Ministry of Higher Education and Scientific Research
Scientific Supervision and Scientific Evaluation Apparatus
Directorate of Quality Assurance and Academic Accreditation
Accreditation Department

Academic Program and Course Description Guide

2026-2025

Introduction:

The educational program is a well-planned set of courses that include procedures and experiences arranged in the form of an academic syllabus. Its main goal is to improve and build graduates' skills so they are ready for the job market. The program is reviewed and evaluated every year through internal or external audit procedures and programs like the External Examiner Program.

The academic program description is a short summary of the main features of the program and its courses. It shows what skills students are working to develop based on the program's goals. This description is very important because it is the main part of getting the program accredited, and it is written by the teaching staff together under the supervision of scientific committees in the scientific departments.

This guide, in its second version, includes a description of the academic program after updating the subjects and paragraphs of the previous guide in light of the updates and developments of the educational system in Iraq, which included the description of the academic program in its traditional form (annual, quarterly), as well as the adoption of the academic program description circulated according to the letter of the Department of Studies T 3/2906 on 3/5/2023 regarding the programs that adopt the Bologna Process as the basis for their work.

In this regard, we can only emphasize the importance of writing an academic programs and course description to ensure the proper functioning of the educational process.

Concepts and terminology:

Academic Program Description: The academic program description provides a brief summary of its vision, mission and objectives, including an accurate description of the targeted learning outcomes according to specific learning strategies.

Course Description: Provides a brief summary of the most important characteristics of the course and the learning outcomes expected of the students to achieve, proving whether they have made the most of the available learning opportunities. It is derived from the program description.

Program Vision: An ambitious picture for the future of the academic program to be sophisticated, inspiring, stimulating, realistic and applicable.

Program Mission: Briefly outlines the objectives and activities necessary to achieve them and defines the program's development paths and directions.

Program Objectives: They are statements that describe what the academic program intends to achieve within a specific period of time and are measurable and observable.

Curriculum Structure: All courses / subjects included in the academic program according to the approved learning system (quarterly, annual, Bologna Process) whether it is a requirement (ministry, university, college and scientific department) with the number of credit hours.

Learning Outcomes: A compatible set of knowledge, skills and values acquired by students after the successful completion of the academic program and must determine the learning outcomes of each course in a way that achieves the objectives of the program.

Teaching and learning strategies: They are the strategies used by the faculty members to develop students' teaching and learning, and they are plans that are followed to reach the learning goals. They describe all classroom and extra-curricular activities to achieve the learning outcomes of the program.

Academic Program Description Form

University Name: **Diyala**

Faculty/Institute: **College of Science**

Scientific Department: **Petroleum Geology and Minerals**

Academic or Professional Program Name: **Petroleum Geology and Minerals**

Final Certificate Name: **Bachelor in Petroleum Geology and Minerals**.

Academic System: Bologna process

Description Preparation Date: **21–9–2025**

File Completion Date: **2–10–2025**

Signature:

Head of Department Name:

Prof. Dr. Munther Dhahir Nsaif

Date :**6**/**10**/2025

Signature:

Scientific Associate Name:

Prof. Dr. Munther Hamza Radhi

Date:**6**/**10**/2025

The file is checked by: **Assist Prof Ghasan Sabeeh Mahmood**

Department of Quality Assurance and University Performance

Director of the Quality Assurance and University Performance Department:

Assist Prof Ghasan Sabeeh Mahmood

Date: **6/10/2025**

Signature:

Approval of the Dean

Prof. Dr. Taha Mohammad Hasan

1. Program Vision

The Department of Petroleum Geology and Minerals aspires to prepare highly qualified geologists who are equipped with the knowledge, practical skills, and professional competence required to meet the evolving challenges of the energy and mineral sectors. The department is committed to developing graduates capable of exploring, evaluating, and managing natural resources responsibly and efficiently while contributing to the sustainable development of both the local community and the global industry..

2. Program Mission

The Department of Petroleum Geology and Minerals is dedicated to providing students with a strong academic foundation and hands-on experience that prepare them for successful careers in the energy and mining industries. Through modern educational programs, advanced laboratory facilities, and practical training, the department aims to develop graduates who can apply geological knowledge effectively in the exploration and evaluation of natural resources. It also promotes scientific research and innovation to support sustainable development and address the needs of society and industry.

3. Program Objectives

- Develop and continuously update the curriculum to align with recent scientific advances and the changing requirements of the labor market.

-Upgrade laboratories by providing modern instruments, equipment, and technologies that enhance teaching, research, and practical training.

-Promote scientific research by encouraging faculty members and students to conduct high-quality research in petroleum and minerals geology .

-Establish strong partnerships with companies and institutions operating in the energy and mining sectors to provide students with practical training opportunities and collaborative research projects.

-Strengthen international collaboration with universities and research institutions through academic exchange, joint research activities, and the sharing of expertise among faculty members, researchers, and students.

4. Program Accreditation

Does the program have program accreditation? And from which agency?

No

5. Other external influences

No

6. Program Structure

Program Structure	Number of Courses	Credit hours	Percentage	Reviews*
Institution Requirements	**4**	**9**	**3.75**	
College Requirements	**4**	**19**	**7.9**	
Department Requirements	**39**	**206**	**85.8**	
Summer Training	**1**	**6**	**2.5**	
Other				

* This can include notes whether the course is basic or optional.

7. Program Description

Year/Level	Course Code	Course Name	Credit Hours		
			theoretical	practical	seminar
First\ first	GEO1101	General Geology1	**2**	**2**	**1**
First\ first	GEO1102	Crystallography	**2**	**2**	**1**
First\ first	COS1103	Chemistry	**2**	**2**	
First\ first	COS1104	Mathematics 1	**2**		
First\ first	UD03	Computer	**1**	**2**	
First\ first	UD02	Arabic language	**1**		
First\ second	GEO1217	General Geology 2	**2**	**2**	**1**

First\ second	GEO1218	Mineralogy	**2**	**2**	**1**
First\ second	COS1209	Physics	**2**	**2**	
First\ second	COS12110	Mathematics 2	**2**		
First\ second	UD04	human rights and Democracy	**2**		
First\ second	UD01	English Language	**2**		
Second\first	GEO23015	Hydrology	**1**	**2**	
Second\first	GEO24123	Stratigraphy	**2**	**2**	
Second\first	GEO23016	**Geomorphology**	**1**	**2**	
Second\first	GEO24024	**Sedimentology**	**2**	**2**	
Second\first	GEO24119	**Crystallography**	**2**	**2**	
Second\first	GEO23018	**Geophysics**	**2**	**2**	
Second\second	GEO24021	**Engineering Geology**	**1**	**2**	
Second\second	GEO23017	Paleontology	**2**	**2**	
Second\second	GEO24122	**Remote Sensing**	**1**	**2**	
Second\second	GEO35128	**sedimentary rocks**	**2**	**2**	
Second\second	GEO23113	**Minerals Chemistry**	**2**	**2**	
Second\second		**Geophysical Exploration**	**2**	**2**	
Third/ first	GEGEG301	**Geochemistry and Exploration Geochemistry**	**2**	**2**	
thirdL/ first	GEPG302	**Petroleum Geology**	**2**	**2**	
Third/ first	GEGFG303	**Geotectonic and Field Geology**	**1**	**2**	
Third/first	GESGW304	**Subsurface Geology and Well Logging**	**2**		
Third/first	GEGGS305	**GIS and geological and Statistical data analysis**	**2**	**2**	
Third/ first	GEFBA306	**Microfacies and basin analysis**	**2**	**2**	
Third/ second	GEGI307	**Geology of Iraq**	**1**	**2**	
Third/ second	GESG308	**Structural Geology**	**2**	**2**	
Fourth	**GEGP401**	**Graduate Project**	2		
Fourth	**GEEGP402**	**Environmental Geology and Pollution**	1	2	
Fourth	**GEOIR403**	**Ores and Industrial rocks**	2	2	
Fourth	GEPRW404	**Petroleum reservoir and well drilling**	1	2	
Fourth	**GESEP405**	**Seismic Exploration**	2	2	
Fourth	GEEG406	**Economic Geology**	1	2	
Fourth	**GEPS407**	**Petroleum and geological software**	2	2	
Fourth	**GEMG408**	**Mining Geology**	2	2	
Fourth	**GEFW409**	**Field Work**	6		

8. Expected learning outcomes of the program	
Knowledge	
Has an experience in oil and minerals exploration	satisfied
Skills	
Possess skills in using geological software	satisfied
He possesses basic skills to keep up with the labor market	satisfied
Ethics	
Knowledgeable of the values required by the work of a geologist in companies and departments	satisfied
Knowledgeable of some of the regulations and laws governing oil exploration	satisfied

9. Teaching and Learning Strategies

Teaching and learning strategies and methods adopted in the implementation of the program in general.

10. Evaluation methods

Implemented at all stages of the program in general.

11. Faculty

Faculty Members

Academic Rank	Specialization		Special Requirements/Skills (if applicable)		Number of the teaching staff	
	General	Special			Staff	Lecturer
Prof. Dr. Salah Ali Hussain	Geology	Stratigraphy and Paleontology			Staff	
Prof. Dr. Kareem Hussain Khwedim	Geology	Geochemistry			Staff	

Prof.Dr. Asem Ahmed Hassan	Geology	Engineering geology			**Staff**	
Prof.Dr. Munther Dhahir Nsaif	Geology	Geophysics			**Staff**	
Assist. Prof. Mouiad Tahir Ahmed	Geology	Geochemistry			**Staff**	
Dr. Abdul-Radha Mohammed Sahab	Geology	Petroleum Geology			**Staff**	
Dr. Ibrahim Mustafa Abbas	Geology	Petroleum Geology			**Staff**	
Assist Lec.Yasir Nasrat Shakur	Mining engineering	Mining			**Staff**	
Assist Lec. Abdul-Qader Adnan Khalaf	Geology	Sedimentology			**Staff**	
Assist Lec. Sara Ali Khalaf	Geology	Sedimentology			**Staff**	
Assist Lec. Ali Abdul-Jaleel Hussain	Geology	Structural Geology			**Staff**	
Assist Lec. Safiya Ata Jassam	Petroleum Enginering	Reservoir			**Staff**	

Professional Development

Mentoring new faculty members

New faculty members are involved in ongoing courses, workshops, and seminars on various topics in order to develop their skills

Professional development of faculty members

Urging them to take courses on teaching methods, validity of teaching, and language integrity, and urging them to join research groups to learn the correct steps for doing research.

12. Acceptance Criterion

Central admission and special admission

13. **The most important sources of information about the program**
1- University requirements 2- College requirements - 3- Department requirements

14. Program Development Plan
Continuous follow-up with foreign universities, updating curricula periodically, and updating student evaluation methods

Program Skills Outline															
				Required program Learning outcomes											
Year/Level	Course Code	Course Name	Basic or optional	Knowledge				Skills				Ethics			
				A1	A2	A3	A4	B1	B2	B3	B4	C1	C2	C3	C4
First\ first	GEO1101	General Geology1	Basic	√	√	√		√	√	√		√	√	√	
First\ first	GEO1102	Crystallography	Basic	√	√	√		√	√	√		√	√	√	
First\ first	COS1103	Chemistry	Basic	√	√	√		√	√	√		√	√	√	
First\ first	COS1104	Mathematics 1	Basic	√	√	√		√	√	√		√	√	√	
First\ first	UD03	Computer	Basic	√	√	√		√	√	√		√	√	√	
First\ first	UD02	Arabic language	Basic	√	√	√		√	√	√		√	√	√	
First\ second	GEO1217	General Geology 2	Basic	√	√	√		√	√	√		√	√	√	
First\ second	GEO1218	Mineralogy	Basic	√	√	√		√	√	√		√	√	√	

First\ second	COS1209	Physics	**Basic**	√	√	√		√	√	√		√	√	√	
First\ second	COS12110	Mathematics 2	**Basic**	√	√	√		√	√	√		√	√	√	
First\ second	UD04	human rights and Democracy	**Basic**	√	√	√		√	√	√		√	√	√	
First\ second	UD01	English Language	**Basic**	√	√	√		√	√	√		√	√	√	
Second\first	GEO23015	Hydrology	**Basic**	√	√	√		√	√	√		√	√	√	
Second\first	GEO24123	Stratigraphy	**Basic**	√	√	√		√	√	√		√	√	√	
Second\first	GEO23016	**Geomorphology**	**Basic**	√	√	√		√	√	√		√	√	√	
Second\first	GEO24024	**Sedimentology**	**Basic**	√	√	√		√	√	√		√	√	√	
Second\first	GEO24119	**Crystallography**	**Basic**	√	√	√		√	√	√		√	√	√	
Second\first	GEO23018	**Geophysics**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/first	GEGEG301	**Geochemistry and Exploration Geochemistry**	**Basic**	√	√	√		√	√	√		√	√	√	

Third/ first	GEPG302	**Petroleum Geology**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/first	GEGFG303	**Geotectonic and Field Geology**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/ first	GESGW304	**Subsurface Geology and Well Logging**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/ second	GEGGS305	**GIS and geological and Statistical data analysis**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/second	GEFBA306	**Microfacies and basin analysis**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/second	GEGI307	**Geology of Iraq**	**Basic**	√	√	√		√	√	√		√	√	√	
Third/second	GESG308	**Structural Geology**	**Basic**	√	√	√		√	√	√		√	√	√	
Fourth	**GEGP401**	**Graduate Project**	**Basic**	√	√	√		√	√	√		√	√	√	
Fourth	**GEEGP402**	**Environmental Geology and Pollution**	**Basic**	√	√	√		√	√	√		√	√	√	
Fourth	**GEOIR403**	**Ores and Industrial rocks**	**Basic**	√	√	√		√	√	√		√	√	√	
Fourth	GEPRW404	**Petroleum reservoir and well drilling**	**Basic**	√	√	√		√	√	√		√	√	√	
Fourth	**GESEP405**	**Seismic Exploration**	**Basic**	√	√	√		√	√	√		√	√	√	

Fourth	GEEG406	**Economic Geology**	**Basic**	**v**	**v**	**v**		**v**	**v**	**v**		**v**	**v**	**v**	
Fourth	**GEPS407**	**Petroleum and geological software**	**Basic**	**v**	**v**	**v**		**v**	**v**	**v**		**v**	**v**	**v**	
Fourth	**GEMG408**	**Mining Geology**	**Basic**	**v**	**v**	**v**		**v**	**v**	**v**		**v**	**v**	**v**	
Fourth	**GEFW409**	**Field Work**	**Basic**	**v**	**v**	**v**		**v**	**v**	**v**		**v**	**v**	**v**	

- **Please tick the boxes corresponding to the individual program learning outcomes under evaluation.**

MODULE DESCRIPTION FORM

Module Information					
Module Title	**English Language**			**Module Delivery**	
Module Type	**S**			☒**Theory** ☐**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	UOD-104				
ECTS Credits	**3**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Othman Khlan Farhan		**e-mail**	othaman@uodiyala.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name(if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	The main objectives of the syllabus are: • to provide material for the students to learn pronunciation of the English sounds, to learn to read, write, and to know the fundamentals of English grammar and vocabulary; • to develop the students' reading skills to enable them to skim an adapted text for main idea, to scan an adapted text for specific information, to interpret an adapted text for inferences; • to develop the students' writing skills to enable them to respond to input applying information to a specified task, to elicit, to select, to summarize information in essays (140-160 words); • to develop the students' listening skills to enable them to understand and apply specific information from the input (within the framework of Breakthrough level); • to develop the students' speaking skills to enable them to use general, social and professional language (within the framework of Breakthrough level); • to develop the students' general capacity to a level that enables them to use English in their professional and academic environment (within the framework of Breakthrough level).
Module Learning Outcomes	**Speak English, to some extent, with confidence.** **Use and practice the language in different social situations.** **Get better reading comprehension skills to improve their reading abilities to read clearly and carefully.** **Master the given rules of grammar.** **Do written tasks free from grammatical mistakes.** **Achieve noticeable progress in the 4 English language skills.** **Use and function the English language skills with more confidence.** **Prioritize the first 2 skills while learning the language.**
Indicative Contents	English language overlaps computer science discipline as it is the lingua franca for computing. Within the same line of thought, most computer science terminology is loaned from the English language. On account of technical restrictions of computer and limitations of International criteria on the Internet, internet users and software engineers along with analysts programmers, not least Computer Science students, and their instructors are required to fully use English keywords when using the network,

	coding and analyzing a computer program and so forth.

Learning and Teaching Strategies	
Strategies	Assessment is by coursework (10%), which integrates the following: • Individual and group oral presentations • Oral interactions (including pair work) • Written tests and tasks of various length (memoranda, notes) • Essays • Listening/ viewing • Communicating the gist of simple reading passages • Translation of simple texts on economics.

