the layout view mode in ArcMap and creating map layouts for printing.	The magnetic of the earth and the pole of the earth	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	2	• Assessing students' understanding of concepts and skills acquired so far.	The reversal of paleomagnetism	Theoretical explanation and practical application.	Practical Exam
9	2	• Understanding and using attribute tables in ArcMap.	Midterm Exam	Theoretical explanation and practical application.	Interactive participation + Practical exercise
10	2	• Learning to use geoprocessing tools in ArcMap for analysis and processing.	Introduction of plate tectonic	Theoretical explanation and practical application.	Interactive participation + Practical exercise

11	**2**	• **Delving deeper into using geoprocessing tools for data analysis.**	**The zones of the earth**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**2**	• **Understanding and using the Model Builder tool to create repeatable models for geographic analysis.**	**Plate tectonic theory**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**2**	• **Learning to create raster data layers in ArcMap and customize them.**	**The earth quake**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
14	**2**	• **Understanding coordinate systems and how to apply and customize them in ArcMap.**	**Arabian plate tectonics**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
15	**2**	• **Evaluating students' understanding of new topics and their skills in applying them**	**Midterm Exam 2**	**Theoretical explanation and practical application.**	**Practical Exam**

11. Course Evaluation

- **- Degree of attendance and participation 5**
- **- First exam score 10**
- **- Second exam 10**
- **- Practical semester 15**
- **Final exam score: 20**
- **The final evaluation score is 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	\
Main references (sources)	\
Recommended books and references (scientific journals, reports...)	\
Electronic References, Websites	**Geotectonic and environmental** **https://desktop.arcgis.com/en/documentation/** **My Youtube Channel:** **https://youtube.com/playlist?list=PLjfG_oiqCXxpR0PtjwMa3WdpYCIF-92fv&si=9aK_qsLvs1xK7AXX**

Geophysics1 (Gravity & Magnetic methods) – Third Stage / First Semester

1. Course Name:
Geophysics 1 (Gravity & Magnetic methods)
2. Course Code:
GEO3522
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Assist. Prof. Dr. Najah Abd Email: najah.abd@sc.uobaghdad.edu.iq **Name: Lec. Dr. Osamah Saad Al-Saadi Email: osamah.sahib@sc.uobaghdad.edu.iq** **Name: Lec. Dr. Ban Salah Mustafa Email: ban.mustafa@sc.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	**Teaching the subject of Geophysical potential methods, which aims to achieve several specific goals, including:** **1. Contributing to the process of scientific progress, raising the level of education, and providing the labor market with graduates to work in all Geological fields of investing in the country's mineral and oil wealth and other geological applications.** **2. Training students on how to take field models and convert them into various applied products used in making various geological maps and analyses.** **3. Cooperating with state institutions to provide scientific consultations and conduct various tests to complete scientific research in all different geological and Geophysical fields.** **4. Conducting scientific research that serves the community in various geological fields.**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.**

	5. **Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications.** 6. **Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively.** 7. **Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning.** 8. **Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Definition of terms and introduction	Introduction to Geophysical methods	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	2	• Explain theory of gravitational	Principles of gravity method	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2	• Explanation of survey modes and data processing	Correction of gravity data	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2	• Diurnal correction explanation	First data correction	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2	• Application of diurnal correction	Gravity data corrections	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2	• Second correction: Elevation correction	Gravity data corrections	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2	• Latitude correction	Gravity data corrections	Theoretical explanation and practical application.	Practical Exam
8	2	• Mid-term exam	Mid-term exam	Theoretical explanation and practical application.	Interactive participation + Practical exercise
9	2	• Calculate total Bouguer gravity data	Total Bouguer values	Theoretical explanation and practical application.	Interactive participation + Practical exercise
10	2	• Interpretation of gravity data	Sphere shape case	Theoretical explanation and	Interactive participation +

				practical application.	**Practical exercise**
11	**2**	• **Interpretation of gravity data**	**Cylinder shape**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**2**	• **Regional-residual separation (Graphical method)**	**Gravity data separation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**2**	• **Analytical method of data separation**	**Gravity data separation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
14	**2**	• **Introduction to magnetic method**	**Magnetic method**	**Theoretical explanation and practical application.**	**Practical Exam**
15	**2**	• **Parameter explanation of the Magnetic method**	**Magnetic method**	**Theoretical explanation and practical application.**	**Practical Exam**

11. Course Evaluation

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Third midterm exam grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	\
Main references (sources)	**-Applied Geophysics, Telford, Geldhart, Sheriff and Keys, Cambridge University Press.** **--An Introduction to Applied and Environmental Geophysics, Reynolds 2011, 2nd Ed., Wiley Blackwell.** **Fundamentals of Geophysics, William Lowrie 2007, 2nd Ed., Cambridge University Press.**
Recommended books and references (scientific journals, reports...)	\
Electronic References, Websites	1. **https://seg.org/resources/** 2. **https://geologyscience.com/geology-branches/geophysical-methods**

Stratigraphy – Third Stage / First Semester

1. Course Name:
Stratigraphy
2. Course Code:
GEO3523
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Aiad Ali Hussien Email: aiad.hussien@sc.uobaghdad.edu.iq **Name: Lec. Shatha Fathi Email: @sc.uobaghdad.edu.iq**

8. Course Objectives	
Course Objectives	**Teaching the subject of stratigraphy, which aims to achieve several specific goals, including:** **1. Contributing to the process of scientific progress, raising the level of education, and providing the labor market with graduates to work in all fields of investing in the country's mineral and oil wealth and other geological applications.** **2. Training students on how to take field models and convert them into various applied products used in making various geological maps and analyses.** **3. Cooperating with state institutions to provide scientific consultations and conduct various tests to complete scientific research in all different geological fields.** **4. Conducting scientific research that serves the community in various geological fields**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.** **5. Technological learning: Utilizing technology in the learning process to provide**

	diverse and stimulating educational experiences, including the use of multimedia and interactive applications. **6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively.** **7. Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning.** **8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Definition of terms and introduction	Introduction to stratigraphy	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	2	• Classification categories	Stratigraphy classification	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2	• Types of rock units and their properties (learn the scientific method for describing them and the method of writing the name of the rock units)	Lithostratigraphic units	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2	• Comparing and matching rock units and their usefulness locally and regionally	Lithostratigraphic correlation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2	• • Types of biostratigraphic units, their pronunciation, and properties (learning the scientific method for describing them and writing their names)	Biostratigraphic units	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2	• Biostratigraphy and Graph correlation	Biostratigraphic correlation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2	• Theoretical and practical exam	Midterm Exam 1	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	2	• Types of time units and their properties (learn the scientific method in describing them and writing their names)	Chronostratigraphic units	Theoretical explanation and practical application.	Practical Exam

9	**2**	• **Comparing and matching chronostratigraphy units and their usefulness spatially and regionally**	**Chronostratigraphic correlation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
10	**2**	• **Determine the changes and stratigraphic relationships vertically and laterally**	**Stratigraphic relationships**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
11	**2**	• **Practical and theoretical exam**	**Midterm Exam 2**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**2**	• **The effect of the advance and retreat of the sea on stratigraphic sequences**	**Transgression and regression**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**2**	• **Tectonic/stratigraphic relationships during geological time**	**tectonostratigraphy**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
14	**2**	• **Applying the principles of stratigraphy in Iraq's geological sequences**	**Applied stratigraphy in geology of Iraq**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
15	**2**	• **Practical and theoretical exam**	**Midterm Exam 3**	**Theoretical explanation and practical application.**	**Practical Exam**

11. Course Evaluation

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Third midterm exam grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	\
Main references (sources)	\
Recommended books and references (scientific journals, reports...)	\
Electronic References, Websites	**1. North American Commission on Stratigraphic Nomenclature (NORTH AMERICAN STRATIGRAPHIC CODE)** **2. Principles of stratigraphy (Faroq S. Al-Omari)** **3. Principles of sequence stratigraphy (Octavian Catuneanu)**

Sedimentology – Third Stage / First Semester

1. Course Name:
Sedimentology
2. Course Code:
GEO3524
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Lec Dr. Hasan Kattoof Jasim Email: Abdullah.i@sc.uobaghdad.edu.iq **Name: Assit Prof Dr. Maysoon Omer Ali Email: maysoon.ali@sc.uobaghdad.edu.iq** **Name: Lec Dr. HibaSadoon Mohsen Email: hiba. mimmar@uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	**1. Sedimentology aims to identify the types of loose sediments, how they are formed, the way they are transported, and the places and environments in which they deposition.** **2. Introducing the importance of sedimentology, which is the link between earth science and all natural, medical and engineering sciences, agricultural and pure sciences** **3. Training in identifying and diagnosing the types of sediments of sediment, chemical and organic** **4. Training on the skills of dealing with different types of sediment and mastering how to study its physical and chemical properties** **5. Mastering the most important applications needed by all engineering scientific disciplines and pure sciences that deal with sediment of all kinds and its industrial and engineering applications.**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and**

	concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills. 5. Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications. 6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively. 7. Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning. 8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks. Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.

10. Course Structure

Theoretical Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Introduction in sedimentology • Types of Sediments • Nature of sediments	Introduction to Sedimentology – How are sediment formed	Theoretical explanation and practical application.	Interactive participation
2	2	• Field geology techniques for sediments • Methods of sediment collection from field	Field Technique and Collection of Samples	Theoretical explanation and practical application.	Interactive participation
3	2	• Types of sediments • Clastic sediments • Chemical sediment • Organic sediments	Types of sediment , clastic, chemical , organic and their main properties	Theoretical explanation and practical application.	Interactive participation
4	2	• Sedimentary environments • Continental environments • Transitional Environments • Marine environments	Sedimentary Environments	Theoretical explanation and practical application.	Interactive participation
5	2	• Processes of sediment formation • Weathering • Methods of sediment transportation	The physical processes of sediments, especially the methods of transport and sedimentation	Theoretical explanation and practical application.	Interactive participation

6	**2**	• **Texture of sediment** • **Grain size analysis** • **Grain shape** • **sorting**	**Texture of Sediments (Grain size , Shape, and Sorting of Sediments)**	**Theoretical explanation and practical application.**	**Interactive participation**
7	**2**	• **Grain size technique measurements** • **Direct measurement** • **Sieving** • **Grain size analysis fro thin section**	**Main Technique of Grain Size**	**Theoretical explanation and practical application.**	**Interactive participation**
8	**2**	• **Middle Theoretical Examination**	**Mid Theoretical Examination**	**Theoretical explanation and practical application.**	**Practical Exam**
9	**2**	• **Grain shape** • **How to determine shape of sediment** • **Form** • **Roundness** • **Sphericity**	**Shape of Sediments**	**Theoretical explanation and practical application.**	**Interactive participation**
10	**2**	• **Stability of sediment** • **Maturity of sediment**	**Stability and Maturity of Sediments**	**Theoretical explanation and practical application.**	**Interactive participation**
11	**2**	• **Dust storms** • **Components of dust storm** • **Classification of dust storms** • **How to analyze dust storms**	**Dust Storms**	**Theoretical explanation and practical application.**	**Interactive participation**
12	**2**	• **Method of mineral separation** • **Hand separation** • **Heavy liquids** • **Froth floatation** • **Magnatic separation**	**Main Technique of Mineral Separation**	**Theoretical explanation and practical application.**	**Interactive participation**
13	**2**	• **Sedimentary Structures** • **Inorganic sedimentary tructures** • **Organic sedimentary structures**	**Sedimentary Structures**	**Theoretical explanation and practical application.**	**Interactive participation**
14	**2**	• **Application of sedimentlogy** • **Factory separation of sediment** • **Industrial uses of sediments**	**Application of Sedimentology**	**Theoretical explanation and practical application.**	**Interactive participation**

