Tikrit university

جامعة تكريت

First Cycle – Bachelor's degree (B.Sc.) – Geology

بكالوريوس علوم – علوم الأرض التطبيقية

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جدول المحتويات

University of Tikrit

Bachelor's Degree of Applied Geology

1. Mission and Vision

Mission Statement

The Department of Applied Geology at Tikrit University creates and disseminates knowledge about Earth's processes and properties for students, scientists, and the public to help create a scientifically informed community. We provide high quality educational opportunities for students seeking PhD, MS, and BS degrees in core strength areas within Applied Geology, and bring earth science principles to the foundational education mission of the university. In all programs, we enable students to discover and develop relevant knowledge and skillsets so that they can achieve their professional goals and pursue solutions to resource and environmental challenges facing the state, nation, and world. We welcome motivated individuals who are passionate about science, value diversity and tolerance, and believe in wise stewardship of our planet through critical thinking and dialogue

Vision Statement

The Department of Geosciences adopts as its goal to become a nationally recognized leader in integrating research excellence and education in applied geology. In research, we strive to sustain and grow a resource platform that continues to enable our scientists to contribute at high levels to internationally significant research problems in geology. In education, we strive to provide students with opportunities to discover and develop relevant knowledge and skill sets that will enable them to achieve their professional goals. We believe that creative integration of research with education will promote excellence in both. We will create undergraduate programs that attract students from across nation and prepares them for

professional careers, and we will become a significant component of foundational education at Tikrit University**.**

2. Program Specification:

Programme Code	GEO	ECTS	240
Duration	4 level, 8 semsters	Method of attendance	Full Time

Programme Overview

If you are looking for a professional career in the Applied Geology, will provide you with a great breadth and depth of geological knowledge and a complete understanding of current research areas in the geological sciences. Particular emphasis is placed on research skills developed through extensive group and independent project work. Your contact hours will vary depending on your module/option choices. Full information about contact hours is provided in individual module profiles.

Programme Structure:

The programme structure table is below: Information about pre and co- requisites is included in individual module profiles. Part I The programme is offered as a full-time course. The MSci programmes normally last for four years. At Tikrit University, each semester having 15 weeks for teaching and learning and 2 weeks for examinations. The programme is divided into individual study modules at each part. Each study module is worth a certain number of credit points to you on successful completion. Modules are normally worth 5 ECTS which is equivalent to 125 hours of study. Normally up to 60 hours comprises contact teaching (lectures, practical sessions, tutorials, etc.), and the remainder of the time is for your own independent study. Modules are generally assessed at the end of each semester, but some are assessed entirely by coursework throughout the duration of the module.

In part 1, there are a number of compulsory modules, which lay a solid foundation in the basic discipline of this programme. A compulsory Mathematics module is also taken, depending on your mathematical background. More specialised training and options that enable diversification commence in part 2.

In parts 3 and 4, students are exposed to the forefronts of geological knowledge, with the opportunity to conduct supervised original research. A significant field mapping project and report is undertaken, with fieldwork in the summer between parts 2 and 3 and the project completed during part 3. If studying for a MSci, in your final (part 4) year you will undertake a major research project which may involve external stakeholders and in which you will play a significant role in the design

stage. The MSci courses are intended to develop research skills, and computational and quantitative skills in a more multidisciplinary context than is possible in a three-year degree structure. You will also be exposed to cutting edge research, participating in seminar presentations in wide- ranging and specialist topics. There will be an opportunity to choose modules from a wide range of master's level options.

3. Program Goals:

1. Prepare students for professional careers in natural resources or environmental sciences, graduate school for advanced studies, or any future where scientific thinking is used. The four degree track options are geology, geophysics, hydrology, and secondary education.
2. Prepare students for successful scientific, technical or management careers in the geosciences or related fields
3. Provide employers with a well-educated workforce that is ready and able to perform valuable scientific, technical or managerial services immediately after graduation • Encourage the growth of knowledge-based industry and stimulate economic growth in Arkansas
4. Acquire advanced knowledge of geology and earth system science in addition to their major area of study area
5. Acquire advanced knowledge of hydrology and earth system science in addition to their major area of study area

4. Learning outcome

- Demonstrate knowledge of: physical and chemical properties of the lithosphere and hydrosphere (minerals, rocks, soils, and water); geologic time and earth history; and crustal materials and dynamics in the context of plate tectonics theory.
- Demonstrate competence in fundamental geological skills including: mineral, rock and soil identification; interpretation of topographic maps, geologic maps, and various forms of imagery; construction of geologic maps and cross sections; three- dimensional conceptualization; and collection of organized field and laboratory data.
- Demonstrate competence in quantitative data analysis including: the construction and reading of graphs; construction and use of spreadsheets; and application of mathematical skills

(ranging from algebra to calculus) for analysis of geological systems.

- Make critical and independent inquiry in the geosciences including: the ability to gather and evaluate peer-reviewed literature; identify a research question; design and conduct a research plan to collect laboratory and/or field data; and interpret research results.
- Gain an understanding of the societal relevance of earth systems.
- Effectively communicate ideas, research results, and interpretations using written, oral, and graphical design skills both on a formal and extemporaneous basis.