Student Workload (SWL)			
Structured SWL (h/sem)	47	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	53	**Unstructured SWL (h/w)**	3.5
Total SWL (h/sem)	100		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1			
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (20)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	**introduction to the course Planning a conference**
Week 2	**Spoken reception, Written reception**
Week 3	**Spoken production, Written production**
Week 4	**Spoken interaction, Written interaction**
Week 5	**Mediating a text**
Week 6	**Leading group work**
Week 7	**Building on plurilingual repertoire**
Week 8	**Mid exam**
Week 9	**Sociolinguistic appropriateness**
Week 10	**Spoken Reception - *Watching TV, film and video***
Week 11	**Written Reception - *Reading correspondence***

Week 12	**Written Reception - Reading for information and argument**
Week 13	**Written Reception - *Reading as a leisure activity***
Week 14	**Spoken Production - *Public announcements***
Week 15	**Written Production - *Written reports and essays***
Week 16	**Online Interaction - *Online conversation and discussion***

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	М.А. Шевелева. English on Economics. М., 1998. Cotton D., Falvey D., Kent S. Market Leader. Intermediate Business English. Longman, 2001. .	Yes
Recommended Texts		
Websites		

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	**Computer Science**			**Module Delivery**	
Module Type	**Basic**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**UMI-101**				
ECTS Credits	**4**				
SWL (hr/sem)	**100**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Iraq Ali Hussein		**e-mail**	IraqAll@uodiyala.edu.iq	
Module Leader's Acad. Title	lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This module aims to provide students with a grounding in the operation of a computer, and the interaction between the hardware, the operating system and the software. Students have gained an insight into basic concepts of computer science, working methods and research questi ons and have an appropriate perception of computer science. They can choose a field of study for themselves in Biology science.
Module Learning Outcomes	Key skills for employability KS1 Written, oral and media communication skills KS2 Leadership, team working and networking skills KS3 Opportunity, creativity and problem solving skills KS4 Information technology skills and digital literacy KS5 Information management skills KS6 Research skills KS7 Intercultural and sustainability skills KS8 Career management skills KS9 Learning to learn (managing personal and professional development, selfmanagement) KS10 Numeracy
Indicative Contents	1- Describe the major sub-systems components and operation of a computer. 2- Describe the components of a modern operating system, using real operating systems to provide examples. 3- Discuss the interaction between the hardware, the operating system, the application software and the user of a modern computer system. 4-Outline typical network architectures, and their operations and protocols using examples from real networks to illustrate the concepts involved.

Learning and Teaching Strategies	
Strategies	The delivery of the module will include a range of teaching methods and learning styles. These include lectures, case studies, project work, presentations and tutorials; drawing on the student's experiential learning.

Student Workload (SWL)			
Structured SWL (h/sem)	49	**Structured SWL (h/w)**	3
Unstructured SWL (h/sem)	51	**Unstructured SWL (h/w)**	3.5
Total SWL (h/sem)	**100**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Introduction to computers, definitions essential
Week 2	Basic language, constants, variables, output
Week 3	Input, output, math equations
Week 4	repetition phrase, terms, nested repetition statements
Week 5	Arrays, Dimension Statement, One-Dimensional Arrays, Applications
Week 6	Two-dimensional arrays, reading and their types
Week 7	Subprograms and internal functions
Week 8	Drawing in a calculator, principle, basic drawing phrases
Week 9	Drawing scale, drawing curves, drawing diagrams
Week 10	Applications on drawing, better straight drawing, curved drawing
Week 11	Computer operating systems, system
Week 12	Programming information gathering devices
Week 13	The use of calculators in laboratories, devices for collecting and reading information
Week 14	Drawing scale, drawing curves, drawing diagrams
Week 15	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	

Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts		Yes
Recommended Texts		No
Websites		

Grading Scheme

Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Human rights, freedom and democracy**			**Module Delivery**	
Module Type	**Support**			☒**Theory** ☐**Lecture** ☐**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**UNI-103**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	2	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Othman Khlan Frhan		**e-mail**	othaman@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. The course aims to introduce students to human rights, freedom and democracy, its most prominent sources and characteristics, and the historical stages that human rights, freedom and democracy went through. 2. Then get acquainted with the Universal Declaration of Human Rights and the most prominent articles included in the Declaration, international treaties and covenants and the most prominent international organizations. 3. The most important international conventions in the field of human rights, freedom and democracy, and introducing students to human rights in the monotheistic religions (Christian, Islamic religion) and other religions. 4. And then emphasizing democracy and how to practice democracy in a newly democratic society, so that students are the nucleus of the future in building the Iraqi state.
Module Learning Outcomes	Cognitive goals 1- Know human rights, freedom and democracy. 2- The student mentions the most important human rights in life. 2- The student knows the term human rights, freedom and democracy. 3- The student applies the principles of human rights, freedom and democracy within the university campus. 4- The student discusses human rights, freedom and democracy and their development through ancient civilizations. 5- The student explains the overlap between the democratic system and other systems of government. 6- The student distinguishes between guaranteeing human rights under democratic regimes from other regimes. Skill objectives of the course 1 - The student realizes the importance of human rights, freedom and democracy to preserve the dignity of this person. 2 - The student demonstrates his adherence to all principles that protect human rights, freedom and democracy. 3 -. The student draws models that express the demand for human rights, freedom and democracy. 4 - The student uses the theoretically acquired concepts in educating society to

	preserve human rights, freedom and democracy.
Indicative Contents	

Learning and Teaching Strategies	
Strategies	Methods of teaching and learning - The electronic lecture on Google meet using Google Classroom. Explanation and clarification. - Brainstorming

Student Workload (SWL)			
Structured SWL (h/sem)	17	**Structured SWL (h/w)**	1.1
Unstructured SWL (h/sem)	33	**Unstructured SWL (h/w)**	2.2
Total SWL (h/sem)	**75**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	1	10% (10)	5	LO #1, #2 and #10, #11
	Assignments	1	10% (10)	10	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	The first topic: definition of human rights Concept of human rights, definition of human rights.- definition of right- definition of human being- definition of concept of human rights). The importance of studying human rights, characteristics of human rights.
Week 2	Generations of human rights (the first generation is the generation of civil and political rights, the second generation is the generation of economic, social and cultural rights, and the third generation is the generation of new rights).
Week 3	The second topic: the historical development of human rights Human rights in the civilizations of Mesopotamia (the law of Urkagina and Urnammu, the law of Ishtar, the law of the kingdom of Eshnunna, the law of Hammurabi's law), human rights in other ancient civilizations (the Indian and Chinese civilization, the civilization of Pharaonic Egypt, the Greek civilization and the Roman civilization).

Week 4	The third topic: Human rights in Islam (the rights of the child, women, social, economic and political rights). Human rights in the Middle Ages, human rights in divine laws, in Judaism and Christianity, human rights at the level of modern revolutions and legitimacy.
Week 5	The fourth topic: Recognition of human rights at the international level, stages of international recognition of human rights, contemporary regional recognition.
Week 6	The fifth topic: human rights at the European level, the American level, the African level, and the Arab and Islamic level, explaining the paragraphs and articles of the Universal Declaration of Human Rights in 1948.
Week 7	The sixth topic: human rights in international and regional conventions and national legislation, including (the Universal Declaration of Human Rights, human rights in the two international covenants).
Week 8	The seventh topic: the emergence of non-governmental organizations and their role in the field of human rights (the International Committee of the Red Cross, Amnesty International, Human Rights Watch, Arab Organization for Human Rights Watch).
Week 9	The eighth topic: the definition of democracy, the concept of democracy, the advantages of democracy, the historical development of democracy and freedom in ancient historical times (Mesopotamia civilization, the Nile Valley civilization, the Greek civilization, the Roman civilization)
Week 10	The ninth topic: the stages of the democratic system in Iraq, the most important articles of the Iraqi constitution of 2005 AD in the field of democracy and human rights. The relationship between the general rights and freedoms of individuals and democracy, the difference between freedom evaluates the democratic system and the stages of its implementation in Iraq (pros of democracy, negatives of democracy)
Week 11	Topic 10: Types of Democracy (First - Direct Democracy, Second - Indirect Democracy, divided into: A - semi-direct democracy, b - indirect democracy, and its most important advantages and disadvantages (representative democracy (parliamentary), consensual democracy, delegated democracy).
Week 12	Table Eleven: General conditions for the success of the democratic system (respect for human rights, political pluralism, peaceful transfer of power) (political equality, respect for the principle of democracy, and the existence of the rule of law).

Week 13	The twelfth topic: the components and pillars of democracy (citizenship, political participation, elections, representatives and responsibility) (contestation, constitutional legitimacy, separation of powers, transparency and accountability).
Week 14	The thirteenth topic: the concept of elections and their legal adaptation (election conditions, concepts specific to elections, electoral administration). (General principles of electoral administration, election systems, majority system and proportional representation).
Week 15	The fourteenth topic: administrative corruption, its concept and definition, types of corruption, causes of corruption, treatments for corruption, some political terms (constitutional court, presidential system, parliamentary system, federal union, secularism, technocracy, aristocracy, liberalism, bureaucracy, imperialism).

Delivery Plan (Weekly Lab. Syllabus)

	Material Covered
Week 1	Lab 1: Introduction to Agilent VEE and PSPICE
Week 2	Lab 2: Thévenin's / Norton's Theorem and Kirchhoff's Laws
Week 3	Lab 3: First-Order Transient Responses
Week 4	Lab 4: Second-Order Transient Responses
Week 5	Lab 5: Frequency Response of RC Circuits
Week 6	Lab 6: Frequency Response of RLC Circuits
Week 7	Lab 7: Filters

Learning and Teaching Resources

	Text	**Available in the Library?**
Required Texts	Fundamentals of Electric Circuits, C.K. Alexander and M.N.O Sadiku, McGraw-Hill Education	Yes
Recommended Texts	DC Electrical Circuit Analysis: A Practical Approach	No

	Copyright Year: 2020, dissidents.	
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

Grading Scheme مخطط الدرجات				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information معلومات المادة الدراسية					
Module Title	**Mathematical 1**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	**8**				
SWL (hr/sem)	**30**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	Petroleum geology and minerals		**College**	College of science- university of Diyala	
Module Leader	Asia A. Mohammed		**e-mail**	admin.science@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	A. L.	
Module Tutor			**e-mail**	asiaali@uodiyala.edu.iq	
Peer Reviewer Name	Calculus		**e-mail**		
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This academic curriculum is a basic introduction to learning the basics of calculus, trigonometric, logarithmic and exponential functions. The student will learn methods of solution and application. The module aims to: 1- The objective required of the student in order to successfully pass the requirements of the course is to teach the student to make derivations for all mathematical functions, as well as the methods of drawing them. 2- The student's knowledge of distinguishing between functions and drawing them

	3- Developing the student's ability to understand the concept of differentiation and its applications.
Module Learning Outcomes	Course Outcomes and Methods of Teaching, Learning and Assessment 1-Giving lectures and using textbooks 2- Solving issues related to scientific material 3- Writing scientific reports and analyzing data 4 method of self-learning A- Cognitive goals A1- Students' ability to distinguish and cognitive perception (to diagnose general theories and principles in the study) A2-Future planning to link what the student has learned to daily life A 3- Practicing different types of mathematical proofs A 4 - self-reliance in the achievement of mathematics B - The soft skills objectives of the course B1 - skills to apply calculus B2 - skill to find limits B3 - skill to draw functions Methods of teaching and learning 1. Lecture, use of the blackboard, and recitation 2. Demos 3. Interactive discussion 4. Self-learning
Indicative Contents	Indicative content includes the following. One of the important themes in mathematic is the analysis of relationship between mathematical quantities .such relationships can be described in terms of graphs ,formulas ,numerical data. Pupil will study properties of some of the most basic functions that occur in calculus and we will examine some familiar ideas involving lines, polynomials and trigonometric functions. 2 Student definition of what is understood limits, algebra limit, continuity. limits Infinite , limits by One and two side

	Tangent lines and derivation, and calculations derivative of some functions by Using definition. Derivatives of Special functions, Mathematical models, Parametric equations

Learning and Teaching Strategies	
Strategies	The main strategy that will be : A1- Students' ability to distinguish and cognitive perception (to diagnose general theories and principles in the study) A2-Future planning to link what the student has learned to daily life A 3- Practicing different types of mathematical proofs A 4 - self-reliance in the achievement of mathematics B - The soft skills objectives of the course B1 - skills to apply calculus B2 - skill to find ends B3 - skill to draw functions

Student Workload (SWL)			
Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**200**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Integer numbers and real numbers intervals inequalities
Week 2	Properties of functions
Week 3	Domain and rang
Week 4	Graph of functions
Week 5	Limits
Week 6	Limits
Week 7	Continuous of functions
Week 8	Special functions
Week 9	Derivatives
Week 10	Derivatives of Special functions
Week 11	Mathematical models

Week 12	Lines
Week 13	Parametric equations
Week 14	Parametric equations
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Calculus, seven edition :Howard Anton, Irl Bivens, Stephen Davis.	Yes
Recommended Texts	Calculus and Analytic Geometry by Thomas	Yes
Websites		

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A –** Excellent		90 – 100	Outstanding Performance
	B - Very Good		80 – 89	Above average with some errors
	C – Good		70 – 79	Sound work with notable errors
	D - Satisfactory		60 – 69	Fair but with major shortcomings
	E – Sufficient		50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information

Module Title	**Mathematical 2**		**Module Delivery**	
Module Type	**Core**		☒**Theory** ☒**Lecture** **Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code				
ECTS Credits	**5**			
SWL (hr/sem)	**30**			
Module Level	1	**Semester of Delivery**	1	
Administering Department	Petroleum geology and minerals	**College**	College of science- university of Diyala	
Module Leader	Asia A. Mohammed	**e-mail**	admin.science@uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer	**Module Leader's Qualification**	B. L.	
Module Tutor		**e-mail**	asiaali@uodiyala.edu.iq	
Peer Reviewer Name	Calculus	**e-mail**		
Scientific Committee Approval Date	21/9/2025	**Version Number**	1.0	

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	This academic curriculum is a basic introduction to learning the basics of calculus, trigonometric, logarithmic and exponential functions. The student will learn methods of solution and application. The module aims to: 1- The objective required of the student in order to successfully pass the requirements of the course is to teach the student to make derivations for all mathematical functions, as well as the methods of drawing them. 2- The student's knowledge of distinguishing between functions and drawing them 3- Developing the student's ability to understand the concept of differentiation and its applications.
Module Learning Outcomes	Course Outcomes and Methods of Teaching, Learning and Assessment 1-Giving lectures and using textbooks 2- Solving issues related to scientific material 3- Writing scientific reports and analyzing data 4 method of self-learning A- Cognitive goals A1- Students' ability to distinguish and cognitive perception (to diagnose general theories and principles in the study) A2-Future planning to link what the student has learned to daily life A 3- Practicing different types of mathematical proofs A 4 - self-reliance in the achievement of mathematics B - The soft skills objectives of the course B1 - skills to apply calculus B2 - skill to find limits B3 - skill to find derivative and Integration
Indicative Contents	Indicative content includes the following: Part A / the derivative Tangent lines and calculating the derivative For some functions using the definition , implied derivation and derivatives from higher powers, implied derivation and derivatives from higher powers, Limits, some applications on

	the limits, mean value theorem , Rolle's theorem, L'Hupetal's rule, Part B/ Types of functions increasing functions, decreasing functions and drown curves, Trigonometric functions together basic equivalent, Inverse trigonometric functions with their derivation, Hyperbolic functions with their derivation. Part C/ Integration Inverse of differential(Integration), Fundamental theorem for integration, properties of integration, Some application integration, Integration for Trigonometric functions, Inverse trigonometric, Hyperbolic functions.