15	**2**	**Final Theoretical Examination**	**Final Theoretical Examination**	**Final Theoretical Examination.**	**Final Theoretical Exam**
Practical Structure					
1	**2**	**Introduction to Sedimentology – How are sediment formed**	**Introduction to Sedimentology – How are sediment formed**	**Practical and experiment application.**	**Lab work and Homework**
2	**2**	**Data Presentation**	**Data Presentation**	**Practical and experiment application.**	**Lab work and Homework**
3	**2**	**Grain Size Analysis of sediment**	**Techniques of Grain Size Analysis of sediment**	**Practical and experiment application.**	**Lab work and Homework**
4	**2**	**Grain Size Analysis of mixture of sediment**	**sieving Analysis of mixture of sedimnt**	**Practical and experiment application.**	**Lab work and Homework**
5	**2**	**Grain Size Analysis of gravels**	**Size Analysis of gravels by vierner**	**Practical and experiment application.**	**Lab work and Homework**
6	**2**	**Grain Size Analysis of sand**	**Sieving Analysis of sand**	**Practical and experiment application.**	**Lab work and Homework**
7	**2**	**Grain Size Analysis of mud**	**Size Analysis of mud fraction by pipette**	**Practical and experiment application.**	**Lab work and Homework**
8	**2**	**Mid Theoretical Examination**	**Mid Theoretical Examination**	**Middle practical Examination.**	**Middle practical Examination**
9	**2**	**Shape Analysis of Gravels**	**Shape Analysis of Gravels by vierner**	**Practical and experiment application.**	**Lab work and Homework**
10	**2**	**Shape Analysis of Sand**	**Shape Analysis of Sand from thin section**	**Practical and experiment application.**	**Lab work and Homework**
11	**2**	**Heavy Mineral Analysis**	**Separation and identify the Heavy Mineral**	**Practical and experiment application.**	**Lab work and Homework**
12	**2**	**Sediment Identification Methods**	**Hand and microscopic ientification**	**Practical and experiment application.**	**Lab work and Homework**
13	**2**	**Sedimentological Section**	**How to drawing the sedimentological section**	**Practical and experiment application.**	**Lab work and Homework**
14	**2**	**Clay mineralogy**	**Clay mineral**	**Practical and experiment**	**Lab work and Homework**

			identification	application.	
15	2	Final Practical Examination	Final Practical Examination	Final Theoretical Examination.	Final Theoretical Examination

11. Course Evaluation

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Project grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Selly, 2000, Applied sedimentology**
Main references (sources)	**Folk, 1974, Petrology of Sedimentary Rocks**
Recommended books and references (scientific journals, reports...)	**Boggs, 2001, Sedimentology and Stratigraphy**
Electronic References, Websites	**www.Sedimentology.com**

Sedimentary Rocks – Third Stage / Second Semester

1. Course Name:	
Sedimentary Rocks	
2. Course Code:	
GEO3524	
3. Semester / Year:	
Semester 2 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Lec Dr. Hasan Kattoof Jasim Name: Lec Dr. Safa Adeeb Salih	Email: Abdullah.i@sc.uobaghdad.edu.iq Email : Safa.adeeb@sc.uobaghdad.edu.iq
8. Course Objectives	
Course Objectives	1. Sedimentary rocks aims to identify the types of loose sediments, how they are formed, the way they are transported, and the places and environments in which they deposition. 2. Introducing the importance of sedimentary rocks , which is the link between earth science and all natural, medical and engineering sciences, agricultural and pure sciences 3. Training on the skill of studying and diagnosing sedimentary rocks during field work, as most parts of Iraq are covered by sedimentary rocks or loose sediments After solidification of the sediments, sedimentary rocks will be formed, which are considered one of the important materials in nature, as they form most parts of the outer part of the earth's crust.
9. Teaching and Learning Strategies	
Strategy	Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including: 1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects. 2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills. 3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively. 4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing

	critical and creative thinking skills. 5. Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications. 6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively. 7. Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning. 8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks. Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.

10. Course Structure

Theoretical Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Introduction to sedimentary rocks	Introduction to Sedimentary Rocks	Theoretical explanation and application.	Interactive participation
2	2	• Classification of sedimentary rocks	Classification of sedimentary rocks	Theoretical explanation and application.	Interactive participation
3	2	• Clastic sedimentary rocks • Texture of sedimentary rocks • Mineralogical composition of sedimentary rocks	Clastic Sedimentary Rocks	Theoretical explanation and application.	Interactive participation
4	2	• Conglomerate and breccia rocks • Components of conglomerate rocks • Classification of conglomerate rocks	Conglomerate and Breccia	Theoretical explanation and application.	Interactive participation
5	2	• Sandstone • Components of sandstone • Sedimentary environments of sandstones	Sandstone	Theoretical explanation and application.	Interactive participation
6	2	• Classification of sandstone • Folk classification • Pettijohn classification	Classification of Sandstone	Theoretical explanation and application.	Interactive participation

7	**2**	• **Mudstone** • **Claystone** • **Clay minerals**	**Mudstone and Claystone**	**Theoretical explanation and application.**	**Interactive participation**
8	**2**	• **Middle Theoretical examination**	**Mid Theoretical Examination**	**Mid Theoretical Examination.**	**Mid Theoretical Examination**
9	**2**	• **Carbonate sedimentary rocks** • **Components of carbonate sedimentary rocks** • **Mineralogical composition of carbonate sedimentary rocks**	**Carbonate Sedimentary Rocks**	**Theoretical explanation and application.**	**Interactive participation + exercise**
10	**2**	• **Classification of carbonate sedimentary rocks** • **Dunham classification**	**Classification of Carbonate Sedimentary Rocks**	**Theoretical explanation and application.**	**Interactive participation + exercise**
11	**2**	• **Chemical sedimentary rocks** • **Groups of chemical sedimentary rocks** • **Mineralogical composition of chemical sedimentary rocks**	**Chemical Sedimentary Rocks**	**Theoretical explanation and application.**	**Interactive participation + exercise**
12	**2**	• **Sedimentary environments of chemical sedimentary rocks**	**Sedimentary Environments of Sedimentary Rocks**	**Theoretical explanation and application.**	**Interactive participation + exercise**
13	**2**	• **Standard facies of sedimentary rocks**	**Facies analysis of carbonate sedimentary rocks**	**Theoretical explanation and application.**	**Interactive participation + exercise**
14	**2**	• **Sedimentary rocks in Iraq** • **Important** • **Applications**	**Sedimentary Rocks in Iraq**	**Theoretical explanation and application.**	**Interactive participation + exercise**
15	**2**	**Final theoretical examination**	**Final Theoretical Examination**	**Final Theoretical Examination.**	**Final Theoretical Examination**
Practical Structure					

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Introduction to Practical sedimentary rocks	Introduction to Practical Sedimentary Rocks	Practical explanation and application.	Interactive participation Lab work and Homework
2	2	Classification of Sedimentary Rocks	Study the main principle of sedimentary rocks classification	Practical explanation and application.	Interactive participation Lab work and Homework
3	2	Rock Forming Mineral of Sedimentary Rocks	Study the main rock forming minerals of sedimentary rocks	Practical explanation and application.	Interactive participation Lab work and Homework
4	2	Clastic Sedimentary Rocks • Types • Textures • Mineral Composition	Determine the main types of Groups, Textures, and mineral Composition of clastic rocks ١	Practical explanation and application.	Interactive participation Lab work and Homework
5	2	• Conglomerate and Breecia • Types • Texture • Mineral Components	How to study the conglomerate and breccia	Practical explanation and application.	Interactive participation Lab work and Homework
6	2	Sandstone • Texture of Sandstones • Mineral Composition	Determine the textural and mineralogical components of sandstone	Practical explanation and application.	Interactive participation Lab work and Homework
7	2	Diagenesis Processes in Clastic Sedimentary Rocks	Explain the main types of diagenesis processes and how to determine it	Practical explanation and application.	Interactive participation Lab work and Homework
8	2	Middle Practical Examination	Middle Practical examination	Middle Practical examination	Middle Practical examination
9	2	Porosity in Sedimentary Rocks	How to determine the main types of porosity	Practical explanation and application.	Interactive participation Lab work and Homework
10	2	Chemical sedimentary rocks • Textures • Mineralogical Composition	Study the principle of textures and minerals of chemical sedimentary rocks	Practical explanation and application.	Interactive participation Lab work and Homework

11	**2**	**Groups of chemical Sedimentary Rocks**	**Study the of groups of chemical sedimentary rocks**	**Practical explanation and application.**	**Interactive participation Lab work and Homework**
12	**2**	**Carbonate sedimentary rocks Texture Mineralogical Composition**	**How to study and determine the textures and mineral composition of carbonate rocks**	**Practical explanation and application.**	**Interactive participation Lab work and Homework**
13	**2**	**Classification of carbonate sedimentary rocks**	**The main principles of carbonate sedimentary rocks classification**	**Practical explanation and application.**	**Interactive participation Lab work and Homework**
14	**2**	**Diagenesis processes of carbonate sedimentary rocks**	**How to determine the main types of diageesis processes of carbonate rocks**	**Practical explanation and application.**	**Interactive participation Lab work and Homework**
15	**2**	**Final practical examination**	**Final practical examination**	**Final practical examination**	**Final practical examination**

11. Course Evaluation

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Project grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Pettijohn, 1975, sedimentary rocks**
Main references (sources)	**Folk, 1974, Petrology of Sedimentary Rocks**
Recommended books and references (scientific journals, reports...)	**Boggs, 2001, Sedimentology and Stratigraphy**
Electronic References, Websites	**www.Sedimentary Petrology.com**

Paleoecology – Third Stage / Second Semester

1. Course Name:
Paleoecology
2. Course Code:
GEO3625
3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Yasamin Kh Ibrahim Email: yasamin.ibrahim@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	To teach the students the fundamentals of paleoecology and how to utilize fossils, their preservation, growth, evolution and population structures in describing paleoecology and paleogeography.

9. Teaching and Learning Strategies	
Strategy	- Extracting information for each course from several sources, such as methodological books, field trips, scientific references, and the Internet, in addition to benefiting from the professors' experiences during and even after the end of the lectures through the professors' office hours. - Developing students' intellectual skills by bringing real applied geological problems to the laboratory and urging students how to think appliedly in solving them and simulating them practically.