Learning and Teaching Strategies	
Strategies	The main strategy that will be : A1- Students' ability to distinguish and cognitive perception (to diagnose general theories and principles in the study) A2-Future planning to link what the student has learned to daily life A 3- Practicing different types of mathematical proofs A 4 - self-reliance in the achievement of mathematics B - The soft skills objectives of the course B1 - skills to apply calculus B2 - skill to find the derivative B3 - skill to

Student Workload (SWL)

Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**200**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Tangent lines and calculating the derivative For some functions using the definition .
Week 2	Some derivational forms, rule series, derivation of the power function.
Week 3	increasing functions, decreasing functions and drown curves
Week 4	implied derivation and derivatives from higher powers
Week 5	Limits, some applications on the limits

Week 6	mean value theorem , Rolle's theorem, L'Hupetal's rule
Week 7	mean value theorem , Rolle's theorem, L'Hupetal's rule
Week 8	Trigonometric functions together basic equivalent
Week 9	Inverse trigonometric functions with their derivation
Week 10	Hyperbolic functions with their derivation
Week 11	Inverse of differential(Integration)
Week 12	Fundamental theorem for integration, properties of integration
Week 13	Some application integration
Week 14	Integration for Trigonometric functions, Inverse trigonometric, Hyperbolic functions
Week 15	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Calculus, seven edition :Howard Anton, Irl Bivens, Stephen Davis.	Yes
Recommended Texts	Calculus and Analytic Geometry by Thomas	Yes
Websites		

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A –** Excellent		90 – 100	Outstanding Performance
	B - Very Good		80 – 89	Above average with some errors
	C – Good		70 – 79	Sound work with notable errors
	D - Satisfactory		60 – 69	Fair but with major shortcomings
	E – Sufficient		50 – 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Physics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UoB12345**				
ECTS Credits	**8**				
SWL (hr/sem)	**100**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title		Assistant lec.	**Module Leader's Qualification**		Msc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		21/9/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	**After completing the course**, Students are able: Intended Learning 1- Have the knowledge of fundamental Computing Science that includes basic theory and concept of computer science, Mathematics, and Statistics, Programming Algorithm, Software Engineering and Information System. 2- Able to demonstrate and analyze the basic property of object/matter in the form of physical equation related to particle kinematic, interaction force between particles/matter, harmonic oscillator, the elasticity of the material, static and dynamic fluid, temperature and heat, and thermodynamic. 3- Able to solve physics problems independently and responsibly with complete physical completion method

	4- Able to use the basic equations of physics in solving problems with Newton's laws of motion, work and energy, linear momentum, and collisions 5- Able to analyze basic physical property based on mathematical concept and formulation about the elasticity of the material, harmonic oscillator, temperature and heat 6- Able to distinguish the first and second thermodynamic equations and able to analyze 4 thermodynamic processes (K) iso volume, isobaric, isothermal, and adiabatic and Able to design and demonstrate the basic principles of physics in conducting experiments on object motion, temperature and heat, mathematical pendulum motion (K).
Module Learning Outcomes	On successful completion of this module the student should be able to: 1.Define a fluid and its basic properties, 2.Apply conservation of mass, energy and momentum to fluid flow, 3.Compute hydraulic gradients and design pipe networks, 4.Analyse flows and pressures for single pipe network using the continuity and steady flow energy equations, 5.Apply well-established techniques to solve engineering problemsin fluid mechanics 6.Evaluate the force on a bend/nozzle due to momentum change.
Indicative Contents	Indicative content includes the following. Students will learn about : 1. Quantity and Unit 2. Particle Kinematics 3. Particle Dynamics 4. Work and Energy 5. Linear momentum and collision 6. Angular Momentum and Inertia 7. Harmonic Oscillator 8. Material Elasticity 9. Fluid Statistics 10. Fluid Dynamics 11. Temperature and Heat 12. Laws of Thermodynamics

Learning and Teaching Strategies	
Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through

	classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	69	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	31	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**100**		

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

	Material Covered
1–4	Chapter 1: “Introduction.” • Viscosity and Other Secondary • Properties • Surface Tension
1–4 (continued)	Chapter 2: “Pressure Distribution in a Fluid.” • Pressure and Pressure Gradient • Equilibrium of a Fluid Element • Hydrostatic Pressure Distributions • Application to Manometry • Hydrostatic Forces on Plane Surfaces • Hydrostatic Forces on Curved Surfaces

		• Hydrostatic Forces in Layered Fluids • Buoyancy and Stability • Pressure Distribution in a Rigid-Body Motion • Pressure Measurement
5–10	Chapter 3: “Integral Relations for a Control Volume.”	• Basic Physical Laws of Fluid Mechanics • The Reynolds Transport Theorem • Conservation of Mass • The Linear Momentum Equation • Frictionless Flow: The Bernoulli Equation • The Angular Momentum Theorem • The Energy Equations

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Lab 1: No lab sections meet this week
Week 2	Lab 2 : Introduction to Techniques in physics dep.
Week 3	Lab 3 : explain how to draw curves
Week 4	Lab 4: exam
Week 5	Lab 5: ohms law
Week 6	Lab 6: An investigation of Kirchhoff's law
Week 7	Lab 7: coil self-induction
Week 8	Lab 8: Diffraction of light by holes
Week 9	Lab9:young law
Week 10	Lab 10: No Labs Spring Break
Week 11	Lab 11: pressure measurement
Week 12	Lab 12: payless law
Week 13	Lab 13: surface tension
Week 14	Lab14: Re-run experiments as necessary
Week 15	Lab 15: exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	fluid mechanics fundamental and applications Cengel_Cimbala. Published by McGraw-Hill 2006.	Yes
Recommended Texts	Bruce R. Munson, Donald F. Young, Theodore H. Okiishi, and Wade W. Huebsch, Fundamentals of Fluid Mechanics, John Wiley & Sons, 6th ed., 2009.	No
Websites	Related books and magazines	

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information		
Module Title	**Arabic**	**Module Delivery**
Module Type	**Theoretical**	☒**Theory**
Module Code	**UoB12345**	

ECTS Credits	**2**	☒**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**
SWL (hr/sem)	**200**	

Module Level	2	**Semester of Delivery**	2
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Othman Khlan Farhan	**e-mail**	othaman@uodiyala.edu.iq
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.
Module Tutor	Name(if available)	**e-mail**	E-mail
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	21/9/2025	**Version Number**	1.0

Relation with other Modules

Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	- **المحاضرة**

	-

Student Workload (SWL)			
Structured SWL (h/sem)	30	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	30	**Unstructured SWL (h/w**	6
Total SWL (h/sem)	**60**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information				
Module Title	**General chemistry**		**Module Delivery**	
Module Type	**Core**		☒**Theory**	
Module Code	**UoB12345**		☒**Lecture**	
ECTS Credits	**8**		☒**Lab**	
SWL (hr/sem)	**300**		☐**Tutorial**	
			☐**Practical**	
			☐**Seminar**	
Module Level	1	**Semester of Delivery**	1	
Administering Department	Type Dept. Code	**College**	Science collage	

Module Leader	Name		**e-mail**	E-mail	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		M.SC.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		21/9/2025	**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	1. To develop problem solving skills and understanding of circuit theory through the application of techniques. 2. To understand voltage, current and power from a given circuit. 3. This course deals with the basic concept of electrical circuits. 4. This is the basic subject for all electrical and electronic circuits. 5. To understand Kirchhoff's current and voltage Laws problems. 6. To perform mesh and Nodal analysis.
Module Learning Outcomes	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Recognize how electricity works in electrical circuits. 2. List the various terms associated with electrical circuits. 3. Summarize what is meant by a basic electric circuit. 4. Discuss the reaction and involvement of atoms in electric circuits. 5. Describe electrical power, charge, and current. 6. Define Ohm's law.

	7. Identify the basic circuit elements and their applications. 8. Discuss the operations of sinusoid and phasors in an electric circuit. 9. Discuss the various properties of resistors, capacitors, and inductors. 10. Explain the two Kirchoff's laws used in circuit analysis. 11. Identify the capacitor and inductor phasor relationship with respect to voltage and current.
Indicative Contents	Indicative content includes the following. <u>Part A - Circuit Theory</u> DC circuits – Current and voltage definitions, Passive sign convention and circuit elements, Combining resistive elements in series and parallel. Kirchhoff's laws and Ohm's law. Anatomy of a circuit, Network reduction, Introduction to mesh and nodal analysis. [15 hrs] AC circuits I – Time dependent signals, average and RMS values. Capacitance and inductance, energy storage elements, simple AC steady-state sinusoidal analysis. [15 hrs] AC Circuits II - Phasor diagrams, definition of complex impedance, AC circuit analysis with complex numbers. [10 hrs] RL, RC and RLC circuits - Frequency response of RLC circuits, simple filter and band-pass circuits, resonance and Q-factor, use of Bode plots, use of differential equations and their solutions. Time response (natural and step responses). Introduction to second order circuits. [15 hrs] Revision problem classes [6 hrs] <u>Part B - Analogue Electronics</u> Fundamentals Resistive networks, voltage and current sources, Thevenin and Norton equivalent circuits, current and voltage division, input resistance, output resistance, coupling and decoupling capacitors, maximum power transfer, RMS and power dissipation,

	current limiting and over voltage protection. [15 hrs] Components and active devices – Components vs elements and circuit modeling, real and ideal elements. Introduction to sensors and actuators, self-generating vs modulating type sensors, simple circuit interfacing. [7 hrs] Diodes and Diode circuits – Diode characteristics and equations, ideal vs real. Signal conditioning, clamping and clipping, rectification and peak detection, photodiodes, LEDs, Zener diodes, voltage stabilization, voltage reference, power supplies. [15 hrs]

Learning and Teaching Strategies

Strategies	Type something like: The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and by considering types of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

Structured SWL (h/sem)	109	**Structured SWL (h/w)**	7
Unstructured SWL (h/sem)	91	**Unstructured SWL (h/w)**	6
Total SWL (h/sem)	**200**		

Module Evaluation

		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative	**Quizzes**	2	10% (10)	5 and 10	LO #1, #2 and #10, #11

assessment	**Assignments**	2	10% (10)	2 and 12	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Atom (Constitutes of atom)
Week 2	Lows of electron configration
Week 3	Electronegtivity
Week 4	Hybridization
Week 5	Resonance
Week 6	Chemicals bond
Week 7	Type of reaction
Week 8	Saturated carbohydrate (alkan)
Week 9	Occurrence, nomenclature, Reaction of alkane
Week 10	Unsaturated carbohydrate
Week 11	alkene , , Occurance ,nomenclature
Week 12	Reaction of alkene
Week 13	Alkyne, Occurance, nomenclature
Week 14	Reaction of alkyne
Week 15	Preparation of exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	LaB1: Types of devices in organic chemistry laboratories
Week 2	Lab 2: Types of tools in organic chemistry laboratories
Week 3	Lab 3 :The first aid
Week 4	Lab 4: The Determine the melting point
Week 5	Lab 5: The Determine the boiling point
Week 6	Lab 6: The reCrystallization
Week 7	Lab 7: The distillation
Week 8	Lab 8: The simply distillation
Week 9	Lab 9: The Fractional distillation
Week 10	Lab 10: The sublimation
Week 11	Lab 11: The extraction
Week 12	Lab 12: Cromotographyia
Week 13	Lab 13: Distinguish between an alkane and an alkene
Week 14	Lab 14: preparation gas of methan
Week 15	Lab 15: preparation for exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts		Yes
Recommended Texts		No
Websites	https://coappsc.uosamarra.edu.iq/wp-content/uploads/2022/01/%D9%85%D8%AD%D8%A7%D8%B6%D8%B1%D8%A9-1-%D9%83%D9%8A%D9%85%D9%8A%D8%A7%D8%A1-	

	%D8%B9%D8%B6%D9%88%D9%8A%D8%A9.pdf

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
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Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Minerals chemistry**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GEO23113**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	GEO		**College**	Science collage	
Module Leader	Muaiad Tahir Ahmed		**e-mail**	E-mail muaiad.tahir@ uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.SC.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules			
Prerequisite module	GEO1218	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives أهداف المادة الدراسية	Student Learning Objectives During this module you will: 1. Describe periodicity in the chemical characteristics of elements listed in order of increasing atomic number or mass. 2. Predict element substitutions in minerals using chemical characteristics (electronegativity, ionic size, valence, etc.), and define element substitutions in common solid solution series as simple, coupled, omission, or interstitial. 3. Hypothesize which minerals have similar characteristics (physical and optical properties) on the basis of their chemical formulas, thereby demonstrating

	understanding the importance of anionic groups. 4. Demonstrate understanding of phase diagrams for any one-component system: anticipate reactions that occur due to a change in temperature or pressure, describe difference between displacive and reconstructive polymorphs, discuss element ordering on atomic sites in the formation of polymorphs. 5. Identify primitive and non-primitive unit cells.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will • Explain how element combine and pack to form minerals and how different ions can be substituded in crystal latices. • Explain the principle of mineral classification and assign minerals to a mineral group by their chemical formula. • Describe crystal structure, crystal growth, and the types of structural defects that occur in minerals. Use a phase diagram to calculate the crystal composition of a substitutional solid solution in a partial melt at different temperatures. • Classify silicates minerals according structure.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • **Introduction of Minerals chemistry** [5 hrs] • **Interior of the Earth** [7hrs] The interior of the Earth is made up of three parts: crust, mantle, and core. The inner core is found to be in a solid state, and the outer core is in a liquid state. The outermost layer of Earth is called the crust. • **Composition of the Crust Rocks** [8 hrs] About 98% of the total crust is made up of eight elements as oxygen, silicon, aluminium, iron, calcium, sodium, potassium, and magnesium. The rest is constituted by elements like titanium, hydrogen, phosphorous, manganese, sulphur, carbon, nickel and others. • **Genesis of Minerals** [7 hrs] In mineralogy, genesis refers to both primary crystallization and the subsequent history of minerals, which may include structural transitions, changes in texture (e.g., grain coarsening), exsolution processes and chemical reactions (e.g., oxidation). • **The Sedimentary Environment** [8 hrs] The sedimentary environment is the specific depositional setting of a particular sedimentary rock and is unique in terms of physical, chemical, and biological characteristics. The physical features of a sedimentary environment include water depth and the velocity and persistence of currents. • **The Igneous & Metamorphic Environment** [10 hrs] Igneous rocks form as molten rock cools and solidifies. Two environments are distinguished: underground - in which case the melt is called 'magma' and the rock that results from its solidification is described as 'intrusive'. Metamorphic rocks form when rocks are subjected to high heat, high pressure, hot mineral-rich fluids or, more commonly, some combination of these factors. Conditions like these are found deep within the Earth or where tectonic plates meet. • **Geochemical classification of elements, valence number, chemical bonds, crystal properties** [10 hrs] Elements are commonly divided into major, minor and trace elements. Major elements are considered to be primary structural elements in major minerals, typically with concentrations

	above 0.2–0.4%. • **Silicate minerals** [8 hrs] Silicate minerals are the most common of Earth's minerals and include quartz, feldspar, mica, amphibole, pyroxene, and olivine. Silica tetrahedra, made up of silicon and oxygen, form chains, sheets, and frameworks, and bond with other cations to form silicate minerals. • **Coordination & Coordination Number** [7 hrs] the number of points of attachment between the ligands and the metal. • **Crystal Structure** [10 hrs] A crystal structure is defined as the particular repeating arrangement of atoms (molecules or ions) throughout a crystal. Structure refers to the internal arrangement of particles and not the external appearance of the crystal. • **Atomic Substitution & Solid Solutions** [8 hrs] Substitutional solid solutions are those in which the atoms of the minor component (solute) are substituted for the atoms of the major component (solvent) on the lattice positions normally occupied by the solvent atoms. • **Formation and Growth of Crystals** [8 hrs] Crystal growth is a major stage of a crystallization process, and consists of the addition of new atoms, ions, or polymer strings into the characteristic arrangement of the crystalline lattice. • **Crystallization of Solid Solution** [7 hrs] Crystallization is a process or unit operation of producing crystals or crystalline substances. It can occur from melts, solutions, or vapors. Crystalline solids need not be single crystals. Usually they are composed of an aggregate of crystals, which can be distinguished as separate entities under the microscope. • **Phase Rule and the Chemical System** [7 hrs] The phase rule describes the possible number of degrees of freedom in an enclosed system at equilibrium, in terms of the number of separate phases and the number of chemical constituents in the system. It was deduced by J.W Gibbs in the 1870s. • **Crystal Growth** [8 hrs] Crystal growth is a major stage of a crystallization process, and consists of the addition of new atoms, ions, or polymer strings into the characteristic arrangement of the crystalline lattice.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Module Evaluation

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Student Workload (SWL)

Structured SWL (h/sem)	64	Structured SWL (h/w)	4
Unstructured SWL (h/sem)	61	Unstructured SWL (h/w)	4
Total SWL (h/sem)	125		

Delivery Plan (Weekly Syllabus)

	Material Covered
Week 1	Introduction of Minerals chemistry
Week 2	Interior of the Earth &Composition of the Crust Rocks
Week 3	Genesis of Minerals
Week 4	The Igneous Environment
Week 5	The Sedimentary Environment
Week 6	The Metamorphic Environment
Week 7	Geochemical classification of elements, valence number, chemical bonds, crystal properties

Week 8	**Silicate minerals**
Week 9	**Coordination & Coordination Number**
Week 10	**Crystal Structure**
Week 11	**Atomic Substitution & Solid Solutions**
Week 12	**Formation and Growth of Crystals**
Week 13	**Crystallization of Solid Solution**
Week 14	**Phase Rule and the Chemical System**
Week 15	**Crystal Growth**

Delivery Plan (Weekly Lab. Syllabus)	
Lab	**Material Covered**
Week 1	Lab 1: **Minerals Groups**
Week 2	**Lab 2: Chemical formula of mineral**
Week 3	**Lab 3: Example for chemical Formula of minerals**
Week 4	**Lab 4: Example for chemical Formula of minerals**
Week 5	**Lab 5: Example for chemical Formula of minerals**
Week 6	**Lab 6: Example for chemical Formula of minerals**
Week 7	**Lab 7: Example for chemical Formula of minerals**
Week 8	**Lab 8: Example for chemical Formula of minerals**
Week 9	**Lab : Coordination number**
Week 10	**Lab 10: Drawing crystal structure**
Week 11	**Lab 11: Minerals Test Blow pipe & Charcoal**
Week 12	**Lab 12: Bead test**
Week 13	**Lab 13: Flame test**

Week 14	**Lab** 14: **Spectroscopic Techniques**: XRF
Week 15	**Lab** 15: **Spectroscopic Techniques**: XRD

Grading Scheme

Group	Grade		Marks %	Definition
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
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Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
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Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Igneous Rocks**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GEO23014**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	GEO		**College**	Science collage	
Module Leader	Muaiad Tahir Ahmed		**e-mail**	E-mail muaiad.tahir@ uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.SC.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives أهداف المادة الدراسية	The student will be able to relate igneous rocks to plate tectonics. understand basic petro genetic processes and he will be able to interpret information derived from thin-section and hand-specimen analysis. Igneous rocks are also very important because their mineral and chemical makeup can be used to learn about the composition, temperature and pressure that exists within the Earth's mantle and much about the tectonic environment, given that they are closely linked to the convection of tectonic plates.
Module Learning Outcomes	• Identify igneous rocks using hand specimens and a petrological microscope. • Define the characteristics of an igneous rock.