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Kind of organisms	Preservation and the Fossil Record:	Theoretical explanation	Discussion
2	2	Types of growth	Ontogenetic variation	=	=
3	2	Preservation of vertebrate and plants	taphonomy	=	=
4	2	Individual variation with populations	Population as a unit	=	=
5	2	The species	Origin of species	=	=
6	Exam		exam		

7	2	Models of evolution	Evolution and fossils recordr	=	=
8	2	Types of evolution	=	=	=
9	2	Terrestrial ecosystem	ecosystem	=	=
10	2	Marine ecosystum	=	=	=
11	2	Learn life habit	Life habit	=	=
12	2	Limiting factors	Distribution of population	=	=
13	2	Distribution of population	Fossil communities	=	=
14	2	Distribution of population	Reef organic communities	=	=
15		exam	exam		
Practical Curriculum					
Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Lab1: Mode of depositional marine environment and the application of paleoecology in geological study	How to differentiate paleo- environments	Preparing laboratory reports, practical application	Discussing and correcting reports after each laboratory
2	2	Lab2 : Identification of Pale environment by using fossils	Distribution of fossils in paleoenvironment	=	=
3	2	Lab3: Classification of Pale environment units by utilizing fossils	How to determined the Pale environment units by using fossils	=	=
4	2	Lab4: Conclusion distance of reef beds from ancient shoreline by using different types of reefs	Using different type of coral to determine the distance of seashore	=	=
5		Lab5: Evidence of animal activity, in conclusion, the Pale environment	Studying and identification the types of trace fossils		
6	2	Lab6: Conclusion The Pale environment by using Pale ichnology	How to concluded the paleoenvironment by using the types of trace fossils	Preparing laboratory reports, practical application	Discussing and correcting reports after each laboratory
7	2	Lab7 : The Paleoecology changed in Quaternary period by using pollen and spore	identification in Quaternary period by using pollen and spore and the effect that in paleoenvironment changed	=	=
8	2	Lab8 : Midterm Exam	Exam	=	=
9	2	Lab9 : The type and shape of evolution and extinction	Evolution and diversity	=	=

10	**2**	**Lab10: Applied the type of evolution by using the figures**	**Evolution and the Fossil Record**	**=**	**=**
11	**2**	**Lab11: Sketch the type of evolution and extinction in Lituolidae families**	**evolution and extinction in Lituolidae families**	**=**	**=**
12	**2**	**Lab12 : Sketch the distribution of the evolution line in Lituolidae families**	**distribution of the evolution line in Lituolidae families**	**=**	**=**
13	**2**	**Lab13 : Sketch the tree of evolution and extinction in graptolite**	**evolution and extinction in graptolite**	**=**	**=**
14	**2**	**Lab14 : Draw the evolution trend for graptolite**	**evolution trend for graptolite**	**=**	**=**
15		**Exam**	**Exam**		

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
first midterm exam grade: 10
Second midterm exam grade: 10
Attendance and participation grade: 10
Reports 10
Final Practical exam 20
Final theoretical exam grade: 40

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Brenchley, P. and Harper, D.; 2004; Palaeoecology.**
Main references (sources)	**Ager, D.; 1963; Principles of Paleoecolgy.** **1989 . العامري . اساسيات البيـه القديمه** **.**
Recommended books and references (scientific journals, reports...)	**Brenchley, P. and Harper, D.; 2006; Palaeoecology**
Electronic References, Websites	**https://www.amazon.com/Principles-Paleoecology-Introduction-Animals-Plants/dp/1258398850**

Metamorphic Rocks – Third Stage / First Semester

1. Course Name:
Metamorphic Petrology
2. Course Code:
GEO3626
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Lec. Dr. Harith Esmaeel Mustaf Email: harith.aljubury@sc.uobaghdad.edu.iq **Name: Lec. Dr. Rana Abas Ali Email: Rana.Ali@sc.uobaghdad.edu.iq** **Name: Ass. Lec. Neaam Omar Farhan Email: neaam.o@sc.uobghdad.edu.iq**

8. Course Objectives	
Course Objectives	**Teaching the subject of metamorphic Petrology, which aims to achieve several specific goals, including:** **1. Contributing to the process of scientific progress, raising the level of education, and providing the labor market with graduates to work in all fields of investing in the country's mineral and other geological applications.** **2. Training students on how to take field models and convert them into various applied products used in making various geological maps and analyses.** **3. Cooperating with state institutions to provide scientific consultations and conduct various tests to complete scientific research in all different geological fields.** **4. Conducting scientific research that serves the community in various geological fields**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.**

	5. **Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications.** 6. **Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively.** 7. **Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning.** 8. **Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Introduction to metamorphic petrology	Definition of terms and introduction	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	2	• Classification of metamorphic rocks on the basis of mineralogy	Diagnosing minerals and calculating their percentages that make up metamorphic rocks	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2	• Classification of metamorphic rocks on the basis of texture	Identifying minerals and studying the textural relationships that bind minerals	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2	• Forms of metamorphic structures	Studying the forms of metamorphic rocks appearing on the Earth's surface	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2	• Texture of metamorphic rocks	Studying the shapes, size, and distribution of mineral grains that make up rocks and the relationships between them	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2	• Theoretical and practical exam	Midterm Exam 1	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2	• Texture of metamorphic rocks	Studying the shapes, size, and distribution of mineral grains that make up rocks and the relationships between them	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	2	• Metamorphic conditions	The change in the conditions that make up the original rocks, including	Theoretical explanation and practical application.	Practical Exam

			temperature, pressure, and the time required for transformation		
9	**2**	• **Metamorphic Facies**	**Studying the relationships between the factors causing the metamorphism of heat and pressure and how they combine**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
10	**2**	• **Metamorphic Facies**	**Studying the relationships between the factors causing the metamorphism of heat and pressure and how they combine**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
11	**2**	• **Practical and theoretical exam**	**Midterm Exam 2**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**2**	• **Chemical relationships of the minerals that make up metamorphic rocks**	**Study of the chemical composition and behavior of chemical elements with each other under changing basic conditions for the formation of metals, such as heat and pressure**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**2**	• **Chemical relationships of the minerals that make up metamorphic rocks**	**Study of the chemical composition and behavior of chemical elements with each other under changing basic conditions for the formation of metals, such as heat and pressure**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
14	**2**	• **Tectonic effect on metamorphic rocks**	**Studying the relationship of tectonic movements to the formation and development of metamorphic rocks**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
15	**2**	• **Practical and theoretical exam**	**Midterm Exam 3**	**Theoretical explanation and practical**	**Practical Exam**

				application.	

11. Course Evaluation

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Third midterm exam grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	\
Main references (sources)	\
Recommended books and references (scientific journals, reports...)	\
Electronic References, Websites	**1. Essentials of Igneous and Metamorphic Petrology.** **2. Principles of Metamorphic Petrology Second Edition.** **3. METAMORPHIC ROCKS AND THEIR GEODYNAMIC SIGNIFICANCE.**

Field Geology – Third Stage / Second Semester

1. Course Name:	
Field Geology	
2. Course Code:	
GEO3627	
3. Semester / Year:	
Semester 2 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Prof. Dr. Thair Thamer Iltayif Email: thair.t@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	**Understanding the basics of field geology and linking field geology as far as common topics are concerned, which are mainly represented by field observations of all geological phenomena (structural and geomorphological), knowing how to measure the direction and inclination of the ground layers because they are considered very necessary for every geological student and are considered the foundation of the field, and knowing the site stabilization and drawing the geological map and geological section.**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.** **5. Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications.** **6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively.**

	7. **Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning.** 8. **Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	•	Principle of field geology	Theoretical explanation and video.	Theoretical examination
2	2	•	Tooles and observations of field geology	Theoretical explanation and video.	Theoretical examination
3	2	•	Rock and fossils sampling	Theoretical explanation and video.	Theoretical examination
4	2	•	Orientations of map and methods of drawing geological map	Theoretical explanation and video.	Theoretical examination
5	2	•	Geological map contnu..	Theoretical explanation and video.	Theoretical examination
6	2	•	Bruntun compass and its uses	Theoretical explanation and video.	Theoretical examination
7	2	•	Bearing, strike, and dip by Bruntun compass	Theoretical explanation and video.	Theoretical examination
8	2	•	Silva compass and its uses	Theoretical explanation and video.	Theoretical examination
9	2	•	Bearing, strike, and dip by Silva compass	Theoretical explanation and video.	Theoretical examination
10	2	•	Abne level	Theoretical explanation and video.	Theoretical examination
11	2	•	The clinometer	Theoretical explanation and video.	Theoretical examination
12	2	•	Geological traverse	Theoretical explanation and video.	Theoretical examination
13	2	•	Geological cross section	Theoretical explanation and video.	Theoretical examination
14	2	•	Sequence stratigraphy	Theoretical explanation and video.	Theoretical examination
15	2		Methods of true thickness calculate	Theoretical explanation and video.	Theoretical examination

Practical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2		Lab1: Bearing: quadrant and azimuth	Theoretical explanation and video.	Theoretical examination
2	2		Lab2: Reverse bearing	Theoretical explanation and video.	Theoretical examination
3	2		Lab3: Point location by	Theoretical explanation	Theoretical

			reverse bearing intersection with known linear feature	and video.	examination
4	2		Lab4: Point location by intersection of reverse bearing lines from index point	Theoretical explanation and video.	Theoretical examination
5	2		Lab5: Point location by Bearing and pacing method in flat area	Theoretical explanation and video.	Theoretical examination
6	2		Lab6: Point location by pacing method in uniformly inclined area	Theoretical explanation and video.	Theoretical examination
7	2		Lab7: Point location by intersection of reverse bearing line with contour lines.	Theoretical explanation and video.	Theoretical examination
8	2		Lab8: Brunton compass: parts of compass and setting	Theoretical explanation and video.	Theoretical examination
9	2		Lab9: Brunton compass :uses of Brunton compass	Theoretical explanation and video.	Theoretical examination
10	2		Lab10: Silva compass: parts of silva compass	Theoretical explanation and video.	Theoretical examination
11	2		Lab11: Silva compass: uses of silva compass for bearing, dip & Strike, pitch angle	Theoretical explanation and video.	Theoretical examination
12	2		Lab12: Abney level: parts and slope angle measurement	Theoretical explanation and video.	Theoretical examination
13	2		Lab13: hand level: parts and uses.	Theoretical explanation and video.	Theoretical examination
14	2		Lab14: Drawing Geological cross section	Theoretical explanation and video.	Theoretical examination
15	2		Lab15: Drawing stratigraphic section	Theoretical explanation and video.	Theoretical examination

11. Course Evaluation

- **Attendance and participation grade: 5**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Practical grade: 15**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Theoretical Curriculum in field geology** **Manual of Field Geology**
Main references (sources)	**Fundamentals of Geology**
Recommended books and references (scientific journals, reports...)	**-Geological Field Techniques**
Electronic References, Websites	

Geophysics 2 (Seismic & Electrical methods) – Third Stage / Second Semester

1. Course Name:
Geophysics 2 (Seismic & Electrical methods)
2. Course Code:
GEO3628
3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Names: Lect. Dr. Ban Salah Mustafa Emails: ban.Mustafa@sc.uobaghdad.edu.iq **Lect. Dr. Osamah Saad Al-Saadi Osamah.Sahib@sc.uobaghdad.edu.iq** **Lect. Dr. Lamees Nazar lamees.nazar@sc.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	**-The goal of studying geophysics 2 is to identify two important geophysical methods, which are Seismic and the electrical resistivity methods, which are mostly used in exploratory geophysical investigations of structures near, medium, and deep from the Earth's surface.** **-The course also explains the principles of these methods in detail, the applications of each method, the importance of using them in geophysical exploration, as well as the most important field seismic and electrical survey methods, the most important advantages and disadvantages of each method, the quality of the results obtained from it, and the methods of quantitative and qualitative interpretation of those results to give a picture of the subsurface geological structures.**

9. Teaching and Learning Strategies

Strategy	

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Determined and calculate the parts of seismic waves. applications on Snell's law	Seismic method	Theoretical explanation and practical application	Interactive participation + Practical exercise
2	2	Calculation the Elastic constants & seismic velocity	Elastic moduli	Theoretical explanation and practical application	Interactive participation + Practical exercise