مخرجات التعلم للمادة الدراسية	• Discuss the role of melting and subsequent cooling in the rock cycle. • Identify the tectonic environment
Indicative Contents	Indicative content includes the following. • **Source Anatomy of the earth** [5 hrs] Magma is extremely hot liquid and semi-liquid rock located under Earth's surface. Earth has a layered structure that consists of the inner core, outer core, mantle, and crust. Much of the planet's mantle consists of magma. This magma can push through holes or cracks in the crust, causing a volcanic eruption. • **Magmatic and Plate tectonics** [10 hrs] Igneous rocks form from magmas, and most magmas are associated with plate tectonics. Mafic (basaltic) and ultramafic magmas form along the divergent mid-oceanic ridges and are major components of new oceanic crust. Physical properties of magma [The properties of magmas include temperature, density, viscosity, gas content and abundance. • **Textures and structures of Igneous rocks** [10 hrs] The texture of an igneous rock (fine-grained vs coarse-grained) is dependent on the rate of cooling of the melt: slow cooling allows large crystals to form, fast cooling yields small crystals. The structure of an igneous rock is normally taken to comprise the mutual relationships of mineral or mineral-glass aggregates that have contrasting textures, along with layering, fractures, and other larger-scale features that transect or bound such aggregates. • **Classification of Igneous rocks** [5 hrs] Igneous rocks can be divided into four categories based on their chemical composition: felsic, intermediate, mafic, and ultramafic. • **MORB and depleted mantle** [5 hrs] The depleted mantle is the part of Earth's mantle from which basaltic melt has been extracted in one or multiple melting events at, for example, mid-ocean ridges, hot spots, or island arcs. • **Evolution of depleted mantle , Evolution of the Enriched mantle** [10 hrs] The depleted mantle (DM) has undergone a complex geological evolution. Depleted mantle that has formed at mid-ocean ridges, hot spots, or island arcs is transported with the overlying oceanic crust and eventually subducted at convergent plate margins. Enriched Mantle – region in the mantle that is enriched in incompatible trace elements with respect to a primitive mantle model. • **Island arc basalts, Concept of Hot spot** [10 hrs] An island arc forms at a converging plate boundary where one oceanic plate sinks beneath another oceanic plate. A hot spot volcano forms in continental or oceanic crust where magma from the mantle erupts. Hot spot volcanoes often are far from plate boundaries. • **Mantle Plumes – Theory and structure** [10 hrs] A mantle plume is posited to exist where super-heated material forms (nucleates) at the core-mantle boundary and rises through the Earth's mantle. • **Trace element characterization of mantle domains** [5 hrs]

In analytical chemistry, a trace element is one whose average concentration is less than 100 parts per million (ppm) measured in the atomic count or less than 100 micrograms per gram.

- **Phase relations of silicates and silicate melts , Binary and ternary systems** [10 hrs]

The term *phase* refers to any compositionally and physically distinctive substance. Phases may be solids, liquids or gases.

binary forms have two large sections (we hear that B merges with the following A), while ternary forms have three large sections

- A physical-chemical system having three components. [10 hrs]

A system with two components is termed as a Binary system. Binary phase relations can be of different types such as a solid solution, eutectic system, and a eutectic system with a peritectic reaction.

Partial melting, Magmatic differentiation – Crystal fractionation, gravitational settling, flow

Partial melting is the transformation of some fraction of the mass of a solid rock into a liquid as a result of decompression, heat input, or addition of a flux.

Fractional crystallization refers to processes which separate crystals from liquid.
Gravitational settling is one of the most efficient means of separating solids from surrounding liquid.
Flow structures in igneous rocks are formed in the fluid stage.

- **Differentiation, flow crystallization, filter pressing, liquid immiscibility** [10 hrs]

In geology, igneous differentiation, or magmatic differentiation, is an umbrella term for the various processes by which magmas undergo bulk chemical change during the partial melting process, cooling, emplacement, or eruption.

- **Zone melting Contamination** [10 hrs]

Igneous rocks form through the crystallization of magma. There is a considerable range of melting temperatures for different compositions of magma. All the silicates are molten at about 1200°C and all are solid when cooled to about 600°C.

- **Mixing of magmas** [5 hrs]

Magma mixing or mingling is a popular hypothesis, generally proposed in terms of blending between a crustal melt and mafic material from the mantle that caused that melting.

- **Role of Volatile components, Pyroclastic rocks** [10 hrs]

Water and carbon dioxide are the most abundant volatile components in terrestrial magmas. As they absolve into magmatic vapor, they promote magma buoyancy, accelerating ascent and modulating eruptive dynamics.

Pyroclastic rocks have characteristics of both igneous or sedimentary rocks. They are composed exclusively of volcanic materials, yet are made up of fragments and grains like sedimentary rocks, and may be reworked by wind and flowing water.

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
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Unstructured SWL (h/sem)	61	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Delivery Plan (Weekly Syllabus)	
	Material Covered
Week 1	Magma definition**,** Source Anatomy of the earth
Week 2	Magmatic and Plate tectonics**,** Physical properties of magma – geothermal gradient, heat source, Igneous activity at the present day
Week 3	Textures and structures of Igneous rocks
Week 4	Classification of Igneous rocks
Week 5	MORB and depleted mantle
Week 6	Evolution of depleted mantle , Evolution of the Enriched mantle
Week 7	Island arc basalts , Concept of Hot spot
Week 8	Mantle Plumes – Theory and structure ,
Week 9	Trace element characterization of mantle domains
Week 10	Phase relations of silicates and silicate melts , Binary and ternary systems
Week 11	Partial melting ,Magmatic differentiation – Crystal fractionation, gravitational settling, flow
Week 12	Differentiation, flow crystallization, filter pressing, liquid immiscibility
Week 13	Zone melting Contamination
Week 14	Mixing of magmas
Week 15	Role of Volatile components , Pyroclastic rocks

Delivery Plan (Weekly Lab. Syllabus)	
Lab	**Material Covered**
Week 1	**Lab 1: Introduction to Igneous rocks**
Week 2	**Lab 2: Classification of igneous rock**
Week 3	**Lab 3: Felsic rocks**

Week 4	**Lab 4:Intermediate rocks**
Week 5	**Lab 5: Mafic rocks Ultra mafic rock**
Week 6	**Lab 6: Ultra mafic rock**
Week 7	**Lab 7: Intrusive igneous rocks**
Week 8	**Lab 8: Extrusive Igneous rocks**
Week 9	**Lab 9: Thin section Felsic rocks**
Week 10	**Lab 10:Thin section intermediate rocks**
Week 11	**Lab 11: Thin section mafic and ultramafic rocks**
Week 12	**Lab 12: CIPW**
Week 13	**Lab 13: CIPW**
Week 14	**Lab 14:CIPW**
Week 15	**Lab 15: CIPW**

Learning and Teaching Resources

	Text	Available in the Library?
Required Texts		
Recommended Texts	Igneous Rocks and Processes A Practical Guide	
Websites	Geology.com	

Grading Scheme

Group	Grade		Marks %	Definition
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria

Fail Group **(0 – 49)**	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Hydrology**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐ **Seminar**	
Module Code	GEO23015				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGII	**Semester of Delivery**		3
Administering Department		GEO	**College**	COS	
Module Leader	Asem Ahmed Hassan		**e-mail**	asem.ahmed@uodiyala.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name		None	**e-mail**	E-mail	
Scientific Committee Approval Date		21/9/2025	**Version Number**		1.0

Relation with other Modules			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents	
Module Objectives	To gain knowledge about: 1. The basics of Hydrology as one of the Geology branches. 2. Importance of Hydrology, major aspects of Hydrology, divisions, and applications 3. The basic hydrological processes and terminologies 4. The role and career paths of a hydrogeologist. 5. The water cycle and its components. 6. Estimation of hydrological processes such as precipitation, evaporation, infiltration, Runoff, etc. 7. Flood and flood types and flood management. 8. The basics of groundwater hydrology.
Module Learning Outcomes	1. Appreciate that water is the most important substance on the earth and is a key factor for human existence and influencing the process of civilization. 2. Define and explain fundamentals about the definition and subjects of hydrology, hydrological cycle, and hydrological processes. 3. Explain basic terms about precipitation and perform data calculation of average precipitation, and how to present the rainfall data 4. Explain basic terms about evaporation and evapotranspiration, how to calculate evaporation, and list the factors which affect evaporation. 5. Explain basic terms about infiltration and analyze them, define infiltration rate and capacity 6. Define infiltration and factors affecting infiltration and how to perform measurement of Infiltration. 7. Define the basics of Flood types, impacts, and Flood control and protection methods. 8. Appreciate the importance of groundwater, define basic terminology about groundwater, types of aquifers, explain basic terminology about groundwater 9. Problem-solving through working on a range of hydrological data. 10. Learning how to estimate the main hydrological processes.
Indicative Contents	Indicative content includes the following. Introduction to Hydrology, Hydrologic Cycle, Hydrological Processes, Hydrologic Balance (Budget), Major Aspects of Hydrology, Applications of Hydrology, [15 hrs] Water losses: Precipitation, Forms are Precipitation, Measurement of rainfall, Presentation of rainfall data, Average of Rainfall Calculation, [15 hrs]

	Evaporation, Influencing Factors on Evaporation, Transpiration, Evaporation Measurement, Empirical Evaporation Formulas, [10 hrs] Infiltration, Factors affecting infiltration, Measurement of Infiltration. [15 hrs] Runoff, Factors affecting Runoff, Classification of streams, Stream Order, [10 hrs] Hydrograph, Factors affecting the Hydrograph, Hydrograph Components. [15 hrs] Floods, Types of Floods, Floods Impacts, Flood Design, Flood Control and Protection [15 hrs] Groundwater, Types of Aquifers, Groundwater movement, Darcy's Law, Springs: [30 hrs]

Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students to participate in the lectures and exercises and expand their thinking skills. Students will learn the basic concepts of Hydrology in lectures and apply these concepts in practical classes involving lab experiments and exercises.

Student Workload (SWL)			
Structured SWL (h/sem)	64	**Structured SWL (h/w)**	4.2
Unstructured SWL (h/sem)	61	**Unstructured SWL (h/w)**	4
Total SWL (h/sem)	**125**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Hydrology
Week 2	Precipitation
Week 3	Measurements of rainfall
Week 4	Average Precipitation calculation methods
Week 5	Evaporation
Week 6	Infiltration
Week 7	Mid-term Exam
Week 8	Runoff
Week 9	Hydrograph
Week 10	Floods

Week 11	Flood control
Week 12	Introduction to groundwater
Week 13	Types of Aquifers
Week 14	Groundwater movements
Week 15	Springs
Week 16	A preparatory week before the Final Exam

Delivery Plan (Weekly Lab. Syllabus)	
	Material Covered
Week 1	Hydrological data
Week 2	The mass curve of precipitation
Week 3	Hyetograph
Week 4	Average Precipitation calculation methods
Week 5	Evaporation calculation 1
Week 6	Evaporation calculation 2
Week 7	Infiltration calculation
Week 8	Lab 8: Exam
Week 9	Runoff calculation
Week 10	Hydrograph separation
Week 11	Discharge
Week 12	Floods calculation
Week 13	Groundwater flow 1
Week 14	Groundwater flow2
Week 15	Groundwater velocity

Week 16	Preparation of the final exam

Learning and Teaching Resources		
	Text	**Available in the Library?**
Required Texts	Hydrology, Principles, Analysis, Design by H. M. Raghunath	No
Recommended Texts	1. Fundamentals of Hydrology by Time Davie 2. Engineering Hydrology by E.M. Wilson 3. Advanced Hydrology by V.T. Chow	No
Websites	https://www.usgs.gov/special-topics/water-science-school/science/what-hydrology#Intro	

Grading Scheme				
Group	**Grade**		**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent		90 - 100	Outstanding Performance
	B - Very Good		80 - 89	Above average with some errors
	C - Good		70 - 79	Sound work with notable errors
	D - Satisfactory		60 - 69	Fair but with major shortcomings
	E - Sufficient		50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail		(45-49)	More work required but credit awarded
	F – Fail		(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

Module Information					
Module Title	**Geomorphology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐**Lecture** ☒ **Lab** ☐**Tutorial** ☐ **Practical** ☐**Seminar**	
Module Code	**GEO23016**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	GEO		**College**	Science collage	
Module Leader	Abdulqader adnan khalaf		**e-mail**	E-mail abdulkader@ uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Lecture		**Module Leader's Qualification**	M.SC.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives	1- The course provides an overview of landforms, landforming processes, and landscape evolution. 2- In particular, it aims to shed light on various landforming processes and how these depend on climate and tectonic regimes, and time. 3- The course shall further convey an understanding of landforming processes on different temporal and spatial magnitudes.
Module Learning Outcomes	On completion of the course the student should have the following learning outcomes defined in terms of knowledge, skills and general competence: Knowledge The student can explain principal terms, definitions and theories (e.g. conceptual approaches in geomorphology) describe landforms and landforming processes in different climate zones and tectonic regimes explain different theories and models for landscape evolution discuss the development of micro to mega scale landforms and their lifespans assess the mode of formation, age and history for landforms in Norway

	Skills The student can plan and carry out a geomorphological field investigation (incl. observation, interpretation, report) search and find relevant information to elucidate geomorphological problems evaluate what information that requires citation in own essay texts, as well as apply a relevant tool for handling references compare and discuss the formation of large-scale landforms involving both exogenous and endogenous processes General competence The student can apply a precise geological language to describe and discuss geological processes, phenomena and theories demonstrate the ability to function individually, in cooperation and ethically with others acknowledge, evaluate and communicate the role of humans in, and our dependency and impact on, the Earth system accomplish field work in alignment with GEO¿s/UiB¿s health and safety regulations use field-based techniques to obtain and work with Earth science data use libraries and scientific databases to retrieve relevant information, including the proper citation of sources
Indicative Contents	Indicative content includes the following. **Introduction of Geomorphology** is the study of earth surface processes and landforms**.** **[10 hrs]** **Topography** Topography is a term used to describe the Earth‟s surface. Topography includes a variety of different features, collectively referred to as landforms. [10 hrs] **Constructive and Destructive Processes** Constructive processes build landforms through tectonic and depositional processes**.** [5 hrs] **Genetic Landform Classification** The genetic landform classification system groups landforms by the dominant set of geomorphic processes responsible for their formation.