3	**2**	**Refraction method /Time - distance curve**	**Interpretations of the Refraction method**	**Theoretical explanation and practical application**	
4	**2**	**Refraction method /Two horizontal layers**	**Interpretations of the Refraction method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
5		**Refraction method / Three horizontal layers &Dipping layer**	**Interpretations of the Refraction method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
6	**2**	**Reflection method / Time - distance curve. Calculate Acoustic impedance, Reflection coefficient & Transmission coefficient**	**Interpretations of the Reflection method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
7		**Mid-Term-Seismic method Exam**			
8	**2**	**Ohm's law and Calculation of Apparent resistivity**	**Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
9	**2**	**Quantitative interpretation of 1D VES curve**	**1D Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
10	**2**	**Two-layers Field curve example of 1D VES resistivity curve**	**1D Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
11	**2**	**Three-layers complete curve matching**	**1D Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
12	**2**	**Second Field curve example of Three-layers complete curve matching**	**1D Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
13	**2**	**Three-layers Partial curve matching**	**1D Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
14	**2**	**Qualitative Interpretation of 2D resistivity field profile**	**2D Electric Resistivity method**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
15	**2**	**2ND Mid-Term-Electric Resistivity Exam**	**EXAM**	**Theoretical explanation and practical application**	**Interactive participation + Practical exercise**
11. Course Evaluation					

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Lab-Work Evaluation: 10**
- **Final practical exam grade: 40**

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	**Fundamentals of Geophysics, William Lowrie 2007, 2nd Ed., Cambridge University Press.** **An Introduction to Applied and Environmental Geophysics, Reynolds 2011, 2nd Ed., Wiley-Blackwell**
Main references (sources)	**Applied Geophysics, Telford, Geldhart, Sheriff and Keys, Cambridge University Press**
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	**1- https://geologyscience.com/geology-branches/geophysical-methods/** **2- https://seg.org/resources/**

Geology of Iraq – Third Stage / Second Semester

1. Course Name:	
Geology of Iraq	
2. Course Code:	
GEO3629	
3. Semester / Year:	
Semester 2 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Aiad Ali Hussien	**Email: aiad.hussien@sc.uobaghdad.edu.iq**
Name: Lec. Shatha Fathi	**Email: shatha.hassan@sc.uobaghdad.edu.iq**
8. Course Objectives	
Course Objectives	**Teaching the subject of stratigraphy, which aims to achieve several specific goals, including:** **1. Contributing to the process of scientific progress, raising the level of education, and providing the labor market with graduates to work in all fields of the country's oil investment and aviation industry.** **2: Training students on how to take field models and convert them into applied products used in making geological maps.** **3: Training the student in the most important way to know the history or age of earth's layers that carry fossils in their belly, the relationship of the layers to each other, and the relationship of the plants and animals that lived in them. This science also studies the sedimentary layers of Iraq, and relies on all of them in geological dating, and determining the exact age of the rocks, thus enabling us to describe the sequence of eras that passed on the Earth, and the development of plants and animals that occurred during them.**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing**

	critical and creative thinking skills. 5. Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications. 6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively. 7. Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning. 8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks. Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	• Introduction to the Geology of Iraq	Introduction to the Geology of Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	2	• Tectonic classification of Iraq	Tectonic classification of Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2	• stratigraphic units of the Paleozoic era in Iraq	stratigraphic units of the Paleozoic era in Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2	• Correlation of the rock units for Paleozoic period	Correlation of the rock units for Paleozoic period	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2	• stratigraphic Units of the Triassic and Jurassic Periods in Iraq	stratigraphic Units of the Triassic and Jurassic Periods in Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2	• Midterm Exam 1	Midterm Exam 1	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2	• stratigraphic units of the Cretaceous period in Iraq	stratigraphic units of the Cretaceous period in Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	2	• Comparison of Mesozoic sedimentary basins	Comparison of Mesozoic sedimentary basins	Theoretical explanation and practical application.	Practical Exam
9	2	• stratigraphic Units of the Paleogene Age in Iraq	stratigraphic Units of the Paleogene Age in Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise

10	**2**	• **Stratigraphic relationships between the Mesozoic Age and the Paleogene**	**Stratigraphic relationships between the Mesozoic Age and the Paleogene**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
11	**2**	• **Midterm Exam 2**	**Midterm Exam 2**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**2**	• **Neogen Age stratigraphic Units in Iraq**	**Neogen Age stratigraphic Units in Iraq**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**2**	• **stratigraphic tectonics relationships of the Cenozoic era (Tertiary)**	**stratigraphic tectonics relationships of the Cenozoic era (Tertiary)**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
14	**2**	• **Quaternary sediments and rock units in Iraq**	**Quaternary sediments and rock units in Iraq**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
15	**2**	• **End of Semester Test**	**End of Semester Test**	**Theoretical explanation and practical application.**	**Practical Exam**

11. Course Evaluation

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Third midterm exam grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	\
Main references (sources)	\
Recommended books and references (scientific journals, reports...)	\
Electronic References, Websites	**1. Geology of Iraq (Jassim and Goff, 2006)** **2. Lexique Stratigraphique International Asie, Iraq. (Bellen et al., 1959)** **3. Regional geology of Iraq (Buday, 1980)** **4. Petroleum geology of Iraq (2010)**

Research methodology – Third Stage / First Semester

1. Course Name
Research methodology
2. Course Code:
GEO3630
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Hours / 1 Unit
7. Course administrator's name (mention all, if more than one name)
Name: Lamees Nazar Abdulkareem Email: lamees.nazar@sc.uobaghdad.edu.iq

8. Course Objectives	
Course Objectives	1.Basic knowledge of concepts that need research 2- Identifying the methods of preparing scientific research 3- Applying the studied concepts to prepare a mini-research

9. Teaching and Learning Strategies	
Strategy	Extracting information for each course from several sources, such as methodical books, scientific references, and the Internet, in addition to benefiting from the professors' experiences during and even after the end of the lectures during the professors' office hours.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1		Research methodology	Theoretical	Questions with discussion	
2		The research problem	Theoretical	Questions with discussion	
3		The review of literature	Theoretical	Questions with discussion	
4		The research approach	Theoretical	Questions with discussion	
5		Preparation of report	Theoretical	Questions with discussion	
6		Writing your introduction	Theoretical	Questions with discussion	

7		**What is the Difference Between Thesis and Research Paper**	**Theoretical**	**Questions with discussion**	
8		**-What is a Thesis**	**Theoretical**	**Questions with discussion**	
9		**Writing mini research project**		**Questions with discussion**	
10		**Writing mini research project**		**Questions with discussion**	
11		**Writing mini research project**		**Questions with discussion**	
12		**Writing mini research project**		**Questions with discussion**	
13		**Writing mini research project**		**Questions with discussion**	
14		**Writing mini research project**		**discussion**	
15				**Final test**	

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Research methodology Methods and techniques C.R.Kothari**
Main references (sources)	
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	**Collecting research from different specializations to read and benefit from how to write scientific research**

1. Course Name:	
Engineering Geology	
2. Course Code:	
GEO4832	
3. Semester / Year:	
Semester 1 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist. Prof. Dr. Thair Thamer Iltayif Email: thair.t@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	Understanding the basics of engineering geology and linking geology to engineering as far as common topics are concerned, which are mainly represented by engineering geotechnical examinations and analyzes of ground materials, namely soil and rocks, to reveal the locations of engineering facilities through analysis and interpretation of the results obtained from those examinations and even some results measured from the field.
9. Teaching and Learning Strategies	
Strategy	Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including: 1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects. 2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills. 3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively. 4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills. 5. Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications. 6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively. 7. Blended learning: Integrating a variety of teaching methods and resources in the

	educational process, such as traditional lectures with hands-on activities and online learning. **8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	•	Engineering Geology – general notes Engineering problems – references	Theoretical explanation and video.	Theoretical examination
2	2	•	Soil Analysis, particle size analysis grading curves analysis. Atterberg limits	Theoretical explanation and video.	Theoretical examination
3	2	•	Casagrande Plasticity Chart, Casagrande Classification of Soil	Theoretical explanation and video.	Theoretical examination
4	2	•	Determination of Atterberg Limits (LL and PL). flow curve	Theoretical explanation and video.	Theoretical examination
5	2	•	Compaction, consolidation. Triaxialtest , and Mohr Diagram , Ø and c .	Theoretical explanation and video.	Theoretical examination
6	2	•	Static elastic moduli : mod. of compression, true mod. of elasticity. Tangent modulus. Secant modulus.	Theoretical explanation and video.	Theoretical examination
7	2	•	Dynamic Moduli of Elasticity : Young's Modulas Ed , Poission's Ratio *V*d , Shear ModulasGd .	Theoretical explanation and video.	Theoretical examination
8	2	•	Uniaxial compression test, tensile strength test, point load test, shear box test.	Theoretical explanation and video.	Theoretical examination
9	2	•	Pressure in Earth Masses Boussinesq and Westergaard Methods	Theoretical explanation and video.	Theoretical examination
10	2	•	2:1 Method. andNewmark's Chart.	Theoretical explanation and video.	Theoretical examination
11	2	•	Dams: types, materials, cross-sections, site selection	Theoretical explanation and video.	Theoretical examination
12	2	•	Slope stability: Modes of failure , Conditions for Sliding (plane and wedge) , Toppling and Rockfall	Theoretical explanation and video.	Theoretical examination
13	2	•	Tunnels: terminology, factors	Theoretical	Theoretical

			affecting stability of tunnels	explanation and video.	examination
14	2	•	Construction materials: Aggregates, cement, alkali reactions	Theoretical explanation and video.	Theoretical examination
15	2		Roads – layers of road, road prism	Theoretical explanation and video.	Theoretical examination
Practical Curriculum					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2		Lab1: Physical properties of soil. Density, specific gravity, moisture content	Theoretical explanation and video.	Theoretical examination
2	2		Lab2: Three weights case: (Dry, Saturated and submerged weights)	Theoretical explanation and video.	Theoretical examination
3	2		Lab3: Soil classification : A. Grading curves and classification of coarse soil	Theoretical explanation and video.	Theoretical examination
4	2		Lab4: Soil classification : B. Plasticity Chart And Classification of Fine Soil	Theoretical explanation and video.	Theoretical examination
5	2		Lab5: Determination of liquid limit (LL) and plastic limit (PL) of fine soil .	Theoretical explanation and video.	Theoretical examination
6	2		Lab6: AASHTO Soil Classification System	Theoretical explanation and video.	Theoretical examination
7	2		Lab7: Pressure in Earth Masses: 1) Boussinseq and Westergaurds Methods 2 : 1 Method	Theoretical explanation and video.	Theoretical examination
8	2		Lab8: Pressure in Earth Masses: Newmark's Chart method	Theoretical explanation and video.	Theoretical examination
9	2		Lab9: Modulus of Elasticity and Poisson's ratio	Theoretical explanation and video.	Theoretical examination
10	2		Lab10: Effective stress on soil	Theoretical explanation and video.	Theoretical examination
11	2		Lab11: Trixial compression test for rock / Brittle rock	Theoretical explanation and video.	Theoretical examination
12	2		Lab12: Trixial compression test for rock / Ductile rock	Theoretical explanation and video.	Theoretical examination
13	2		Lab13: Classification system of discontinuities of rock	Theoretical explanation and video.	Theoretical examination

14	**2**		**Lab14: Force acting on dams**	**Theoretical explanation and video.**	**Theoretical examination**
15	**2**		**Lab15: Rock Slope Stability Analysis by Stereographic projection**	**Theoretical explanation and video.**	**Theoretical examination**

11. Course Evaluation

- **Attendance and participation grade: 5**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Practical grade: 15**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Theoretical Curriculum in engineering geology**
Main references (sources)	**Johnson , R.B. , and De Graff , J.V. , 1988 , Principles of Engineering .1 .Geology , John Wiley and Sons , New York . 497P** **Krynine , D.P. , and Judd , W.R. , 1957 , Principles of Engineering Geology .2 .and Geotechnics , McGraw Hill Book Company , New York , 780P**
Recommended books and references (scientific journals, reports...)	**-Engineering Geology 2022**
Electronic References, Websites	

Subsurface Geology – Fourth Stage / First Semester

1. Course Name:	
Subsurface Geology	
2. Course Code:	
GEO4833	
3. Semester / Year:	
Semester 1 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist.Prof.Dr. Buraq Adnan Hussein Email: buraq.hussein@sc.uobaghdad.edu.iq Name: Dr.Thamer Abdulah Mahdi Email: thamer.mahdi@sc.uobaghdad.edu.iq Name: Dr. Rasha Fawzi Faisal rasha.faisal@sc.uobaghdad.edu.iq	
8. Course Objectives	
Course Objectives	Subsurface geology is linked different branches of geological sciences that can be applied to petroleum exploration. This module offers students the basic understanding of geological mapping principles, and techniques, in addition to well logs analysis. It presents the different methods of subsurface geologic mapping, including subsurface maps and cross sections, and different types of well logs and their applications in stratigraphy and structural geology of the oilfields. During the module, students learn principles and techniques for subsurface geologic interpretation through inquiry-based, hands-on activities using typical oil fields data.
9. Teaching and Learning Strategies	
Strategy	Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including: 1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects. 2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills. 3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively. 4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills. 5. Technological learning: Utilizing technology in the learning process to provide diverse

	and stimulating educational experiences, including the use of multimedia and interactive applications. 6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively. 7. Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning. 8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks. Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Types of subsurface geologic data	Subsurface geologic data	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	4	Types of drilling wells	Drilling wells	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	4	Interpretation of Subsurface structural and thickness maps	Subsurface structural and thickness maps	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	4	Types of facies maps	Facies maps	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	4	Types of subsurface geologic cross sections	Subsurface geologic cross sections	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	4	Explain the basic concepts of well logs	Basics of well logging	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	4	Understanding the gamma ray log and its applications	Gamma ray log	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	4	Evaluating students' understanding of new topics and their skills in applying them	Midterm Exam 1	Theoretical explanation and practical application.	Theoretical and Practical Exam
9	4	Understanding the sp log and its applications	SP log	Theoretical explanation and practical application.	Interactive participation + Practical exercise

10	**4**	**Understanding the Neutron log and its applications**	**Neutron log**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
11	**4**	**Understanding the Density log and its applications**	**Density log**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**4**	**Understanding the Sonic log and its applications**	**Sonic log**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**4**	**Understanding the Resistivity log and its applications**	**Resistivity logs**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
14	**4**	**Explain the Sw calculation and well logs interpretation**	**Sw calculation and well logs interpretation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
15	**4**	**Evaluating students' understanding of new topics and their skills in applying them**	**Midterm Exam 2**	**Theoretical explanation and practical application.**	**Theoretical and Practical Exam**
Practical Curriculum					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**4**	**Drilling wells data management**	**Drilling wells data management**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
2	**4**	**Structural maps interpretation**	**Structural maps interpretation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
3	**4**	**Thickness maps interpretation**	**Thickness maps interpretation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
4	**4**	**Facies maps interpretation**	**Facies maps interpretation**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
5	**4**	**Interpretation of combined structural maps**	**Interpretation of combined structural maps**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
6	**4**	**Subsurface geologic cross sections**	**Subsurface geologic cross sections**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
7	**4**	**Well logs correlation**	**Well logs correlation**	**Theoretical explanation and practical**	**Interactive participation + Practical**

				application.	exercise
8	4	Evaluating students' understanding of new topics and their skills in applying them	Midterm Exam 1	Theoretical explanation and practical application.	Theoretical and Practical Exam
9	4	Drilling time log	Drilling time log	Theoretical explanation and practical application.	Interactive participation + Practical exercise
10	4	Vshale calculation-Gamma ray log	Vshale calculation-Gamma ray log	Theoretical explanation and practical application.	Interactive participation + Practical exercise
11	4	Vshale calculation-SP log	Vshale calculation-SP log	Theoretical explanation and practical application.	Interactive participation + Practical exercise
12	4	Caliper log interpretation	Caliper log interpretation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
13	4	Porosity logs measurements	Porosity logs measurements	Theoretical explanation and practical application.	Interactive participation + Practical exercise
14	4	Qualitative well log interpretation and Lithology assessment	Qualitative well log interpretation-Lithology	Theoretical explanation and practical application.	Interactive participation + Practical exercise
15	4	Evaluating students' understanding of new topics and their skills in applying them	Midterm Exam 1	Theoretical explanation and practical application.	Theoretical and Practical Exam

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports.

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Project grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**Basic well logs Analysis for Geologists. 2004** **Tearpock and Bischke (2002),Applied Subsurface Geological Mapping**
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Geochemistry – Fourth Stage / First Semester

1. Course Name:
Geochemistry
2. Course Code:
GEO4834
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Assistant Professor Dr. Firas Mudhafar Abdulhussein (Theoretical + practical) Email: firas.mudhafar@sc.uobaghdad.edu.iq Name: Dr. Rana Abbas Ali (practical) Email: rana.ali@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	1. Students acquire basic skills that will develop their cognitive and intellectual level. 2. Cooperating with state departments to provide scientific consultations and conduct various tests to complete scientific research in all different geological fields. 3. Contributing to the process of scientific progress, raising the level of education, and providing the labor market with graduates to work in all fields of investing in the country's mineral and oil wealth and other geological applications. 4. Conducting scientific research that serves the community in various geological fields. 5. Training students on how to take field models and convert them into various applied products used in making various geological maps and analyses. 6. Basic knowledge of the principles of geochemistry and its branches. 7. Identify the concepts of the origin of chemical elements and their universal abundance. 8. Identify the geochemistry of igneous, metamorphic, and sedimentary rocks. 9. Identify the geochemical cycle of elements. 10. Understanding the geochemistry of the current Earth with its different atmospheres and regions. 11. Familiarity with the applied aspects of some basic concepts of geochemistry and their industrial applications.

9. Teaching and Learning Strategies	
Strategy	Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:

	1.Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects. **2.Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3.Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4.Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.** **5.Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive applications.** **6.Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively.** **7.Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning.** **8.Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks.** **Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.**

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Uses the tools of chemistry to understand processes on Earth	Introduction of Geochemistry	Theoretical + practical	General questions, reports and discussion
2	2	The quantification of the elements	Sampling and Analysis methods	Theoretical + practical	General questions, reports and discussion
3	2	Universe & The Solar System	Origin &Development of the Solid Earth	Theoretical + practical	General questions, reports and discussion
4	2	Earth's Compositional Layers	Earth's Spheres & Earth's Interior	Theoretical + practical	General questions, reports and discussion
5	2	Meteorites Classification	Meteorites	Theoretical + practical	General questions, reports and discussion
6	2	The geochemical properties of the elements	Geochemical classification of the elements	Theoretical + practical	General questions, reports and discussion
7	2	Chemical Weathering processes	Chemical Weathering	Theoretical + practical	General questions, reports and discussion
8	2	Midterm Exam 1	Midterm Exam 1	Theoretical	Theoretical

				Exam 1	Exam 1
9	2	A measure of the nature of the ion towards water	Ionic potential	Theoretical + practical	General questions, reports and discussion
10	2	Relationship between Oxidation potential (Eh) and (pH)	Geochemical Fence	Theoretical + practical	General questions, reports and discussion
11	2	Colloidal solutions	Colloids and Colloidal Processes	Theoretical + practical	General questions, reports and discussion
12	2	Distribution of rare elements	Trace elements	Theoretical + practical	General questions, reports and discussion
13	2	The importance of clay minerals	Clay Minerals	Theoretical + practical	General questions, reports and discussion
14	2	Water quality	Hydrogeochemistry	Theoretical + practical	General questions, reports and discussion
15	2	Exam 2	Exam 2	Theoretical Exam 2	Theoretical Exam 2
Practical Curriculum					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Soil, river and rock modeling surveys	Geochemical modeling	Smart board and poster	Practical exam and class effectiveness
2	2	Parts per million, percentage and molarity	Units	Smart board and poster	=
3	2	Calculating concentrations of major and trace elements	Atomic absorption spectrometer	Smart board and poster	=
4	2	Calculating the validity and accuracy of the analyses	Correctness and accuracy	Smart board and poster	=
5	2	Calculate the chemical formula of metals	Calculate the chemical formula	Smart board and poster	=
6	2	Calculating undissolved minerals	Undissolved waste	Smart board and poster	=
7	2	Calculate the percentage of minerals	Calculate XRD charts	Smart board and poster	=
8	2	Calculate and set water quality	Calculate the hydrochemical formula	Smart board and poster	=
9	2	Determine water quality using the STF chart	Stv chart	Smart board and poster	=
10	2	Determine the total dissolved salts and the	TDS, EC, PH and T	Smart board and poster	=

		electrical and acid			
11	**2**	**conductivity of the aqueous solution**	**TDS, EC, PH and T**	**Smart board and poster**	**=**
12	**2**	**Determine water quality using a Piper chart**	**Piper chart**	**Smart board and poster**	**=**
13	**2**	**Determine the default total salts and water type**	**Virtual salts**	**Smart board and poster**	**=**
14	**2**	**Classification of calcium and magnesium ions in the aqueous model**	**Know the type of water**	**Smart board and poster**	**=**
15	**2**	**Calculate the chemical transformation index and the chemical weathering index**	**CIA and CIW**	**Smart board and poster**	**=**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
The score of the first monthly exam is 20
- The score of the second monthly exam is 20
- Cues and attendance score 5
- Practical exam score 15
Quest score 40
The final practical exam score is 20
The final semester exam score is 40

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**Mason, B, (1958): Principles of geochemistry. Third edition. John Wiley & Sons. New York.329P.** **Boyd, C.E., (2015): Water Quality. An Introduction Second. Kluwer Acad. Publisher, USA, 427 P.** **Drever, J.I.,(1997): The Geochemistry of Natural Water, Surface and Groundwater Environments, 3rd edition, Prentice Hall, USA, 436p**
Recommended books and references (scientific journals, reports...)	**GEMS/WATER OPERATIONAL GUIDE (1992):** **National water research institute, CANADA Centre for Inland waters, BURLINGTON, ONTARIO.** **Boyd CE, Clay J (1998): Shrimp aquaculture and the environment. Sci Am 278:42–49** **Boyd CE, Tucker CS (2014): Handbook for aquaculture water quality. Craft master, Auburn**
Electronic References, Websites	

Environmental Geology – Fourth Stage / First Semester

1. Course Name:
Environmental Geology
2. Course Code:
GEO4835
3. Semester / Year:
Semester 1 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Enaam Jumaa Abdullah Email: anam.g@sc.uobaghdad.edu.iq Name : Dr. Hind Fadhil (practical) hind.abdullah1108@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	1-Knowledge and Understanding: Upon completing the Environmental Geology module, students will demonstrate a comprehensive knowledge and understanding of Earth's dynamic systems and their interactions with the environment. They will be able to explain the key geological processes that shape the Earth's surface, analyze the formation and behavior of natural hazards, and assess the impacts of human activities on the environment. Students will also have a solid understanding of the principles and techniques used in geotechnical investigations, hazard assessment, and environmental conservation. 2-Analytical Skills: Students will develop strong analytical skills through the Environmental Geology module. They will be able to critically analyze geological data, interpret maps, diagrams, and satellite imagery to assess environmental risks and hazards. Students will demonstrate proficiency in applying scientific principles to evaluate the impacts of geological processes on the environment and make informed decisions regarding resource management and hazard mitigation. They will also develop the ability to identify and propose solutions for environmental challenges based on a thorough understanding of geological concepts. 3-Communication and Collaboration: The module aims to enhance students' communication and collaboration skills within the context of environmental geology. Students will learn how to effectively communicate complex geological concepts, hazard assessments, and conservation strategies to diverse audiences, both orally and in written form. They will also develop the ability to work collaboratively in interdisciplinary teams, engaging with professionals from various fields to address environmental challenges. Through group projects, presentations, and discussions, students will refine their communication and collaboration skills, preparing them for real-world applications of environmental geology in professional settings.