	This includes the following processes and associated landforms **[5 hrs]** **Orogenesis** Orogenesis is the thickening of the continental crust and the building of mountains over millions of years and it translates from Greek as “birth of mountains”, (oros is the Greek word for mountain). **[5 hrs]** **Fractures and Joints** **Joints occur where a rock breaks but there is no displacement or faulting associated** **with the break ,Fractures are breaks in rocks that are often singular more random features and are not associated with a set of joints** [10 hrs] **Lava Domes** Lava domes are rounded, steep-sided mounds built by very viscous magma that is resistant to flow and builds up forming a dome. **[5 hrs]** **Volcanic Landforms: Extrusive Igneous** **[7 hrs]** **Volcanic Landforms: Intrusive Igneous** **[7 hrs]** **River Systems and Fluvial Processes** Rivers are one of the most dominant agents of landscape change because their flowing waters are continually eroding, transporting, and depositing sediments. **[10 hrs]** **Mountain Streams** Mountain streams are high-gradient, low-order streams sourced from springs, rainfall, or snowmelt. They often contain a v-shaped valley, bedrock stream bottom, rapids, waterfalls, and a very narrow flood plain. **[10 hrs]** **Flood plains** Flood plains are the landform adjacent to the river channel that is influenced by modern river processes. Flood plains are constructive, depositional landforms created by stream flow and sediment deposition. **[10 hrs]**

	Karst Landforms Karst is a term used to describe landscapes that are formed by chemical weathering process controlled by groundwater activity. Karst landscapes are predominantly composed of limestone rock that contains > 70 percent calcium carbonate. **[10 hrs]** . **Aeolian Landforms** Aeolian landforms are formed by the deposition of windblown sediments. The sediments are generally sourced from deserts, glacial deposits, rivers, or coastal shorelines **[10 hrs]** **Coastal Landforms** Coastal landforms include a diverse array of shoreline and near-shoreline features, as well as some coastal plain landforms far removed from the modern ocean by long term sea-level changes. This section will explore both constructive and destructive landforms formed by current coastal processes, as well as marine related landforms that were formed during periods of higher sea level**.** **[10 hrs]**
Learning and Teaching Strategies	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Student Workload (SWL)			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered

Week 1	**Introduction of** Geomorphology
Week 2	**Topography**
Week 3	**Constructive and Destructive Processes**
Week 4	**Genetic Landform Classification**
Week 5	**Orogenesis**
Week 6	**Fractures and Joints**
Week 7	**Volcanic Landforms: Extrusive Igneous**
Week 8	**Lava Domes**
Week 9	**Volcanic Landforms: Intrusive Igneous**
Week 10	**River Systems and Fluvial Processes**
Week 11	**Mountain Streams**
Week 12	**Flood plains**
Week 13	**Karst Landforms**
Week 14	**Aeolian Landforms**
Week 15	**Coastal Landforms**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Lab	**Material Covered**
Week 1	**Lab 1: Methods of studying** Geomorphology
Week 2	**Lab 2: Topography**
Week 3	**Lab 3: Constructive and Destructive Processes**
Week 4	**Lab 4: Genetic Landform Classification**

Week 5	**Lab 5: Orogenesis**
Week 6	**Lab 6: Fractures and Joints**
Week 7	**Lab 7: Volcanic Landforms: Extrusive Igneous**
Week 8	**Lab 8: Lava Domes**
Week 9	**Lab 9: Volcanic Landforms: Intrusive Igneous**
Week 10	**Lab 10: River Systems and Fluvial Processes**
Week 11	**Lab 11: Mountain Streams**
Week 12	**Lab 12: Flood plains**
Week 13	**Lab 13: Karst Landforms**
Week 14	**Lab 14: Aeolian Landforms**
Week 15	**Lab 15: Coastal Landforms**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
Recommended Texts	INTRODUCTION TO MINERALOGY AND PETROLOGY S. K. HALDAR Emeritus Scientist, Dept. of Applied Geology & Environmental System Management, Presidency University, Kolkata-700 073, and IMX Resources Limited, Australia. Formerly, Hindustan Zinc Limited, Hindustan Copper Limited, ESSO INC and BIL Infratech Ltd, India. JOSIP Formerly Professors, Head, Director, President and Dean, Department of Mining, Geology and Petroleum Engineering, University of Zagreb, Croatia	No
Websites	Geology.com	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Paleontology**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	GEO23017				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	GEO		**College**	COS	
Module Leader	Salah Ali Hussain		**e-mail**	Dr.salah@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Abdelratha M.		**e-mail**	abdalratha.sahaab@uodiyala.edu.iq	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	9. Students will be able to reconstruct the biological traits of extinct organisms. 10. Students will be able to interpret the modes of life of fossil organisms. 11. Students will be able to reconstruct the taphonomic history of a given fossil or fossil assemblage. 12. Students will be able to use the principles of taphonomy to predict what an "entire" community would have looked like based on preserved fauna. 13. Students will be able to determine evolutionary relationships among a set of organisms. 14. Students will be able to gather and analyze phylogenetic information. 15. Students will be able to design a phylogeny of familiar objects, imaginary fossils, or real organisms.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	16. Recognize, interpret and explain the geological, climatic and environmental processes that have shaped present-day landscapes and habitats. 17. Outline the major phases in the evolution of life on earth and describe key events as preserved in the fossil record. 18. Describe the evolution of major groups of organisms and identify the anatomical links between extinct and living life forms.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Introduction and Paleontology and nature of fossils</u> Paleontology is the study of the remains of animals and plants which existed prior to the present time. [15 hrs] Sponges The sponges are aquatic, dominantly marine invertebrates, which are ranked next above protozoans in classification [15 hrs] Coelenterates The coelenterates are aquatic invertebrates of highly varied form which are the most simply organized animals having well-developed body tissues. [10 hrs] Bryozoans The invertebrates called bryozoans are aquatic animals, of which the great majority live in the sea and only a few kinds inhabit freshwaters. [15 hrs]

	Brachiopods One of the chief divisions of invertebrate fossils consists of the Brachiopoda. [10 hrs] Mollusks The name Mollusca (Mollusca, soft- bodied) are one of the main groups of invertebrates, especially from the standpoint of paleontological study, is the assemblage contained in the phylum Mollusca. [15 hrs] Cephalopods Most of the animals discussed previously are sessile or relatively slow-moving invertebrates, crawling on the bottom or drifting about at the mercy of waves and currents. [15 hrs] Pelecypods The pelecypods are a division of mollusks which stands rather well apart from others in having a skeletal covering that consists of two calcareous valves.. [15 hrs] Arthropods Animals called arthropods (arthro, joint; pod, foot) are invertebrates of highly varied form, distinguished primarily by a segmented organization of the body and the possession of a hardened external covering. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Students will learn the basic concepts in lectures and apply these concepts in practical classes involving maps, seismic sections, and outcrop and subsurface log information. Previous field courses will be made explicit reference to in order to provide linkage from the field to the class.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to paleontology and nature of fossils
Week 2	Type of preservation Unaltered Soft and hard Parts
Week 3	Type of preservation - Altered hard Parts
Week 4	Type of preservation Altered hard Parts
Week 5	Sponge
Week 6	Coelenterates
Week 7	Mid-term Exam
Week 8	Bryozoans
Week 9	Brachiopoda
Week 10	Brachiopoda
Week 11	Gastropoda
Week 12	Pelecypoda
Week 13	Cephalopoda
Week 14	Arthropoda
Week 15	Arthropoda
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to paleontology and nature of fossils

Week 2	Type of preservation Unaltered Soft and hard Parts
Week 3	Type of preservation - Altered hard Parts
Week 4	Type of preservation Altered hard Parts
Week 5	Sponge
Week 6	Coelenterates
Week 7	Mid-term Exam
Week 8	Bryozoans
Week 9	Brachiopoda
Week 10	Brachiopoda
Week 11	Gastropoda
Week 12	Pelecypoda
Week 13	Cephalopoda
Week 14	Arthropoda
Week 15	Arthropoda
Week 16	Preparation of final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Moore R.C., 1979. Treatise on invertebrate paleontology. Geological Society of America. 594 P.	No
Websites	https://biodiversity.ku.edu/invertebrate-paleontology/publications	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Geophysics**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	GEO23016				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	3	
Administering Department	GEO		**College**	COS	
Module Leader	Munther Dhahir Nsaif		**e-mail**	Munther_hnt@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Abdelratha M.		**e-mail**	abdalratha.sahaab@uodiyala.edu.iq	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Physics , geology	**Semester**	1 , 2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1- The course aims to equip the student with fundamental theory, and different geophysical methods that are used currently in different applications 2- The module will equip students with experience in a range of geophysical methods, carrying out surveys and associated data analysis and interpretation. How the various methods can be integrated will also be explored.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	On completion of this course, the student will be able to: 1- understand the basic principles of different geophysical methods 2- Gain practical experience and understanding of some geophysical survey techniques in the field. 3-Use of Integrated Geophysical Methods
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. introduction on the theoretical fundamentals of geophysics, overview of the geophysical techniques, definition of sensitivity and resolution and applicability of the methods. Planning of a geophysical survey: Gravimetric method: Introduction on the physical principles of gravity, gravity measurements, ellipsoid and geoid, gravimetric anomalies and main corrections, interpretative methods, regional and local fields, anomalies due to bodies of different geometries, determination of depth and mass, hints to direct and inverse modelling, fields of application and limitations, study examples. Geomagnetic method: Introduction on the physical principles of geomagnetism, magnetic properties of rocks and minerals, Earth's magnetic field and variations, measurement tools and techniques, data processing and interpretation principles, modelling of anomalies due to bodies of different geometries and magnetic properties, determination of body depth, comparison with gravimetric method, fields of application and limitations, study example . [15 lecture]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	• lectures are given to transfer the course material to the student in a simple and clear way • discussion will be open at each class to help students express their thoughts and ideas, and to improve theircommunication skills • students will be given group assignments to do team and individual research work to broaden theirknowledge and put into practice the different theories and concepts covered in the lectures.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	Midterm Exam	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to geophysics , classification , important and application of geophysical methods.
Week 2	Basic principles of Gravity method. Gravity survey design , Methods of correction gravity data
Week 3	Regional and residual anomaly , methods of separation anomaly ,
Week 4	Density and methods of density determination
Week 5	Methods of interpretation
Week 6	Methods of interpretation
Week 7	Mid-term Exam

Week 8	**Magnetic methods , Basic principles Types of magnetization**
Week 9	**Magnetic field , theories on origin of magnetic field , Geomagnetic Field Elements**
Week 10	**Components of the magnetic field , Temporal variations of magnetic field**
Week 11	**Magnetic survey design , Methods of correction, Factors influence magnetic anomaly shape**
Week 12	**Introduction to electrical methods, Basic principles**
Week 13	**Electrodes Configuration(Electrodes Arrangements).**
Week 14	**Field Techniques of Measurements**
Week 15	**presentation and interpretation of resistivity data**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Units and converting methods
Week 2	International gravity equation
Week 3	Gravity corrections
Week 4	Gravity corrections
Week 5	Bouger anomaly map
Week 6	Regional and residual anomaly
Week 7	Methods of separation anomaly
Week 8	Mid-term Exam
Week 9	Magnetic storms
Week 10	Diurnal corrections
Week 11	Presentation of Horizontal profiling data

Week 12	Qualitative Interpretation
Week 13	Calculation of geometric factor
Week 14	Presentation of VES data (three layer
Week 15	Presentation of VES data (type of resistivity curves)
Week 16	Preparation of final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Dobrin and Savit,1988,Introduction to geophysical prospecting - Kearey ,Brook,1984,An Introduction to geophysical prospecting - Parasnis,1986, Principles of applied geophysics - Reynolds , 1997,An introduction to Applied and environmental Geophysics	No
Websites		

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Optical mineralogy**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GEO24119**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	GEO		**College**	Science collage	
Module Leader	Muaiad Tahir Ahmed		**e-mail**	E-mail muaiad.tahir@ uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.SC.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	**GEO1218**	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This course is designed to achieve the general objectives in the form of outputs that the student is supposed to acquire after successfully completing the course, as follows: 1. The student learned about the different types of minerals using a polarizing microscope, based on their optical properties resulting from their interaction with light. 2. Identify the types of interference forms and the classification of minerals on their basis. 3. Identify the occurrence of important minerals and their distribution on the three types of rocks and how to differentiate between minerals within the same rock sample. 4. The student learns the systematic methods of studying minerals and their textures using a polarizing microscope.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Through the student's study of the mineral optics course, it is assumed that a number of cognitive, intellectual and practical outputs will be achieved, as follows: A. Knowledge and understanding After studying this course, it is assumed that the student has understood and recognized the basic facts and information related to the optical properties of minerals and their applications, in particular the following: 1 Learn the basics of mineral optics as a basis for the study of minerals and rocks. 2 Learn the techniques of the plane stage in the polarizing microscope in the study of transparent minerals. 3 Learn the petrographic characteristics of rock-forming minerals as a basis for rock petrology. 4 Learn the systematic methods of studying minerals and their textures using a polarizing microscope and linking the relationship between the crystalline and chemical structure with the optical properties of minerals. B. Mental skills By passing this course, the student is supposed to have acquired the following mental skills: 1 Understand the relationship between the internal (crystalline), chemical and optical structure of minerals and their distribution. 2 Understanding and interpreting histological relationships and mineral assemblies under the microscope. 3 Compare the change in the optical properties with the change in the crystal system and the chemical composition. 4 Understand systematic methods for identifying unknown transparent minerals.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Introduction of Mineral Optics [5 hrs] Optical mineralogy involves studying rocks and minerals by studying their optical properties. Today, most optical mineralogy involves examining thin sections with a petrographic microscope. Petrographic microscopes have polarized light sources that illuminate a thin section. • polarizing microscope [7 hrs]

Polarizing microscopes are also referred to as petrology or geology microscopes. Polarizing light is used with either transmitted and/or reflected light to view chemicals, rocks and minerals. When viewing rocks and minerals thin sections of the sample are mounted on a slide for examination.

- Plane polarized and cross polarized Light-Isotropic [8 hrs]

Without the upper polarizer, we see a sample in plane-polarized light, also called PP light. With the upper polarizer, we see it in cross-polarized light, also called crossed polars or XP light. Grain size, shape, color, cleavage, and other physical properties are best revealed in PP light.

- Anisotropic Minerals Behavior of minerals in cross polarized light [7 hrs]

anisotropic mineral: A mineral with more than one principal refractive index. birefringence: The mathematical difference between the largest and smallest refractive index for an anisotropic mineral. biaxial mineral: A mineral with three principal refractive indices and two optic axes.

- Birefringence - Uniaxial and Biaxial minerals [8 hrs]

Birefringence is the phenomenon exhibited by certain materials in which an incident ray of light is split into two rays, called an ordinary ray and an extraordinary ray, which are plane-(linear) polarized in mutually orthogonal planes, or circular-polarized in opposite directions (left and right).

- Uniaxial Indicatrices - Orientation of indicatrices as per the section [10 hrs]

In uniaxial crystals, the optic indicatrix is an ellipsoid of revolution (with two main axes and a circular horizontal plane). The direction of the optic axis (vertical axis or "c" axis) coincides with the direction of the axis with greatest crystalline symmetry (quaternary axis).

- Biaxial Indicatrices - Orientation of indicatrices as per the section [10 hrs]

The biaxial indicatrix has three principle axes, labeled α, β, and γ. Directions that have refractive indices between α and β, are referred to as α'. Directions with refractive indices between γ and β are referred to as γ'. Note that the β direction also must occur in the plane that includes α and γ.

- Interference of light waves - Passage of light through doubly refracting minerals [8 hrs]

Double refraction, or birefringence, occurs in optical mineralogy when plane-polarized light passes through an anisotropic mineral and emerges as two rays traveling at different speeds, the difference between which is characteristic of a mineral.

- Generation of interference colors [7 hrs]

The interference color is produced when the retardation between the waves of the crystal is equal to a whole number of wavelengths corresponding to its complementary colour.

- Conoscopic or convergent polarized light - Generation of Uniaxial [10 hrs]

Conoscopic interference is generated when crystals are viewed between crossed polarizers with converging monochromatic light.

- interference figures - Forms of interference figures related to sections [8 hrs]

Interference figures are a technique which can be used to help identify minerals using a polarizing light microscope. In this chapter, we explore the practical aspects of obtaining and interpreting interference figures and other related observations.

- Generation of Biaxial interference figures - Forms of interference figures related to sections [8 hrs]

	Biaxial interference figures are most useful for the determination of optic sign and estimation of the 2V angle, both of which are useful diagnostic properties of biaxial minerals. • Optical accessories like mica, gypsum and quartz plates - Determination of Optic sign of uniaxial and biaxial minerals [7 hrs] accessory plate (sensitive tint) In optical microscopy, a plate used to determine the optical properties of minerals. Quartz, mica, and gypsum are the common minerals used to determine the slow and fast vibration directions that relate to the two refractive indices of an anisotropic mineral. • True and apparent optic axial angle, 2V and 2E, - Methods of determination of optic axial angle - Use of Universal stage [7 hrs] The angle between the two optic axes of a biaxial crystal; its symbol is 2V (less than 90 degrees), $2V_{alpha}$, or $2V_{gamma}$, depending on whether the optic direction X or Z is in the acute bisectrix. • Dispersion of light - its effect on interference figures [7 hrs] Interference figures are a technique which can be used to help identify minerals using a polarizing light microscope. • Absorption of light by minerals - Scheme of pleochroism [8 hrs] A pleochroic mineral literally changes color as it is rotated on the microscope stage while viewed using plane-polarized light and is described by the pleochroic scheme.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Module Evaluation تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	**Introduction of** Mineral Optics
Week 2	**polarizing microscope**
Week 3	Plane polarized and cross polarized Light-Isotropic
Week 4	Anisotropic Minerals Behavior of minerals in cross polarized light
Week 5	Birefringence - Uniaxial and Biaxial minerals
Week 6	Uniaxial Indicatrices - Orientation of indicatrices as per the section
Week 7	Biaxial Indicatrices - Orientation of indicatrices as per the section
Week 8	Interference of light waves - Passage of light through doubly refracting minerals
Week 9	Generation of interference colours
Week 10	Conoscopic or convergent polarized light - Generation of Uniaxial interference figures - Forms of interference figures related to sections
Week 11	Generation of Biaxial interference figures - Forms of interference figures related to sections
Week 12	Optical accessories like mica, gypsum and quartz plates - Determination of Optic sign of uniaxial and biaxial minerals
Week 13	True and apparent optic axial angle, 2V and 2E, - Methods of determination of optic axial angle - Use of Universal stage
Week 14	Dispersion of light - its effect on interference figures
Week 15	Absorption of light by minerals - Scheme of pleochroism