9. Teaching and Learning Strategies

Strategy	1- Integrated Field Studies: One strategy employed in Environmental Geology is the integration of field studies into the curriculum. Field studies provide students with hands-on experiences to observe and analyze geological features and processes in their natural environment. Students may visit geological sites, such as coastlines, river valleys, or areas affected by natural hazards, to apply their theoretical knowledge and develop practical skills in data collection, geological mapping, and sample analysis. This strategy allows students to deepen their understanding of geological concepts and their relevance to environmental issues, fostering a direct connection between theory and real-world applications. 2- Hazard Mapping and Risk Assessment: Environmental Geology incorporates strategies for hazard mapping and risk assessment to evaluate and mitigate environmental risks. Students learn to identify and map areas prone to natural hazards such as earthquakes, landslides, or floods using geological and geospatial data. They develop skills in analyzing geological structures, topography, and historical hazard events to assess the potential impacts on human populations and infrastructure. By applying quantitative risk assessment methodologies, students can prioritize areas for hazard mitigation measures, including land-use planning, engineering solutions, and emergency preparedness strategies. 3- Collaboration and Interdisciplinary Approach: Environmental Geology encourages collaboration and an interdisciplinary approach to address complex environmental challenges. Students work collaboratively with professionals from various fields, such as environmental science, engineering, and policy-making, to develop comprehensive solutions. This strategy promotes the exchange of ideas, diverse perspectives, and integration of different expertise to tackle environmental issues holistically. By engaging in group projects, discussions, and presentations, students enhance their communication, teamwork, and problem-solving skills, preparing them for multidisciplinary work environments where collaboration is essential for effective environmental management.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction	Basics of environmental geology	Theoretical	General questions, reports and discussion
2	4	Earthquake	Environmental causes and effects, methods of protection and environmental treatments	Theoretical	General questions, reports and discussion
3	4	Volcanoes	Environmental causes and effects, methods of protection and environmental treatments	Theoretical	General questions, reports and discussion
4	4	Floods	Environmental causes and effects, methods of protection and environmental treatments	Theoretical	General questions, reports and discussion
5	4	Coastal operations	Geological processes that threaten coastal areas, identifying and treating them	Theoretical	General questions, reports and discussion
6	4	Coastal and riverine environments	Geological processes that threaten coastal areas, identifying and treating them	Theoretical	General questions, reports and discussion
7	4	Landslides	The impact of landslides on the environment and methods of protection	Theoretical	General questions, reports and discussion

8	4	Operations in desert areas	Reasons for the increase in dry areas and treatment methods	Theoretical	General questions, reports and discussion
9	4	Desertification	Human causes of desertification and ways to reduce them	Theoretical	General questions, reports and discussion
10	4	Climate change	Climate change factors and its impact on the environment, reasoning about it, and simulating the phenomenon in the future	Theoretical	General questions, reports and discussion
11	4	Natural sources/water, rocks and minerals	Use of natural resources and their environmental impacts	Theoretical	General questions, reports and discussion
12	4	Renewable energy/fossil fuels	The use of fossil fuels and their environmental pollution	Theoretical	General questions, reports and discussion
13	4	Renewable energy/nuclear energy	The use of sustainable nuclear energy, its applications and environmental impacts	Theoretical	General questions, reports and discussion
14	4	Renewable energy/solar energy	The use of sustainable solar energy, its applications and environmental impacts		
15	4	Environmental Laws	definitions		discussion

Practical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Introduction	Basics of environmental geology	practical	Exercises , reports and discussion
2	4	Earthquake	Environmental causes and effects, methods of protection and environmental treatments	practical	Exercises , reports and discussion
3	4	Volcanoes	Environmental causes and effects, methods of protection and environmental treatments	practical	Exercises , reports and discussion
4	4	Floods	Environmental causes and effects, methods of protection and environmental treatments	practical	Exercises , reports and discussion
5	4	Coastal operations	Geological processes that threaten coastal areas, identifying and treating them	practical	Exercises , reports and discussion
6	4	Coastal and riverine environments	Geological processes that threaten coastal areas, identifying and treating them	practical	Exercises , reports and discussion
7	4	Landslides	The impact of landslides on the environment and	practical	Exercises , reports and discussion

			methods of protection		
8	4	Operations in desert areas	Reasons for the increase in dry areas and treatment methods	practical	Exercises , reports and discussion
9	4	Desertification	Human causes of desertification and ways to reduce them	practical	Exercises , reports and discussion
10	4	Climate change	Climate change factors and its impact on the environment, reasoning about it, and simulating the phenomenon in the future	practical	Exercises , reports and discussion
11	4	Natural sources/water, rocks and minerals	Use of natural resources and their environmental impacts	practical	Exercises , reports and discussion
12	4	Renewable energy/fossil fuels	The use of fossil fuels and their environmental pollution	practical	Exercises , reports and discussion
13	4	Renewable energy/nuclear energy	The use of sustainable nuclear energy, its applications and environmental impacts	practical	Exercises , reports and discussion
14	4	Renewable energy/solar energy	The use of sustainable solar energy, its applications and environmental impacts	practical	Exercises , reports and discussion
15	4	Environmental Laws	definitions		discussion

11. Course Evaluation

The score of the first monthly exam is 20
- The score of the second monthly exam is 20
- Cues and attendance score 5
- Practical exam score 15
Quest score 40
The final practical exam score is 20
The final semester exam score is 40

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**Environmental geology (Montgomery, 2006)**
Main references (sources)	**Environmental geology (Montgomery, 2006)**
Recommended books and references (scientific journals, reports...)	**Environmental Geology/ Handbook of Field Methods and Case Studies (Klaus et al., 2007)**
Electronic References, Websites	**https://www.googleadservices.com/** **https://www.aegweb.org/environmental-geology** **https://www.sciencedirect.com/topics/earth-and-planetary-sciences/environmental-geology**

1. Course Name:
Water Resources
2. Course Code:
GEO4938
3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: prof .Dr Qusai Al-Kubaisi **Dr. Iman Ahmed Al-Ali** **Dr. Momammed H.Nasir** **Email: iman.ali@sc.uobaghdad.edu.iq**

8. Course Objectives	
Course Objectives	1. Contributing to developing the student's skills in recognizing and calculating the amount of water resources coming to Iraq, their most important sources, and ways to preserve them. 2. Studying the climatic factors affecting water resources, as well as determining the water budget from water surplus and water deficit. 3. Training the student on the most important methods for determining water hydrochemistry and classifying the type of water and its water composition to determine its suitability for different purposes. 4. Train students to identify the quantities of water that have infiltrated the ground as groundwater and calculate its value. 5. Train the student to determine the general direction of groundwater movement by drawing a flow network map. 6. Determine the hydraulic properties of wells using the Jacob and Theiss methods....
9. Teaching and Learning Strategies	
Strategy	1. Fieldwork and practical experience: Fieldwork is an essential component of hydrology. Engage students in field trips or field exercises where they can observe and analyze pumping tests, measure climatic parameters to plot the relationship between them and show temporal variation over time, interpret water parameters, and collect samples. Practical experience allows students to develop observational skills, make connections between theoretical concepts and real-life examples, and enhance their understanding - course-specific skills 2. Acquire the ability and skills necessary to determine the management of water resources, whether surface or groundwater, and the main factors affecting them. 3. Acquire the skill of calculating the water budget and classifying water types. 4. Creating a generation capable of dealing wisely with water resources as the primary source of life

and recognizing the most important factors affecting water scarcity.

5. Identify the basic principles of water resources management in Iraq.
6. Teaching and learning methods

We introduce the student to the basic principles of water resources through:

- Mainly focusing on the use of various analytical methods and scientific techniques, they collect and analyze data to help solve water-related problems such as environmental conservation, natural disasters, and water management.
- Introducing the student to the types of hydrology, such as surface water hydrology, groundwater hydrology (water geology), and marine hydrology. Areas of hydrology include hydrometeorology, surface hydrology, hydrogeology, drainage basin management, and water quality.
- Familiarize the student with the determinants of water quality and the chemical, physical, and biological properties of water based on the criteria for its use. It is most often used in reference to a set of criteria against which compliance, generally achieved through water treatment, can be assessed. The most common criteria used to monitor and evaluate water quality convey the health of ecosystems, safety of human contact, extent of water pollution, and condition of drinking water. Water quality has a major impact on water supplies and often determines supply options.
- Identify current environmental laws and determine specific uses for water bodies. In some countries, these designations allow some water pollution as long as the specific type of pollution does not harm the specific uses. Due to landscape changes (e.g., land development, urbanization, logging in forest areas) in watersheds of many freshwater bodies, returning to original conditions will be a major challenge. In these cases, ecologists focus on achieving the goals of maintaining healthy ecosystems and draw a hydrograph to explain the impact of the natural state on water resource management

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2 hours	1. Acquire the ability and skills necessary to determine the management of water resources, whether surface or groundwater, and the main factors affecting them. 2. Acquire the skill of calculating the water budget and classifying water types. 3. Creating a generation capable of dealing wisely with water resources as the primary source of life and recognizing the most important factors affecting water scarcity. 4. Identify the basic principles of water	Hydrological Cycle	2 hours	
2	2 hours		Climate and weather	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	2 hours		Precipitation and Relative Humidity	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	2 hours		Temperature, Evaporation, Wind Speed	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	2 hours		River discharge and Flow rating Curve	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	2 hours		Hydrograph, Exam	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	2 hours		siminar	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	2 hours		Infiltration and percolation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
9	2 hours		Midterm Exam	Theoretical explanation and practical application.	Interactive participation + Practical exercise

10	2 hours	resources management in Iraq. 5. Training students to identify the quantities of water that have infiltrated the ground as groundwater and calculate its value. 6. Train the student to determine the general direction of groundwater movement by drawing a flow network map. 7. Determine the hydraulic properties of wells using the Jacob and Theiss methods.	Groundwater and Physical properties	Theoretical explanation and practical application.	Interactive participation + Practical exercise
11	2 hours		Groundwater movement and Flow net	Theoretical explanation and practical application.	Interactive participation + Practical exercise
12	2 hours		Types of Aquifers	Theoretical explanation and practical application.	Interactive participation + Practical exercise
13	2 hours		Pumping Test (Theiss method)	Theoretical explanation and practical application.	Interactive participation + Practical exercise
14	2 hours		Pumping test Jacob method	Theoretical explanation and practical application.	Interactive participation + Practical exercise
15	2 hours		Final Exam	Theoretical explanation and practical application.	Interactive participation + Practical exercise