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Week Lab	**Material Covered**
Week 1	Lab 1: **Relationships**
Week 2	Lab 2: **Questions in relationships**
Week 3	Lab 3: **Dispersion**
Week 4	Lab 4: **Question in Dispersion**
Week 5	Lab 5: **Polarized light**
Week 6	Lab 6: **Polarizing microscope**
Week 7	Lab 7:**Polarized microscope components**
Week 8	Lab 8: **Light Absorption And Color Transmission**
Week 9	Lab 9:**Study optical properties of minerals under microscope**
Week 10	**Lab 10: Study describing the groups of minerals that form the rocks, which include: ferrous silicate minerals (olivine group - pyroxene group - amphibole group**
Week 11	**Lab 11: A study describing the groups of minerals that form the rocks, including: the mica group - the chlorite group and serpentine) - the ferrous minerals**
Week 12	**Lab 12: A study describing the groups of minerals that form the rocks, including: the metamorphic and additional minerals - the carbonate minerals that form the rocks.**
Week 13	Lab 13: **Thin section of Igneous rocks**
Week 14	Lab 14: **Thin section of Sedimentary rocks**
Week 15	Lab 15: **Thin section of Metamorphic rock**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts		
Recommended Texts		

Websites	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Metamorphic rocks**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GEO24120**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	2	
Administering Department	GEO		**College**	Science collage	
Module Leader	Muaiad Tahir Ahmed		**e-mail**	E-mail muaiad.tahir@ uodiyala.edu.iq	
Module Leader's Acad. Title	Assistant Professor		**Module Leader's Qualification**	M.SC.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	GEO23014 Igneous rocks	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To give students a broad introduction to and understanding of geological materials and their creation, destruction, and change via the rock cycle. The focus will be to introduce the main rock-forming minerals (silicates and non-silicates), their structures, chemistry, formation and identification. The main rock types will be introduced (igneous, sedimentary, and metamorphic) and explored in the context of their formation and alteration via the rock cycle and associated major Earth processes. The module addresses the science of geological materials at an introductory level and then applies this to mineral and rock-forming processes in the context of plate tectonics. The ability to describe and identify major rock-forming minerals and the major rock types will be a key practical focus of the module.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Students will 1. Know of basic plate tectonic environments on the Earth and their relation to the rock types developed 2. Be able to identify and describe a range of common rock-forming minerals using physical and optical properties, and demonstrate how these collectively make up the composition of a variety of rocks; 3. be able to identify and describe the three rock types (igneous, sedimentary and metamorphic) in hand specimen and thin section and understand their modes of formation; 4. Be able to use geological evidence to test hypotheses about the formation of rock units and therefore constrain their associated environments. 5.Define the characteristics of a metamorphic rock. 6. Discuss the effect of heat, pressure and deformation on rocks.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. • Metamorphic petrology Concepts and theory [5 hrs] Metamorphic petrology covers the chemical and physical work done in natural systems in response to changing physical conditions. Petrogenetic processes such as recrystallization, continuous and discontinuous reactions, mixed volatile reactions and deformation are addressed. • Types of metamorphism and their controlling factors [10 hrs] The three types of metamorphism are Contact, Regional, and Dynamic metamorphism. Contact Metamorphism occurs when magma comes in contact with an already existing body of rock. When this happens the existing rocks temperature rises and also becomes infiltrated with fluid from the magma. • Common minerals of metamorphic rocks [5 hrs] Some different minerals that are common in metamorphic rocks are: kyanite, garnet, sillimanite, andalusite, and corundum. In addition, metamorphic rocks can contain combinations of minerals that would never be found in ingeous rocks, such as quartz and amphibole. • Field observation, petrographic classification of common metamorphic rocks [10 hrs] There are two main types of metamorphic rocks: those that are foliated because they have formed in an environment with either directed pressure or shear stress, and those that are not foliated because they have formed in an environment without directed pressure or relatively

near the surface with very little pressure at all. Some types of metamorphic rocks, such as quartzite and marble, which also form in directed-pressure situations, do not necessarily exhibit foliation because their minerals (quartz and calcite respectively) do not tend to show alignment .

- Metamorphic facies and facies series [10 hrs]

Metamorphic facies series were defined (Miyashiro, 1994) on the basis of pressure and temperature gradients, both of which are related to the conditions of metamorphism and tectonic setting. Five metamorphic facies series, assigned to three major groups, are recognized.

- Phase diagrams and graphic representation of mineral assemblages [7 hrs]

Phase diagram is a graphical representation of the physical states of a substance under different conditions of temperature and pressure. A typical phase diagram has pressure on the y-axis and temperature on the x-axis. As we cross the lines or curves on the phase diagram, a phase change occurs.

- Pro grade and retrograde metamorphism, Metasomatism [10 hrs]

Prograde metamorphism refers to the changes in a rock that accompany such increasing metamorphic grade. Retrograde refers to decreasing grade as a body of rock cools and recovers from a metamorphic or igneous event, and retrograde metamorphism describes any accompanying changes.

- Deformation textures and textures related to recrystallization [10 hrs]

Textures are often developed during thermomechanical treatments of alloys and classified into two types: one is the deformation texture caused by a severe deformation process such as cold rolling, and the other is the recrystallization texture caused by a subsequent solution (recrystallization) heat treatment.

- Metamorphic reactions, elemental and PT conditions of isograds [10 hrs]

Metamorphic rocks form when rocks are subjected to high heat, high pressure, hot mineral-rich fluids or, more commonly, some combination of these factors. Conditions like these are found deep within the Earth or where tectonic plates meet.

- Regional and thermal metamorphism of pelitic rocks [8 hrs]

A pelite (from Ancient Greek πηλός (pēlós) 'clay, earth') or metapelite is a metamorphosed fine-grained sedimentary rock, i.e. mudstone or siltstone.

- Regional and thermal metamorphism of basic and ultra-basic igneous rocks [7 hrs]

Regional metamorphism is metamorphism that occurs over broad areas of the crust. Most regionally metamorphosed rocks occur in areas that have undergone deformation during an orogenic event resulting in mountain belts that have since been eroded to expose the metamorphic rocks.

- Regional and thermal metamorphism of impure, siliceous carbonate rocks [8 hrs]

Calcsilicates, metacarbonate rocks dominated by silicate minerals, are produced by metasomatism during metamorphism of carbonate sedimentary rocks.

Calcsilicates may be in zoned *skarns* that develop adjacent to or around igneous intrusions.

	• Metamorphism of Granitoides, Charnokites and Migmatites [10 hrs] Typically, granitoids occur where orogeny thickens continental crust either by subduction yielding a continental arc or by convergence yielding continental collisions. Generally, the evolution to granitoid magmas requires a thermal disturbance to ascent though continental crust. The charnockite series originally was assumed to have developed by the fractional crystallization of a silicate magma (molten material). Subsequent studies have shown, however, that many, if not all, of the rocks are metamorphic, formed by recrystallization at high pressures and moderately high temperatures. Migmatites form under extreme temperature and pressure conditions during prograde metamorphism, when partial melting occurs in metamorphic paleosome. Components exsolved by partial melting are called neosome (meaning 'new body'), which may or may not be heterogeneous at the microscopic to macroscopic scale. • Plate tectonic and 4 metamorphic processes [10 hrs] All of the important processes of metamorphism that we are familiar with can be understood in the context of geological processes related to plate tectonics. • Examples of metamorphic rocks in Iraq [5 hrs] The Iraqi territory is covered mainly by sedimentary rocks, Quaternary sediments and very rare igneous and metamorphic rocks.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.

Module Evaluation تقييم المادة الدراسية				
	Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**

Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Metamorphic petrology Concepts and theory
Week 2	**Types of metamorphism and their controlling factors**
Week 3	**Common minerals of metamorphic rocks**
Week 4	**Field observation, petrographic classification of common metamorphic rocks**

Week 5	**Metamorphic facies and facies series**
Week 6	**Phase diagrams and graphic representation of mineral assemblages**
Week 7	**Pro grade and retrograde metamorphism, Metasomatism**
Week 8	**Deformation textures and textures related to recrystallization**
Week 9	**Metamorphic reactions, elemental and PT conditions of isograds**
Week 10	**Regional and thermal metamorphism of politic rocks**
Week 11	**Regional and thermal metamorphism of basic and ultra-basic igneous rocks**
Week 12	**Regional and thermal metamorphism of impure, siliceous carbonate rocks**
Week 13	**Metamorphism of Granitoides, Charnokites and Migmatites**
Week 14	**Plate tectonic and 4 metamorphic processes**
Week 15	**Examples of metamorphic rocks in Iraq**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
Lab	**Material Covered**
Week 1	Lab 1: Introduction to Metamorphic rocks
Week 2	Lab 2: Type of Metamorphism
Week 3	Lab 3: Regional Metamorphism rocks
Week 4	Lab 4: Contact Metamorphism rocks
Week 5	Lab 5: Foliated rocks
Week 6	Lab 6: Non-Foliated rocks
Week 7	Lab 7: Metamorphism of sedimentary rocks
Week 8	Lab 8: Metamorphism of mafic and ultramafic
Week 9	Lab 9: Thin section regional metamorphism

Week 10	Lab 10: Thin section contact metamorphism
Week 11	Lab 11: Thin section Foliated rocks
Week 12	Lab 12: Thin section non-foliated rocks
Week 13	Lab 13: ACF *Diagram*
Week 14	Lab 14: AKF *Diagram*
Week 15	Lab 15: AFM Thompson diagram

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts		
Recommended Texts		
Websites	Geology.com https://opengeology.org/petrology/13-metamorphism-of-mafic-rocks/	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Engineering Geology**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐ **Seminar**	
Module Code	GEO24021				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	GEO		**College**	COS	
Module Leader	Asem Ahmed Hassan		**e-mail**	asem.ahmed@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	None		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	To gain knowledge about: 19. The basics of Engineering as one of the applied branches of Geology 20. Importance of Engineering geology, major aspects of Engineering, and applications, The role and career paths of Engineering geologists. 21. The physical properties of soils and rocks 22. The engineering properties of soils and rocks 23. Stress, Strain, Strength, and Deformations in soils and rocks 24. Physical state and Consistency of soil. 25. The main principles of Site Investigation and soil sampling. 26. Geohazards and engineering problems of soil and rocks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	11. Define and explain fundamentals about the definition and subjects of Engineering Geology. 12. Appreciate the role of engineering geology in civil engineering works 13. Explain basic terms about the physical and mechanical properties of rocks and soils. 14. Explain basic terms about site investigation and how to perform field site investigation. 15. Learning how to perform soil sampling 16. Define the basics of geohazards, impacts, and mitigation methods 17. Problem-solving through working on a range of geotechnical problems. 18. Learning how to carry out tests to determine the physical and engineering properties of soils and rocks.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Introduction to Engineering Geology, The role of Engineering Geologist, Aspects of Engineering Geology and Applications [15 hrs.] Physical Properties of soils, Water content, Density, Unit weight, void ratio, degree of saturation, etc. [15 hrs.] Stress, strain, strength, deformations, Engineering Properties of soils, [10 hrs.] Physical states of soils, Atterberg limits, Consistency of soils. [15 hrs.] Site investigation, Site investigation stages, geotechnical reports [10 hrs.] Soil sampling and boring methods, Geophysical methods for site investigation [15 hrs.] Geohazards, [15 hrs.] Engineering problems of soils [30 hrs.]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main strategy that will be adopted in delivering this module is to encourage students to participate in the lectures and exercises and expand their thinking skills. Students will learn the basic concepts of Engineering Geology in lectures and apply these concepts in practical classes involving lab experiments and exercises.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	86	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	150		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Engineering Geology
Week 2	Physical properties of soils and rocks
Week 3	Engineering properties of soils and rocks 1
Week 4	Engineering properties of soils and rocks 2
Week 5	Soil states and consistency
Week 6	Site investigation
Week 7	**Mid-term Exam**
Week 8	Soil sampling
Week 9	Geophysical Methods in engineering projects 1
Week 10	Geohazards 1
Week 11	Geohazards 2
Week 12	Geohazards 3
Week 13	Slope Stability
Week 14	Engineering problems of soils1
Week 15	Engineering problems of soils2
Week 16	**A preparatory week before the Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab equipment
Week 2	Soil sampling
Week 3	Moisture content
Week 4	Lab Soil density
Week 5	Field soil density
Week 6	Soil compaction
Week 7	Specific gravity
Week 8	**Lab 8: Exam**
Week 9	Liquid limit
Week 10	Plastic limit
Week 11	Shrinkage limit
Week 12	Grain size
Week 13	Soil Classification
Week 14	Consolidation
Week 15	Shear test
Week 16	**Preparation for the final exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Engineering Geology by F. G. Bell	No

Recommended Texts	1. Engineering Geology, Principles and Practice by D. G. Price 2. Engineering Geology by Subinoy Gangopadhyay 3. Practical Engineering Geology by Steve Hencher	No
Websites	https://www.iaeg.info	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Stratigraphy**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**GEO24122**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	GEO		**College**	COS	
Module Leader	Salah Ali Hussain		**e-mail**	Dr.salah@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Abdelratha M.		**e-mail**	E-mail	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	GEO-215	**Semester**	3
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	27. To examine controls on stratigraphic organisation of sedimentary strata within a time framework. 28. To examine the means by which a time framework can be established in sedimentary strata 29. To examine differences between lithostratigraphy and chronostratigraphy and to communicate formal stratigraphic nomenclature. 30. To introduce the concepts of sequence stratigraphy 31. To enable students to produce well constrained interpretations of the ways in which controlling processes operate to create stratigraphic organization and architecture.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	32. Appreciate the concept of geological time and the differences between lithostratigraphy and chronostratigraphy. 33. Analyze stratigraphy in terms of space and time and to interpret likely controls on stratal patterns. 34. evaluate the geological controls of stratigraphic development. 35. apply formal stratigraphic nomenclature to the geological record. 36. develop an interpretation of geological history and stratigraphic evolution from a geological map. 37. problem solving through working on a range of data types to produce integrated solutions. 38. Working with others through the sharing of maps and sections in practicals and developing solutions. 39. Learning how to draw a simple to complicate stratigraphic column. 40. Correlate between sections. 41. Draw sub-surface Stratigraphic sections 42. Learning all about cutting and core stratigraphy.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Introduction and Stratigraphic units</u> Stratigraphy from Latin stratum + Greek graphia, is the description of all rock bodies forming the Earth's crust. [15 hrs] <u>Stratigraphic relationships</u> Stratigraphic laws and the effect of tectonic and erosions on starta [15 hrs]

	Lithostratigraphic units - There is a hierarchical framework of terms used for lithostratigraphic units. [10 hrs] APPLICATIONS OF LITHOSTRATIGRAPHY Part of the definition of a formation is that it should be a 'mappable unit', and in practice this usually means that the unit can be represented on a map of a scale of 1:50,000, or 1:100,000. [15 hrs] Biostratigraphy [10 hrs] Magnetostratigraphy: The Earth's magnetic field alternates between periods of normal magnetic polarity, which is the field orientation of the present day, and reversed magnetic polarity. [15 hrs] Subsurface Stratigraphy and Sedimentology - Geologists usually learn the principles of sedimentology and stratigraphy from outcrop relationships in the field, but many will work with subsurface data if they are employed as professional geoscientists. [15 hrs] Borehole stratigraphy Data from these sources can provide some indicators of the lithologies in the subsurface, but a full geological picture can be obtained only by the addition of information on lithology and facies. This can be provided by drilling boreholes through the succession and either taking samples of the rocks. [30 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Students will learn the basic concepts in lectures and apply these concepts in practical classes involving maps, seismic sections, and outcrop and subsurface log information. Previous field courses will be made explicit reference to in order to

	provide linkage from the field to the class.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	3 and 12	LO #1, #2 and #10, #11
	Assignments	2	10% (10)	5 and 8	LO #3, #4 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #7
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to stratigraphy and sedimentary rocks
Week 2	Geological time units and Geologic time scale
Week 3	Stratigraphic units
Week 4	Stratigraphic relationships
Week 5	Lithostratigraphic units and facies
Week 6	APPLICATIONS OF LITHOSTRATIGRAPHY
Week 7	Mid-term Exam
Week 8	Biostratigraphy and classification of organisms
Week 9	Magnetostratigraphy
Week 10	Subsurface Stratigraphy
Week 11	Processing of seismic reflection data
Week 12	Interpretation of seismic reflection data:
Week 13	Borehole stratigraphy
Week 14	Borehole cuttings
Week 15	Core
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Stratigraphic units and rock symbols