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	Engineering hydrology by Wilson Groundwater hydrology by Todd Hydrology by Davies and Dewiest
Main references (sources)	
Recommended books and references (scientific journals, reports...)	Water Resources
Electronic References, Websites	http://www.sepmstrata.org/page.aspx?pageid=229

Petroleum Geology – Fourth Stage / Second Semester

1. Course Name:	
Petroleum geology	
2. Course Code:	
GEO4939	
3. Semester / Year:	
Semester 2 / 2024 - 2025	
4. Description Preparation Date:	
1 / 9 / 2024	
5. Available Attendance Forms:	
Theoretical and Practical Attendance	
6. Number of Credit Hours (Total) / Number of Units (Total)	
4 Hours / 3 Units	
7. Course administrator's name (mention all, if more than one name)	
Name: Assist.Prof.Dr. Buraq Adnan Hussein Email: buraq.hussein@sc.uobaghdad.edu.iq **Name: Dr. Thamer Abdullah Mahdi Email: thamer.mahdi@sc.uobaghdad.edu.iq** **Name: Dr. Rasha Fawzi Faisal rasha.faisal@sc.uobaghdad.edu.iq**	
8. Course Objectives	
Course Objectives	**This module is designed to describe the different elements and processes that constitute the petroleum system. The module presents the origin, types and characteristics of source rocks and hydrocarbons. It contains the reservoir rocks and their petrophysical properties. The hydrocarbon migration and traps are also included in this module. Main oil fields in Iraq and selected case study will be presented, as well. Tha laboratory work includes the methods of calculation different petrophysical properties of rocks by using well logs. During the module, students learn principles and techniques to differentiate between source, reservoir, and seal rocks through inquiry-based, hands-on activities using typical oil fields data.**
9. Teaching and Learning Strategies	
Strategy	**Teaching and learning strategies rely on a variety of methods and approaches aimed at effectively achieving educational objectives, including:** **1. Active learning: Encouraging students to actively engage in the learning process through activities such as group discussions, hands-on experiments, and research projects.** **2. Cooperative learning: Promoting students to work together as a team to solve problems and accomplish tasks, fostering social interaction, collaboration, and communication skills.** **3. Self-directed learning: Empowering students to take responsibility for their learning process by providing the necessary resources and tools for self-directed learning and motivating them to use them effectively.** **4. Inquiry-based learning: Encouraging students to actively explore topics and concepts through inquiry, self-directed research, and data collection, enhancing critical and creative thinking skills.** **5. Technological learning: Utilizing technology in the learning process to provide diverse and stimulating educational experiences, including the use of multimedia and interactive**

	applications. 6. Continuous assessment: Providing feedback and ongoing assessment of student performance to help them improve their performance and achieve learning objectives more effectively. 7. Blended learning: Integrating a variety of teaching methods and resources in the educational process, such as traditional lectures with hands-on activities and online learning. 8. Promoting interaction: Encouraging students to actively participate in the lesson through asking questions, discussions, solving puzzles, and interactive tasks. Employing these strategies appropriately can enhance the learning experience and maximize student benefits in various educational contexts.

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Origin and generation of oil	Origin and generation of oil	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	4	Stages of thermal maturation	Thermal maturation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	4	Types of petroleum components	Petroleum components	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	4	Hydrocarbons migration mechanism	Hydrocarbons migration	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	4	Explain the properties of sandstone reservoirs	Sandstone reservoirs	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	4	Explain the properties of carbonate reservoirs	Carbonate reservoirs	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	4	Distribution of fluid in the reservoir and types of cap rocks	Reservoir hydrodynamics and seal	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	4	Evaluating students' understanding of new topics and their skills in applying them	Midterm Exam 1	Theoretical explanation and practical application.	Theoretical and Practical Exam
9	4	Explain the elements of traps and classification	Basics of Hydrocarbon traps	Theoretical explanation and practical application.	Interactive participation + Practical exercise
10	4	Explain the types of structural traps	Structural traps	Theoretical explanation and practical application.	Interactive participation + Practical exercise

11	4	Explain the types of Stratigraphic traps	Stratigraphic traps	Theoretical explanation and practical application.	Interactive participation + Practical exercise
12	4	Explain the Hydrodynamic and combination traps traps	Hydrodynamic and combination traps	Theoretical explanation and practical application.	Interactive participation + Practical exercise
13	4	Understanding of oil exploration methods	Oil exploration methods	Theoretical explanation and practical application.	Interactive participation + Practical exercise
14	4	Understanding of distribution of Iraqi oil field	Petroleum systems of Iraq	Theoretical explanation and practical application.	Interactive participation + Practical exercise
15	4	Evaluating students' understanding of new topics and their skills in applying them	Midterm Exam 2	Theoretical explanation and practical application.	Theoretical and Practical Exam
Practical Curriculum					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	4	source rock evaluation-1	source rock assessment-1	Theoretical explanation and practical application.	Interactive participation + Practical exercise
2	4	source rock evaluation-2	source rock assessment-2	Theoretical explanation and practical application.	Interactive participation + Practical exercise
3	4	Kerogen type assessment	Kerogen type evaluation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
4	4	Organic matter evaluation	Organic matter evaluation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
5	4	Reservoir lithology determination from porosity logs	Reservoir lithology determination	Theoretical explanation and practical application.	Interactive participation + Practical exercise
6	4	Total porosity calculation	Total porosity determination	Theoretical explanation and practical application.	Interactive participation + Practical exercise
7	4	Water saturation calculation	Water saturation calculation	Theoretical explanation and practical application.	Interactive participation + Practical exercise
8	4	Evaluating students' understanding of new topics and their skills in applying them			
	Midterm Exam 1	Theoretical explanation and practical application.	Practical Exam		

9	**4**	**Porosity-permeability cross plot**	**Porosity-permeability Application**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
10	**4**	**Reservoir temperature calculation**	**Reservoir temperature determination**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
11	**4**	**Reservoir hydrodynamics**	**Reservoir hydrodynamics and fluids**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
12	**4**	**oil water contact determination**	**OWC**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**
13	**4**	**Gas oil contact determination**	**GOC**	**Theoretical explanation and practical application.**	**Interactive participation + Practical exercise**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports

- **Attendance and participation grade: 10**
- **First midterm exam grade: 10**
- **Second midterm exam grade: 10**
- **Project grade: 10**
- **Final practical exam grade: 20**
- **Final theoretical exam grade: 40**

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	**Selley and Sonnenberg, 2014. Elements of Petroleum Geology**
Recommended books and references (scientific journals, reports...)	
Electronic References, Websites	

Ore Geology – Fourth Stage / Second Semester

1. Course Name:
Ore Geology
2. Course Code:
GEO-4940
3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Enaam Jumaa Abdullah **Email: anam.g@sc.uobaghdad.edu.iq** **Name:Dr. Rana Abbas Ali** **Email: rana.ali@sc.uobaghdad.edu.iq**
8. Course Objectives

Course Objectives	1- Understanding Ore Formation Processes: The aim of the Ore Geology module is to provide students with a comprehensive understanding of the geological processes involved in the formation of mineral deposits. Students will learn about the various ore-forming processes, including magmatic, hydrothermal, sedimentary, and metamorphic processes. They will explore the factors that control the concentration and enrichment of valuable minerals in specific geological settings. By gaining knowledge of the processes that lead to ore formation, students will be able to identify and characterize different types of mineral deposits and understand the factors that contribute to their economic significance. 2- Ore Deposit Evaluation and Resource Assessment: Another key aim of the module is to equip students with the skills to evaluate and assess ore deposits. Students will learn the methods and techniques used in exploration, sampling, and geological modeling to estimate the size, grade, and economic potential of mineral deposits. They will gain proficiency in analyzing geological data, such as drill core samples, geophysical data, and geochemical data, to determine the presence and characteristics of ore bodies. By developing expertise in resource assessment, students will be able to contribute to the estimation of mineral reserves and the evaluation of mining projects for sustainable resource management. 3-Mineral Resource Extraction and Environmental Considerations: The Ore Geology module aims to provide students with an understanding of the extraction of mineral resources and the associated environmental considerations. Students will explore the various mining methods used to extract ores, including underground mining, open-pit mining, and placer mining. They will examine the environmental impacts of mining activities, such as habitat destruction, water pollution, and the release of greenhouse gases. Students will also learn about the principles and practices of responsible mining, including mine reclamation, waste management, and the use of sustainable technologies. By considering environmental considerations in ore extraction, students

	will develop the knowledge and awareness necessary to contribute to sustainable mining practices and minimize the environmental footprint of mineral resource extraction.

9. Teaching and Learning Strategies

Strategy	1-Exploration Strategy: The ore geology module focuses on the strategies used to identify and explore potential ore deposits. This includes various techniques such as geological mapping, geochemical sampling, geophysical surveys, and remote sensing. The module emphasizes the importance of understanding the geological setting and structural controls of ore deposits to guide exploration efforts. Students learn about target generation, data interpretation, and decision-making processes involved in designing and implementing effective exploration strategies. 2- Deposit Characterization Strategy: Once an ore deposit is discovered, the module covers strategies for characterizing its geology and mineralization. This involves detailed sampling, laboratory analyses, and geological modeling. Students learn about the different types of ore deposits, their mineralogy, textures, and geological controls. They study methods to determine the grade, tonnage, and economic viability of the deposit. Emphasis is placed on integrating geological, geochemical, and geophysical data to develop comprehensive models that aid in understanding the deposit's genesis and potential. 3-Mining Strategy: The ore geology module also delves into the strategies employed in mining operations. This includes selecting appropriate mining methods based on deposit characteristics, economics, and environmental considerations. Students learn about underground and open-pit mining techniques, mine planning, and optimization. They explore strategies for efficient extraction, mineral processing, and metallurgical recovery. The module also covers sustainable mining practices, mine closure planning, and the mitigation of environmental impacts associated with ore extraction.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Basics of economic geology	Basics of economic geology	Theoretical	General questions, reports and discussion
2	4	Definition of ore deposits and economic terms	Definition of ore deposits and economic terms	Theoretical	General questions, reports and discussion
3	4	Classification and distribution	Classification and distribution	Theoretical	General questions, reports and discussion
4	4	Show the characteristics of each group	Show the characteristics of each group	Theoretical	General questions, reports and discussion
5	4	Classification of geological processes that form mineral deposits	Classification of geological processes that form mineral deposits	Theoretical	General questions, reports and discussion
6	4	Classification of geological processes that form mineral deposits	Classification of geological processes that form mineral deposits	Theoretical	General questions, reports and discussion
7	4	Classification of geological processes that form mineral deposits	Classification of geological processes that form mineral deposits	Theoretical	General questions, reports and discussion
8	4	Showing the types of mineral formations	Showing the types of mineral formations	Theoretical	General questions, reports and

		within the rock layers	within the rock layers		discussion
9	4	Showing the types of structural textures for material compositions	Showing the types of structural textures for material compositions	Theoretical	General questions, reports and discussion
10	4	Showing the types of structural textures for material compositions	Showing the types of structural textures for material compositions	Theoretical	General questions, reports and discussion
11	4	Showing methods of investigating and exploring raw materials	Showing methods of investigating and exploring raw materials	Theoretical	General questions, reports and discussion
12	4	Classification of types and spread of gemstones	Classification of types and spread of gemstones	Theoretical	General questions, reports and discussion
13	4	Industrial rocks and minerals	Types and distribution	Theoretical	General questions, reports and discussion
14	4	Mineral resources in Iraq	Types and distribution	Theoretical	General questions, reports and discussion
15	4	Ores deposits in world	Types and distribution	Theoretical	General questions, reports and discussion

Environmental Pollution – Fourth Stage / Second Semester

1. Course Name:
Environmental pollution
2. Course Code:
GEO-4941
3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Asst. Prof. Dr. Murtada Jabbar Issa Email: murtatha20042000@yahoo.com
8. Course Objectives

Course Objectives	Raising student awareness to provide a healthy Iraqi environment with international standards.