Week 2	Lab 2: Stratigraphic relationships and unconformities
Week 3	Lab 3: Stratigraphic relationships and included fragments
Week 4	Lab 4: Time-ordering of geologic events
Week 5	Lab 5: Time-ordering of geologic events
Week 6	Lab 6: Drawing a stratigraphic section
Week 7	Lab 7: Drawing a stratigraphic section and correlation
Week 8	Lab 8: Exam
Week 9	Lab 9: LATERAL FACIES CHANGES
Week 10	Lab 10: LATERAL FACIES CHANGES and Walther law
Week 11	Lab 11: LATERAL FACIES CHANGES and Transgression
Week 12	Lab 12: LATERAL FACIES CHANGES and Regression
Week 13	Lab 13: LATERAL FACIES CHANGES and MFS
Week 14	Lab 14: Subsurface section drawing
Week 15	Lab 15: Subsurface section and faults effect
Week 16	Preparation of final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Koutsoukos E.A.M., 2005. Applied Stratigraphy. Springer. 486 P.	Yes
Recommended Texts	Nichols G., 2009. Sedimentology and Stratigraphy. Blackwell Publishing. 432 P.	No
Websites	http://www.agiweb.org/nacsn/code2.html	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks %**	**Definition**
Success Group (50 - 100)	**A -** Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Sedimentology**			**Module Delivery**	
Module Type	**Core**			☒**Theory** ☐**Lecture** ☒**Lab** ☐**Tutorial** ☐**Practical** ☐**Seminar**	
Module Code	**GEO24123 GEO24123**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	2		**Semester of Delivery**	4	
Administering Department	GEO		**College**	COS	
Module Leader	Kareem Hussein Khwedim		**e-mail**	kkhwedim@uodiyala.edu.iq	
Module Leader's Acad. Title	Professor		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name	Abdalratha M. Sahaab		**e-mail**	Abdalratha.sahaab@uodiyala.edu.iq	
Scientific Committee Approval Date	21/9/2025		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	
Co-requisites module		**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives **أهداف المادة الدراسية**	43. Describe how sediments and sedimentary rocks are formed through transport and deposition, with a basic insight into diagenesis and petroleum geology. 44. Identify the main types of sedimentary rocks, textures, ichnofacies and sedimentary structures, and able to reflect on the implications of their formation. 45. Describe the most important characteristics of continental and marine sedimentary environments. 46. Understand stratigraphic principles such as lithostratigraphy, biostratigraphy, chronostratigraphy and sequence stratigraphy. 47. interpretation of ancient environmental conditions in sediment source areas and depositional sites. 48. Study the constituents, textures, structures, and fossil content of the deposits laid down in different geological environments. By these means the students can differentiate between continental and marine deposits of the geologic record.
Module Learning Outcomes **مخرجات التعلم للمادة الدراسية**	1- Understanding how the sediments weathered, transport, and deposited. 2- An appreciation of the way in which Clastic Sedimentology and Petrography relates to other aspects of Petroleum Geosciences and the Earth sciences. 3- Study the types of Clastic sedimentary rocks. 4- Understand theoretical concepts in Clastic Sedimentology and relate these to specific problems or questions. 5- Work safely in the Field and assess related safety issues. 6- Undertake practical experimental work using appropriate equipment and instruments. 7- Apply basic knowledge of practical approaches. 8- Manage and manipulate numerical data from laboratory work and work productively with others in group laboratory experiments.
Indicative Contents **المحتويات الإرشادية**	**Indicative content includes the following:** - Introduction The sedimentary cycle, Biological Weathering and Soil Formation, physical weathering, Chemical Weathering, Physical properties of particles. [15 hrs] - Methods of Particle Analysis

	Interpretation of Particle Size Analyses, Porosity and Permeability, Direct and Indirect methods of porosity measurement, Direct method of permeability measurement. [15 hrs] - Primary or Depositional Porosity Secondary or Postdepositional Porosity, Transportation and Sedimentation, Stokes' law. [10 hrs] - Aqueous processes Unidirectional Traction Currents, Bidirectional Tractional Currents, Sedimentation from High and low-Density Turbidity Currents. [15 hrs] - Eolian processes. [10 hrs] - Glacial processes Gravitational processes, rock fall, slides and slumps, mass flows. [15 hrs] - The sedimentary structures Biogenic sedimentary structures, Primary inorganic sedimentary structures, Predepositional (Interbed) Structures. [15 hrs] - Syndepositional (Intrabed) Structures Massive Bedding, Flat-Bedding, Cross-Bedding, Ripples and Cross-Lamination, Post depositional Sedimentary Structures, Vertical Plastic Deformational Structures, Slumps and Slides, Miscellaneous Structures, Rain Prints, Salt Pseudomorphs, Desiccation Cracks, Synaeresis Cracks, Sand Dikes. [30 hrs]

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	This module has both theoretical and practical examination which form the summative assessments. Part of the summative assessments (continuous exams) are during the semester and another part is at the end of the semester.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	64	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	61	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**125**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	4 and 13	LO #3, #4 and #10, #12
	Assignments	3	10% (10)	2, 6 and 10	LO #2, #5 and #6, #9
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	14	LO #4, #8 and #12

Summative assessment	**Midterm Exam**	2hr	10% (10)	8	LO #1 - #6
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction
Week 2	The sedimentary cycle
Week 3	Chemical weathering
Week 4	Chemical Weathering
Week 5	Interpretation of Particle Size Analyses
Week 6	Measurements of Porosity and Permeability
Week 7	Secondary or Post depositional Porosity
Week 8	Secondary or Post depositional Porosity
Week 9	Aqueous Processes
Week 10	Sedimentation from Low-Density Turbidity Currents
Week 11	Gravitational Processes
Week 12	Primary Inorganic Sedimentary Structures
Week 13	Syndepositional (Intrabed) Structures
Week 14	Cross-Bedding, Slumps and Slides
Week 15	Miscellaneous Structures
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	**Lab 1:** Introduction
Week 2	**Lab 2- 5:** Grain size analysis ((Mechanical Analysis) of Terrigenous Clastic sediments), Gravel, sand and mud
Week 3	
Week 4	
Week 5	
Week 6	**Lab 6- 10:** Size analysis of silt and clay by pipette method
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	**Lab 11- 15:** Graphic presentation of size analysis data
Week 12	
Week 13	
Week 14	
Week 15	
Week 16	Preparation of final exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Selley R.C., 2000, Applied sedimentology, second edition, Academic press, 543p.	Yes
Recommended Texts	- Nichols G., 2009. Sedimentology and Stratigraphy. Blackwell Publishing. 432p.	No
Websites	https://libguides.dickinson.edu/sedstrat/internet	

Grading Scheme

مخطط الدرجات

Group	Grade	التقدير	Marks %	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Baath Party Crimes in Iraq**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐**Lecture** ☐ **Lab** **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	UD24				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	2		**Semester of Delivery**	2	
Administering Department			**College**		
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name	none		**e-mail**		
Scientific Committee Approval Date	11/08/2024		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	None	**Semester**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	ارتكب نظام البعث في العراق إبّان حكمه عدد اً كبير ا مَّن الجرائم المختلفة، واختلافها يلُزم بيان مفاهيم وتعاريف للطالب ليكون على معرفة ودراية بما يمر به مما لها علاقة بمادة المنه ا ج ، كمفهوم الجريمة وأقسامها،والجرائم الدولية التي حُكِ م عليها قيادات وأزلام نظام البعث وف ق قانون المحكمة الجنائية العراقية العلى ا، وعليها سيكون هذا الف صل في مبحثين، المبحث الأول في بيان مفهوم الجرائم وأقسامها، والمبحث الآخر في بيان جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العلى ا لسنة ٢٠٠٥ م.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- تسليط الضوء على جرائم ما ارتكبها نظامٌ جائرٌ في العالمَ ِ ك لهّ على تعاقبُ ِ الأزَمانِ كتلكَ التي ارتكبها)نظامُ البعثِ (على صعيدِ العراقِ خاصة ، والمنطقةِ الإقليميةِ عامة ، والعالمَ ِ كلِهّ شُمولًا. 2- لقد جثمَ نظامُ البعثِ البائدِ على صدرِ العراقِ والعراقيينَ زُهاءَ أرَبعةِ عقودٍ يستقي سياسة تسلطُ ِه من رَضاع عُ تاة الطغاة حِقبَ َ التاريخ ك)قابيلَ ، والنمرودِ ، وفرعَونَ ، وأبَي لهبٍ ، والحجَّاج ، ويزيد ، وهولاكو ، وموسيليني ، وهتلر (بما يتناسبُ ونشأة رأسِه الطاغيةِ وعدوِّ الإنسانيةِ) صدام حسين (المقبورِ ؛ فذاقَ وَيلاتِ بطشِ هذا النظامِ كلُّ مَنِ انتهجَ سبيلَ الحقِّ وحُبِّ الوطنِ ؛ فرفض النهجَ البعثيَّ العفَ ِن ، واكتوى بنارِ قمعِه مِن صنوفِ المآسي والمِحَنِ. 3- لقد تحصَّلَ من هذا الواجبِ التربويّ - التعليميّ) الشرعيّ - الرسميّ(ِ أنَ تكُلفَّ َ لجَنة وزارية مختصة تعُنىَ بوضع منهج يوُثِّقُ بعضا من) جرائمَ النظامِ البعثيّ(ِ ؛ ليكونَ مَبصَرَ حقيقةٍ يشُرِفُ به الشبابُ الجامعيُّ الحاليُّ على ما مضَى من حياة عقودٍ مِن حُكمِ العراقِ بيدِ طاغيةٍ شيطانٍ بهيأة إنسانٍ فيستحضرون من اطِّلاعِهم على أفَصُلِه ومضامينِها ما يجعلُهُم على هُدىً يدرؤُون به كلَّ تعَمِيةٍ إعِلاميةٍ تحُاولُ تضليلهَم ؛ فيمَنعوُن به كلَّ عمًى.
Indicative Contents المحتويات الإرشادية	ارتأتِ اللجنة - التي عاش رئيسُها وأعَضاؤُها كافة مُدة الحُكمِ البعثيّ المُجرمِ ، وذاقوُا مِن وَيلاتِ ا بصدقٍ ومصاديقَ - بعد رِحلةِ توثيقيةٍ بطشِه ما يجعلُ هذا المنهجَ المقررَ للمنظومةِ الأكَاديميةِ الجامعيةِ موضوعى حضوريةٍ ، وإلكترونيةٍ أنَ يأتيَ هذا المنهجُ المُقررُ على مقدِمّةٍ هي التي بينَ يديَ الطالبِ الجام عيّ ، والقارئِ يستنيرُ بها للمضمونِ كلِهّ بدواعي تأليفِه ، ومسوّغاتِ إقرارِه ، ودوافع تدريسِه ، ثم أرَبعةِ أفَصُلٍ وُظِّفَ أوَلهُا لتوثيقِ) جرائمِ نظامِ البعثِ وفقَ قانونِ المحكمةِ الجنائيةِ العراقيةِ العلُيا عام ٢٠٠٥ م (، وجُعِل ثانيها لكشفِ) الجرائمِ النفسيةِ والاجتماعيةِ ، وآثارِها ، وأبَرز انتهاكاتِ النظامِ البعثيّ في العراق (، وكُرّس ثالثهُا لتبيين) الجرائمِ البيئيةِ لنظامِ البعثِ في العراق (، أمَّ َا الفصلُ الرابعُ والأخَيرُ فقد خُصِّص ل)جرائمِ المقابرِ الجماعيةِ (،ثم خُتِم المنهجُ بملخَّصٍ شافٍ وافٍ يضَعُ الحقائقَ مواضعهَا مما مرَّ العرضُ له ، والاستدلالُ عليه. لقد تضمن هذا المنهجُ ما جاء مفاتيحَ معرفية بيدِ الطالبِ الجامعيّ يقَوَى بها على كلِّ مُرتجَ حَبكَ َت رواية أكُذوبتهِ أيَادي البعثِ وإعلامُه المزيفِّ ، وباعت ضميرَ ها أنَفسُ ٌ ترى أنَ تبقى إلِى الآنَ ذليلة أسَيرة ، وذيَلًا تابعاً.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	هذا الواجبِ التربويّ - التعليميّ) الشرعيّ - الرسميّ(ِ أنَ تكُلفَّ َ لجَنة وزارية مختصة تعُنىَ بوضع منهج يوُثِّقُ بعضا من) جرائمَ النظامِ البعثيّ(ِ ؛ ليكونَ مَبصَرَ حقيقةٍ يشُرِفُ به الشبابُ الجامعيُّ الحاليُّ على ما مضَى من حياة عقودٍ مِن حُكمِ العراقِ بيدِ طاغيةٍ

شيطانٍ بهيأة إنسانٍ ؛ فيستحضرون من اطِّلاعِهم على أفَضُلِه ومضامينها ما يجعلهُم على هُدىً يدرؤُون به كلَّ تعَمِيةٍ إعِلاميةٍ تحُاولُ تضليلهَم ؛ فيمَنعوُن به كلَّ عمًى.	

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	1.5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	20	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	0.7
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / tutorial.	1	10% (10)	Continuous	
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	1 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	المقدمة /جرائم نظام البعث وفق قانون المحكمة الجنائية العراقية العليا عام ٢٠٠٥ م
Week 2	الفصل الأوّل:

	١,١ . مفهوم الجرائم وأقسامها ١,١,١ . تعريف الجريمة لغة واصطلاحا
Week 3	.أقسام الجرائم ١,٢. جرائم نظام البعث وفق توثيق قانون المحكمة الجنائية العراقية العليا عام ٢٠٠5 ١,٢,١. أنواع الجرائم الدولية
Week 4	.القرارات الصادرة من المحكمة الجنائية العليا
Week 5	الفصل الثاني الجرائم النفسية والاجتماعية وأثارها، وأبرز انتهاكات النظام البعثي في العراق
Week 6	.الجرائم النفسية ٢,١,١ . آليات الجرائم النفسية. ٢,١,٢ آثار الجرائم النفسية. ٢,٢ الجرائم الاجتماعية. ٢,٢,١ عسكرة المجتمع
Week 7	. موقف النظام البعثي من الدين انتهاكات القوانين العراقية ٢,٣,١ . صور انتهاكات حقوق الإنسان وجرائم السلطة
Week 8	.بعض قرارات الانتهاكات السياسية والعسكرية لنظام البعث ٢,٣,٣ . أماكن السجون والاحتجاز لنظام البعث
Week 9	الفصل الثالث الجرائم البيئية لنظام البعث في العراق.
Week 10	٣,١ . التلوث الحربي والإشعاعي وانفجار الالغام
Week 11	٢ . تدمير المدن والقرى) سياسة الأرض المحروقة
Week 12	.تجفيف الأهوار ٣,٤ . تجريف بساتين النخيل والأشجار والمزروعات
Week 13	جرائم المقابر الجماعية
Week 14	جرائم المقابر الجماعية أحداث مقابر الإبادة الجماعيةّ المرتكبة من النظام البعثي في العرا ق
Week 15	**EXAM**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	جرائم حزب البعث في العراق	yes

	النسخة 1 – الطبعة الاولى20023	
Recommended Texts	أرشيف مؤسسة السجناء السياسيين. أرشيف مؤسسة الشهداء. -أرشيف المركز العراقي لتوثيق جرائم التطرف في العتبة العباسية المقدسة. -الموقع الرسمي للأمم المتحدة. -ايمن عبد العزيز سلامة ، ال مسؤولية الدولية عن ارتكاب جريمة الابادة الجماعية ، ط ١، دار العلوم للنشر والتوزيع ، القاهرة ، ٢٠٠٦. -جندي عبد الملك، الموسوعة الجنائية، الجزء الثالث، دار احياء التراث العربي، بيروت، ١٩٩٠ م.	No
Websites	https://iraqicenter-fdec.org/archives/4224	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
	B - Very Good	جيد جدا	80 - 89	Above average with some errors
	C - Good	جيد	70 - 79	Sound work with notable errors
	D - Satisfactory	متوسط	60 - 69	Fair but with major shortcomings
	E - Sufficient	مقبول	50 - 59	Work meets minimum criteria
Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required

Note: Marks Decimal places above or below 0.5 will be rounded to the higher or lower full mark (for example a mark of 54.5 will be rounded to 55, whereas a mark of 54.4 will be rounded to 54. The University has a policy NOT to condone "near-pass fails" so the only adjustment to marks awarded by the original marker(s) will be the automatic rounding outlined above.