9. Teaching and Learning Strategies	
Strategy	• Collaborative Learning Strategy • Improv Games Learning Strategy • Brainstorming Learning Strategy • Panorama Learning Strategy • Collaborative Concept Mapping Learning Strategy • One-Minute Paper Learning Strategy • Real-Time Feedback Learning Strategy • Observation Chain Learning Strategy

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	It helps to determine what the student should learn and what they will be able to do	The reality of environmental problems Supplies and	Lectures and practical sessions Reports and research	Quizzes and midterm written exams

		after completing the required academic program.	**solutions**		
2	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**The reality of environmental problems in Iraq ... Environment and future generations**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
3	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**The basic concepts of environmental geology**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
4	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**Examples of industrial risks**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
5	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**Sources of air pollution Examples and solutions**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
6	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**Sources of water pollution Examples and solutions**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
7	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**Exam 1**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
8	**2**	**It helps to determine what the student should learn and what they will be able to do after completing the required academic program.**	**Allimnologip cycle of lakes.. environmental problems and solutions**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**
9	**2**	**It helps to determine what the student should learn and what**	**Hydro chemical surveys of various water**	**Lectures and practical sessions Reports and research**	**Quizzes and midterm written exams**

		they will be able to do after completing the required academic program.	sources - Classification of water - the theory of the spread of pollutants		
10	2	It helps to determine what the student should learn and what they will be able to do after completing the required academic program.	Pollution standards	Lectures and practical sessions Reports and research	Quizzes and midterm written exams
11	2	It helps to determine what the student should learn and what they will be able to do after completing the required academic program.	Processors to reduce water pollution	Lectures and practical sessions Reports and research	Quizzes and midterm written exams
12	2	It helps to determine what the student should learn and what they will be able to do after completing the required academic program.	The radioactive contamination	Lectures and practical sessions Reports and research	Quizzes and midterm written exams
13	2	It helps to determine what the student should learn and what they will be able to do after completing the required academic program.	Oil Pollution	Lectures and practical sessions Reports and research	Quizzes and midterm written exams
14	2	It helps to determine what the student should learn and what they will be able to do after completing the required academic program.	Medical Geological	Lectures and practical sessions Reports and research	Quizzes and midterm written exams
15	2	It helps to determine what the student should learn and what they will be able to do after completing the required academic program.	Exam 2	Lectures and practical sessions Reports and research	Quizzes and midterm written exams
Practical Curriculum					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	2	Evaluation of air pollution by	Air Pollution (Particulate	Identification of measurement devices,	Discussion + Report

		particulate matter	Matter)	equations, and approved calculation methods with training calculation problems	preparation
2	2	Evaluation of air pollution by gases	Air Pollution (Gases Pollution)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
3	2	Evaluation of air pollution by heavy metals	Air Pollution (Heavy Metals)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
4	2	Evaluation of water quality for human drinking purposes	Water Quality for Human Drinking	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
5	2	Evaluation of water quality for irrigation purposes	Irrigation Water Quality	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
6	2	Evaluation of water pollution by heavy metals	Water Pollution (Metal Index Calculation)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
7	2	Evaluation of human health risks due to water pollution	Water Pollution (Human Health Risk Assessment)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
8	2	Exam	—	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
9	2	Evaluation of groundwater pollution by various pollutants	Groundwater Pollution	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
10	2	Evaluation of soil quality and pollution level	Soil Pollution (Pollution Index)	Identification of measurement devices, equations, and approved	Discussion + Report preparation

				calculation methods with training calculation problems	
11	2	Evaluation of soil quality and pollution level	Soil Pollution (Enrichment Factor)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
12	2	Evaluation of soil quality and heavy metal contamination	Soil Pollution (Metal Pollution)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
13	2	Evaluation of soil quality using the geo-accumulation factor	Soil Pollution (Geo-accumulation Factor)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
14	2	Evaluation of human health risks due to soil pollution	Soil Pollution (Human Health Risk Assessment)	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation
15	2	Exam	—	Identification of measurement devices, equations, and approved calculation methods with training calculation problems	Discussion + Report preparation

11. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	The Most Dangerous Types of Environmental Pollution: Water Pollution and Air Pollution as Forms of Pollution and How to Prevent and Protect Against Them
Main references (sources)	"Environmental Pollution Book – University of Mosul"
Recommended books and references (scientific journals, reports...)	All published research on Iraq, as well as theses and dissertations
Electronic References, Websites	Wikipedia

1. Course Name:
Signal Processing
2. Course Code:
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3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
2 Hours / 2 Units
7. Course administrator's name (mention all, if more than one name)
Name: Prof. Dr. Ali Maki Hussein Email: ali.m.@sc.uobaghdad.edu.iq

8. Course Objectives	
Course Objectives	The course aims to introduce geology students to the different types of geological data and how to convert them into a digital signal that can be processed using various processing methods, such as Fourier analysis to investigate data components and apply various filters to them, and then link the results with the resulting geological variables, such as various ground movements, earthquakes, waves, tides, etc.

9. Teaching and Learning Strategies	
Strategy	Thinking Skills Part 1: General and Transferable Skills (other skills related to employability and personal development). Part 2: Students acquire the ability to communicate with each other and with professors to develop themselves and their skills independently. Part 3: Encourage students to engage in self-learning and expand their knowledge of the course area. Encourage students to think critically and actively participate in classroom discussions. Part 4: Students acquire new communication skills by selecting dialogues that encourage interaction with others. Part 5: Teach students exemplary behavior and cooperation with others.

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge and applied	Types of Geological Data	Attendance	Short exam

2	**2**	**Knowledge and applied**	**Convert data to digital signal**	**Attendance**	**Questions**
3	**2**	**Knowledge and applied**	**Univariate Data**	**Attendance**	**Short exam**
4	**2**	**Knowledge and applied**	**Bivariate Data**	**Attendance**	**Questions**
5	**2**	**Knowledge and applied**	**Periodic Data**	**Attendance**	**Short exam**
6	**2**	**Knowledge and applied**	**Process periodic data**	**Attendance**	**Questions**
7	**2**	**Knowledge and applied**	**Real example**	**Attendance**	**Questions**
8	**2**	**Knowledge and applied**	**Mid. exam**	**Attendance**	**20%**
9	**2**	**Knowledge and applied**	**Fourier analysis**	**Attendance**	**Short exam**
10	**2**	**Knowledge and applied**	**Spectrum Analysis**	**Attendance**	**Questions**
11	**2**	**Knowledge and applied**	**International observatory data**	**Attendance**	**Short exam**
12	**2**	**Knowledge and applied**	**Connect data with geology**	**Attendance**	**Questions**
13	**2**	**Knowledge and applied**	**Summer**	**Attendance**	**Short exam**
14	**2**	**Knowledge and applied**	**Case study**	**Attendance**	**20%**
15		**Final Exam**			**60%**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc
The 40% effort is divided into 20% written exam, 10% seminar presentation (proposed topic), and 10% attendance, class exams, and other student activities.
Final 60%

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**"Matlab recipes for earth science" Book**
Main references (sources)	**"Statistics and data analysis for earth science" Book**
Recommended books and references (scientific journals, reports...)	**From www**
Electronic References, Websites	**Wiki and prepared lecture using YouTube**

Radiological method – Fourth Stage / Second Semester

1. Course Name:
Radiological method
2. Course Code:
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3. Semester / Year:
Semester 2 / 2024 - 2025
4. Description Preparation Date:
1 / 9 / 2024
5. Available Attendance Forms:
Theoretical and Practical Attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
4 Hours / 3 Units
7. Course administrator's name (mention all, if more than one name)
Name: Kamal kareem ali Email: kamal.ali@sc.uobaghdad.edu.iq
8. Course Objectives

Course Objectives	The course aims to achieve the following: Course Objectives - Understanding the basics of radioactivity - Knowing the types of radiation and radioisotopes, their measurements, and their environmental effects - Using radiometric methods in geological applications - Knowing the different methods for measuring radiation in the field and laboratory
9. Teaching and Learning Strategies	
Strategy	Using modern presentation methods to present lectures - Viewing available equipment and how it works - Viewing explanatory videos - Field visits to specialized laboratories

10. Course Structure

Theoretical Curriculum

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	5	Introduction to Radiation and the Atom	Atom and isotopes	powerpoint	Direct questions
2	5	Types of Radiation According to Their Origin	Radioactive History	powerpoint	Discussion
3	5	Field Measurements	ground radiometric method	powerpoint	Quiz

4	**5**	**How to Select and Collect Samples**	**Sampling**	**powerpoint**	**Questions**
5	**5**	**Preparing Samples for Measurement**	**Laboratory gamma ray spectroscopy**	**powerpoint**	**Mathematical solutions**
6	**5**	**Calculating Decay and Estimating Age**	**Radiometric dating**	**powerpoint**	**Quiz**
7	**5**	**Accurate Age Estimation**	**Rb-Sr dating method**	**powerpoint**	**Practical exam**
8	**5**	**Bi-Monthly Exam 1**	**Mid exam**	**powerpoint**	**Theoretical and practical question paper**
9	**5**	**Well Logging Outputs and Their Reading**	**Nuclear logs**	**powerpoint**	**Discussion**
10	**5**	**Student Seminar Presentations**	**application of radiometric in geology**	**powerpoint**	**Discussion**
11	**5**	**Types of Ionization and Their Radioactive Effects**	**ionizing radiation and radiological Ascpect**	**powerpoint**	**Quiz**
12	**5**	**Recommended Limits for Radiation in Water**	**Radioactivity in water**	**powerpoint**	**Questions**
13	**5**	**What is Radon and Its Importance**	**Radon**	**powerpoint**	**Mathematical solutions**
14	**5**	**Estimating Radiation Doses in Different Environments**	**Dose estimation**	**powerpoint**	**Quiz**
15	**5**	**Course Discussion and Second Exam**	**Exam2**	**powerpoint**	**Theoretical and practical question paper**

11. Course Evaluation

Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, daily oral, monthly, or written exams, reports .... etc

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	**1. Faure, G. (1986): Principles of isotope geology. 2nd edition.** **2. John Milsom, (2003): Field geophysics. 3rd edition, wiley&son Ltd., England.**
Main references (sources)	**1- Sharma P.V.,(1997): Environmental and engineering geophysics. Cambridge university press, USA. PP.475.** **2- IAEA,(1999): Nuclear geophysics and its applications. TECHNICAL REPORTS SERIES No. 393, TRS393.**
Recommended books and references (scientific journals, reports...)	**Publications of the International Atomic Energy Agency**
Electronic References, Websites	**ICRP , UNCSEAR**