Course Description Form

1. Course Name: **Environmental Pollution**
2. Course Code: **GEO-423**
3. Semester / Year: **Semester**
4. Description Preparation Date: **2025**
5. Available Attendance Forms: **Attendance**
6. Number of Credit Hours (Total) / Number of Units (Total): **60/ 3**
7. Course administrator's name (mention all, if more than one name)

Name: **Prof. Dr. Kareem Khwedim**
Email: **kkhwedim@uodiyala.edu.iq**

8. Course Objectives

Course Objectives	Students will learn how to: 1. **assess pollution sources.** 2. **study exposure pathways and fate.** 3. **evaluate consequences of human exposure to pollution and impacts to environmental quality.**

9. Teaching and Learning Strategies

Strategy	Create discussions for your students, where they can put their knowledge into practice, develop their own views on classroom content, and consolidate what they've learned. Every student has a voice - there's no talking over each other, and students have the space to explore arguments at their own pace. Encourages students to work together to find the best way to express each idea.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Students will be able to: Explain how perceptions of environmental problems, the problems themselves, and the proposed solutions are shaped by their historical,	Introduction	Direct teaching and visual tools	Note
2	4		Water Pollution	Direct teaching and visual tools	Note

3	4	geographical, social, political, economic, and cultural contexts.	Water Analysis	Direct teaching and visual tools	Note
4	4		Water Analysis	Direct teaching and visual tools	Quiz
5	4		First Exam		
6	4		Radioactive Pollution	Direct teaching and visual tools	Note
7	4		Radioactive Pollution	Direct teaching and visual tools	Note
8	4		Heavy Metals	Direct teaching and visual tools	Note
9	4		Petroleum Pollution	Direct teaching and visual tools	Quiz
10	4		Second Exam		
11	4		Air Pollution	Direct teaching and visual tools	Note
12	4		Soil Pollution	Direct teaching and visual tools	Note
13	4		Soil Pollution (Biological aspects)	Direct teaching and visual tools	Note
14	4		Climatic Changes	Direct teaching and visual tools	Quiz
15	4	Final Course Exam			

11.Course Evaluation

10 theoretical + 10 Practical + 5 (attendance, seminar, reports)= 25 + 25 final course exam = 50

12.Learning and Teaching Resources	
Required textbooks (curricu books, if any)	- Der Perk M.V. (2007), Soil and Water Contamination (from molecular to catchment scale), Taylor and Francis Group, 389p.
Main references (sources)	- Peirce JJ, Weiner RF., Vesilind PV. 1997, Environmental pollution and control, 4TH Edition, Elsevier Science and Technology Books, 381p.
Recommended books and references (scientific journals, reports...)	- Journal of Geology and mining. - Journal of Geoarabia.
Electronic References, Website	http/18-The-Impact-of-Pollution-on-Our-Planet-and-Our-Lives.pdf

Course Description Form

13.Course Name: **Ore and Industrial Minerals**	
14.Course Code: **GEO47042**	
15.Semester / Year: **Year**	
16.Description Preparation Date: **2025**	
17.Available Attendance Forms: **Attendance**	
18.Number of Credit Hours (Total) / Number of Units (Total): **125**/**5**	
19.Course administrator's name (mention all, if more than one name)	
Name: **Abdulqader adnan khalaf** Email: **abdulkader@ uodiyala.edu.iq**	
20.Course Objectives	
Course Objective	The objective is to enable students after completion of the course to: 1) Describe the principles of different areas of geometallurgy (ore geology, process mineralogy, minerals processing, modelling and simulation) and how they are linked in a geometallurgical concept. 2) Use different research and analytical methods of importance for geometallurgy and interpret the results. 3) Evaluate, analyze and interpret the geometallurgical data in a quantitative way. 4) Design a geometallurgical sampling, analysis and research campaign. 5) Design a geometallurgical program.
21.Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this module is to encourage students' participation in the exercises, while at the same time refining and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials.
22. Course Structure	

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Above listed ILOs cover the EIT Overarching Learning Outcomes: 1, 4, 5 and 6: Linking ore geology, mineral processing and simulation for data treatment customization contributes to making value judgements and developing sustainability competencies. By constructing a model with different types of geological and metallurgical data for simulation and prediction, the research skills and competencies are trained. Intellectual transforming skills and competencies are taught in group projects by solving possible realistic processing problems. Through integration of multiple data and process models for resource efficiency optimization, the innovation skills and competencies are addressed.	**Introduction of Ore Geology**	Direct teaching and visual tools	Note
2	4		**Some definitions related to ore geology**	Direct teaching and visual tools	Note
3	4		**Types of ore minerals**	Direct teaching and visual tools	Note
4	4		**Classifications of ore deposits**	Direct teaching and visual tools	Quiz
5	4		**First Exam**		
6	4		**Ore Forming Processes**	Direct teaching and visual tools	Note
7	4		**Ore Forming Fluids**	Direct teaching and visual tools	Note
8	4		**Morphology of Ore Deposits**	Direct teaching and visual tools	Note
9	4		**Importance of ore minerals in society and the global economy**	Direct teaching and visual tools	Quiz
10	4		Second Exam		
11	4		**Basic characteristics and properties of ore minerals**	Direct teaching and visual tools	Note
12	4		**Classification based on composition**	Direct teaching and visual tools	Note
13	4		**Classification based on mode of occurrence**	Direct teaching and visual tools	Note
14	4		**Classification based on economic significance**	Direct teaching and visual	Quiz

				tools	
15	4		**Classification of ore minerals**	Direct teaching and visual tools	Note
16	4		**Introduction of Industrial minerals**.	Direct teaching and visual tools	Note
17	4		**Importance of non metallic**	Direct teaching and visual tools	Note
18	4		**Bates Classification**	Direct teaching and visual tools	Quiz
19	4		**Industrial Basalt and Diabase**	Direct teaching and visual tools	Note
20	4		**First Exam**		
21	4		**Metamorphic rocks**	Direct teaching and visual tools	Note
22	4		**Industrial sedimentary rocks**	Direct teaching and visual tools	Quiz
23	4		**Industrial limestone and dolomite**	Direct teaching and visual tools	Note
24	4		**Clay**	Direct teaching and visual tools	Note
25	4		**Second Exam**		
26	4		**Gypsum**	Direct teaching and visual tools	Quiz
27	4		**Industrial phosphates rocks**	Direct teaching and visual tools	Note

28	4	**Cement Industrial**	Direct teaching and visual tools	Note
29	4	**Importance of ore minerals in the economy and industry**	Direct teaching and visual tools	Note
30	4	**Final Course Exam**		

23.Course Evaluation	
30 theoretical + 15 practical + 5 (attendance, seminar, reports)= 50 + 50 final course exam = 100	
24.Learning and Teaching Resources	
Required textbooks (curricu books, if any)	-
Main references (sources)	1- Almond.D.CandWhitlen. D.A.(1996):Rocks. Minerals and Crystals.128P Hamyln.London 2- Tyrrell. F.G. (2005): Petrology . 480P.Mc Graw Hill.N.Y
Recommended books and references (scientific journals, reports...)	- مجلة الجيولوجيا و التعدين Journal of Geoarabia.
Electronic References, Website	

Course Description Form

25. Course Name: Mining Geology	
26. Course Code: GEMG 408	
27. Semester / Year: Year	
28. Description Preparation Date: 2025	
29.Available Attendance Forms: Mandatory	
30.Number of Credit Hours (Total) / Number of Units (Total): 120 hour/6 units	
31. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Asem Ahmed Hassan Email: asem.ahmed@uodiyala.edu.iq	
32. Course Objectives	
Course Objectives	To gain knowledge about: 4. The basics of Mining Geology as one of the Geology branches. 5. Importance of Mining Geology and Applications 6. The role of a mine geologist. 7. The role and career paths of a Mining Geologist. 8. The basic mining terminologies, mining stages, and Operations 9. Environmental impacts of surface and subsurface mining. **10**. Surface mining and subsurface mining methods Quarries and methods of quarrying
33. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this course is to encourage students to participate in the lectures and exercises and expand their thinking skills. Students will learn the basic concepts of Mining Geology in lectures and apply these concepts in practical classes involving lab experiments and exercises.

34. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**4**	**Define the basics of Mining Geology and mining terminologies**	**Introduction to Mining Geology**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
2	**4**	**Classify the mineral deposits based on their Genesis, form, geological setting, etc.**	**Classification of Mineral deposits**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
3	**4**	**Explain the stages in the life cycle of a mine**	**Mining Cycle**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
4	**4**	**Learn the main principles of mineral exploration, goals, stages, etc.**	**Mineral Exploration**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
5	**4**	**Use of remote sensing methods for mineral exploration**	**Remote Sensing**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
6	**4**	**Learn the basics of using geophysical methods (gravity and magnetic) for mineral prospecting**	**Geophysical prospecting 1**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**

7	**4**	**Learn the basics of using geophysical methods (seismic, Resistivity, Radar, Airborn) for mineral prospecting**	**Geophysical prospecting 2**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
8	**4**	**-**	**Exam**	**-**	**Monthly exam**
9	**4**	**Explain the basics and types of geochemical exploration methods**	**Geochemical exploration 1**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
10	**4**	**Design of Geochemical survey and stages**	**Geochemical exploration 2**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
11	**4**	**Use drilling methods in mineral exploration**	**Drilling**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
12	**4**	**Learn sampling methods used for mineral exploration**	**Sampling**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
13	**4**	**Explain sampling patterns for mineral exploration**	**Sampling patterns**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
14	**4**	**Learn the basics and tools of the geological survey in Mineral exploration**	**Geological survey**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
15	**4**	**-**	**Exam**		**Monthly exam**
16	**4**	**Learn the basics of mining methods and factors influencing the choice of mining method**	**Mining methods**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
17	**4**	**Explain the basics of surface mining methods**	**Surface Mining**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
18	**4**	**Learn the extraction techniques of mechanical extraction methods**	**Mechanical Extraction Methods**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**

19	**4**	**Learn the extraction techniques of Aqueous Extraction Methods**	**Aqueous Extraction Methods**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
20	**4**	**Explain the basics of surface mining methods**	**Subsurface Mining**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
21	**4**	**Learn the principles of mining of unsupported mining methods**	**Unsupported mining methods**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
22	**4**	**Learn the principles of mining of supported mining methods**	**Supported mining methods**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
23	**4**	**-**	**Exam**	**-**	**Monthly exan**
24	**4**	**Understand the basics of quarrying**	**Introduction to quarries**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
25	**4**	**Learn the methods used for quarrying**	**Methods of quarrying**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
26	**4**	**Explain the basics of mineral processing**	**Mineral processing**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
27	**4**	**Learn the stages of mineral processing**	**Stages of mineral processing**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
28	**4**	**Explain the basics of Physical processing methods**	**Physical mineral processing**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
29	**4**	**Explain the basics of chemical processing methods**	**Chemical mineral processing**	**Direct lecture Question and answ Data show**	**Homeworks quizzes reports**
30	**4**	**-**	**Exam**	**-**	**Monthly exan**

35. Course Evaluation	
Distributing the score out of 100 according to the tasks assigned to the student such as daily preparation, dailyoral, monthly, or written exams, reports .... etc	
36. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	
Main references (sources)	1. Evans, A.M. 1986. An introduction to ore geology, Blackwell scientific publications. P230. 2. Moon, C. J., Whateley, M.K.C. and Evans, A.M. 2006. introduction to mineral exploration, Blackwell publishing, P. 481. 3. Stocks, J. and Down, C., 1980. Mining and Mineral processing, Open University Press, P.
Recommended books and references (scientific journals, reports…)	1. Iraqi Bulletin of Geology and Mining 2. Geology and mining research
Electronic References, Websites	https://ibgm-iq.org/ https://www.pngminers.com/

Course Description Form

37. Course Name: Petroleum Software	
38. Course Code: GEPS407	
39. Semester / Year: Year	
40. Description Preparation Date: 2025	
41.Available Attendance Forms: Mandatory	
42.Number of Credit Hours (Total) / Number of Units (Total): 120 hour/6 units	
43. Course administrator's name (mention all, if more than one name)	
Name: Prof. Dr. Asem Ahmed Hassan Email: asem.ahmed@uodiyala.edu.iq	
44. Course Objectives	
Course Objectives	To gain knowledge about: 1. The basics of some petroleum and geologic software. 2. Using SedLog software for creating graphic sediment logs 3. Plotting different maps using Surfer software. 4. Application of IPI2win for interpretation of vertical electrical sounding. 5. Using petroleum and geologic software for the preparation of reports and articles.
45. Teaching and Learning Strategies	
Strategy	The main strategy that will be adopted in delivering this course is to encourage students to participate in the lectures and exercises and expand their thinking skills. Students will learn the basic concepts of Petroleum software in lectures and apply these concepts in practical classes and exercises.

46. Course Structure					
Week	**Hours**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**4**	**Learn the basics of SedLog software and its applications**	**Introduction to SedLog**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
2	**4**	**Learn the main components of SedLog home screen**	**The home screen of SedLog software**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
3	**4**	**Use the main commands for data input in SedLog**	**Data input in SedLog**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
4	**4**	**Learn how to customize the graphic log**	**Graphic log customization**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
5	**4**	**Practice how to create Lithologies/symbols**	**Create Lithologies/symbols**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
6	**4**	**Learn how to create templates and data export**	**Templates**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
7	**4**	**Practice plotting the Sedemintry logs**	**Practice on plotting the Sedemintry logs**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
8	**4**	**-**	**Exam**	**-**	**Monthly exan**
9	**4**	**Learn the basics of Surfer software**	**Introduction to Surfer**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
10	**4**	**Learn the main components of the home screen of Surfer**	**Home screen of Surfer**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
11	**4**	**Practice to create XYZ data file**	**Creating XYZ data file**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**

12	**4**	**Practice to create Grid data**	**Creating Grid file**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
13	**4**	**Learn how to create contour maps**	**Contour maps**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
14	**4**	**Change properties of the contour maps**	**Contour maps properties 1**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
15	**4**	**-**	**Exam**		**Monthly exar**
16	**4**	**Change properties of the contour maps**	**Contour maps properties 2**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
17	**4**	**Practice creating post maps and changing their properties**	**Creating post maps**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
18	**4**	**Practice creating 3D surface maps and changing their properties**	**Creating 3D surface maps**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
19	**4**	**Learn to add transparency and color scales**	**Transparency and Color scales**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
20	**4**	**Explain the basics of surface mining methods**	**Adding map layers and titles**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
21	**4**	**Practice plotting different maps**	**Training 1**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
22	**4**	**Practice plotting different maps**	**Training 2**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
23	**4**	**-**	**Exam**	**-**	**Monthly exar**
24	**4**	**Understand the basics of IPI2WIN software**	**Introduction to IPI2WIN**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**

25	**4**	**Learn the theoretical principles of the electrical resistivity method**	**Principles of electrical resistivity method**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
26	**4**	**Practice the main commands to use IPI2Win**	**The main steps for using IPI2Win**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
27	**4**	**Learn to insert data in IPI2WIN**	**Data input in IPI2WIN**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
28	**4**	**Practice to interpret the data in IPI2WIN**	**Data interpretation in IPI2WIN**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
29	**4**	**Create Pseudo and Resistivity Cross Sections in IPI2WIN**	**Creating Pseudo and Resistivity cross-sections**	**Direct lecture Practical lab Data show**	**Homeworks quizzes reports**
30	**4**	**-**	**Exam**	**-**	**Monthly exa**

47. Course Evaluation

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

48. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	1. SedLog: A shareware program for drawing graphic logs and log data manipulation, Computers & Geosciences, Volume 35, Issue 10, Pages 2151-2159, 2009. 2. Reynolds, J. M. 1997. An introduction to applied and environmental geophysics Chichester: John Wiley & Sons
Recommended books and references (scientific journals, reports…)	
Electronic References, Websites	https://sedlog.rhul.ac.uk/download.html https://www.goldensoftware.com/products/surfer www.geotomosoft.com/coursenotes.zip

Course Description Form

49.Course Name: **seismic exploration**
50.Course Code: GEO48143
51.Semester / Year: **Semester**
52.Description Preparation Date: **2025**
53.Available Attendance Forms: **Attendance**
54.Number of Credit Hours (Total) / Number of Units (Total): **60/ 3**
55.Course administrator's name (mention all, if more than one name)
Name: **Prof. Dr. Munther Dhahir** Email: **munther_hnt@uodiyala.edu.iq**
56.Course Objectives

Course Objective	• **The course aims to equip the student with fundamental theory, of seismic reflection methods that are used today in oil industry** • **Geological interpretation of reflection seismic data.**

1- Teaching and Learning Strategies

Strategy	• lectures are given to transfer the course material to the student in a simple and clear way • discussion will be open at each class to help students express their thoughts and ideas, and to improve theircommunication skills • students will be given group assignments to do team and individual research work to broaden theirknowledge and put into practice the different theories and concepts covered in the lectures.

2- Course Structure

Week	Hours	Required Learning	Unit or subject name	Learning	Evaluati

		Outcomes		method	on method
1	4	Information about principles of seismic method , seismic data acquisition , processing and interpretation	Seismic methods , Basic principles	Direct teaching and visual tools	Note
2	4		Acoustic impedance , Reflection and Transmission Coefficients	Direct teaching and visual tools	Note
3	4		Seismic data acquisition	Direct teaching and visual tools	Note
4	4		Seismic Receivers , spread layout or receiver distribution	Direct teaching and visual tools	Quiz
5	4		Recording system		Note
6	4		Design of field Parameters, ACQUISITION PARAMETERS	Direct teaching and visual tools	Note
7	4		First month exam		
8	4		Seismic Noise , signal and noise , types of noise , Filtering	Direct teaching and visual tools	Note
9	4		The Well Velocity Survey	Direct teaching and visual tools	Quiz
10	4		Seismic data processing		
11	4		Seismic data processing	Direct teaching and visual tools	Note
12	4		Seismic data interpretation	Direct teaching and visual tools	Note
13	4		Structural seismic interpretation	Direct teaching and visual tools	Note

14	4		Strati graphical seismic interpretation	Direct teaching and visual tools	Quiz
15	4	Second month exam			

3- Course Evaluation	
10 theoretical + 10 practical + 5 (attendance, seminar, reports)= 25 + 50 final course exam = 100	
4- Learning and Teaching Resources	
Required textbooks (curricu books, if any)	
Main references (sources)	- Dobrin and Savit,1988,Introduction to geophysical prospecting - Kearey ,Brook,1984,An Introduction to geophysical prospecting - Parasnis,1986, Principles of applied geophysics - Reynolds , 1997,An introduction to Applied and environmental Geophysics
Recommended books and references (scientific journals, reports...)	
Electronic References, Website	