5. Academic Staff:

- Mohamed R. Abood, PhD in Engineering Geology, Professor
- Sabbar A. Salih, PhD in Hydrogeology, Professor
- Abdulsalam M. Salih, PhD in Rocks and Minerals, Professor
- Sawsan F. Al-Hazaa, PhD in Sedimentology, Professor
- Faris N. Hassa, PhD in Stratigraphy and Paleontology, Professor
- Mohmood F. Abed, PhD in Environmental Geology, Professor
- Mohamed W. Alkhafaji, PhD in Geochemistry, Professor
- Ammar J. Mohammed, PhD in Sedimentology, Assistant Professor
- Yaseen S. Kareem, PhD in Stratigraphy, Assistant Professor
- Muthana Y. Mohamed, PhD in Stratigraphy, Lecturer
- Ahmed M. Mahood, PhD in Geochemistry, Lecturer
  Tahir M. Taha, PhD in Geochemistry, Lecturer
- Ayed H. Ward, PhD in Structural Geology, Lecturer
- Najim A. Abdula, PhD in Geography, Lecturer
- Mohaned E. Khedir, MSc in Engineering Geology, Assistant Professor
- Nawfal H. Ali, MSc in Hydrogeology, Assistant Lecturer
- Alaa A. Mohamed, MSc in Geography, Assistant Lecturer
- Ehab M. Ameen, MSc in Hydrogeology, Assistant Professor
- Manar Kh. Ismail, MSc in Mathematics, Lecturer
- Wisam I. Hajim, MSc in Mathematics, Lecturer
- Riadh M. Rashid, MSc in Geophysics, Assistant Lecturer
- Ektifaa T. Abdulkader, MSc in Hydrology, Lecturer
- Zainab Hasan, MSc in Mathematics, Assistant Lecturer
- Ali A. Ahmed, MSc in Engineering Geology, Assistant Lecturer
- Ahmed J. Hussein MSc in Geomatic, Assistant Lecturer

6. Credits, Grading and GPA

Credit

Tikrit University is following the Bologna Process with the European Credit Transfer System (ECTS) credit system. The total degree program number of ECTS is 240, 30 ECTS per semester. 1 ECTS is equivalent to 25 student workload, including structured and unstructured workload.

Grading

Before the evaluation, the results are divided into two subgroups: pass and fail. Therefore, the results are independent of the students who failed a course. The grading system is defined as follows:

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	مقبول بقرار	(45-49)	More work required but credit awarded
	F – Fail	راسب	(0-44)	Considerable amount of work required
Note:				
NB 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.				

Calculation of the Grade Point Average (GPA)

The GPA is calculated by the summation of each module score multiplied by its ECTS, all are divided by the program total ECTS.

GPA of a 4-year B.Sc. degrees:

GPA = [(1st module score x ECTS) + (2nd module score x ECTS) + ……] / 240

7. Curriculum/Modules

Semester 1 | 30 ECTS

Code	Module	SS WL	USS WL	ECTS	Type	Pre-request
Geo1101	Physical Geology	90	110	9	C	
Geo1102	Crystallography	90	110	9	C	
Geo1103	Computer science 1	60	40	3	B	
Geo1104	Inorganic chemistry	60	65	5	B	
UNI-1105	Democracy and Human Rights	25	50	2	S	
UNI-1106	**Arabic language**	**30**	**20**	**2**	**S**	

Semester 2 | 30 ECTS

Code	Module	SS WL	USSWL	ECTS	Type	Pre-request
Geo1207	Historical Geology	90	85	9	C	
Geo1208	Mineralogy	90	85	8	C	
Geo1209	Physics	60	65	5	B	
Geo12010	Mathematics	45	55	3	B	
UOT003	English Language	35	40	2	S	
UOT002	**Computer science 2**	**30**	**45**	**3**	**B**	

Semester 3 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Geo23113	Optical Mineralogy	60	65	5	C	
Geo23114	Stratigraphy	60	65	5	C	
Geo23015	Petrology	60	65	5	C	
Geo23016	Geological Statistics	65	60	5	B	
Geo12017	Sedimentology	60	65	5	C	
Geo23118	**Environmental Geology**	**60**	**65**	**5**	**C**	

Semester 4 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Geo24119	Macropaleontology	60	65	5	C	
Geo24120	Sedimentary rocks	60	65	5	C	
Geo24121	Igneous and Metomorphic rocks	68	57	5	C	
Geo24122	Structural Geology	68	57	5	C	
Geo24123	Geomorphology	60	65	5	C	
Geo24124	**Remote Sensing**	**60**	**65**	**5**	**C**	

Semester 5 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Geo35125	Structural analysis	60	65	5	C	
Geo35126	Hydrology	60	65	5	C	
Geo35127	Micropaleontology	60	65	5	C	
Geo35128	Quarries and Mines	65	60	5	C	
Geo35129	Principles of Geochemistry	65	60	5	C	
Geo35130	**Geomatics**	**60**	**65**	**5**	**C**	

Semester 6 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Geo36131	Geophysics (Gravity and Magnetic)	63	62	5	C	
Geo36132	Filed Geology	63	62	5	C	
Geo36133	Hydrogeology	60	65	5	C	
Geo36134	Geology of Iraq	60	65	5	C	
Geo36135	Geochemistry of Rocks	60	65	5	C	
Geo36136	**Research methodology**	**63**	**62**	**5**	**C**	

Semester 7 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Geo47137	Petroleum Geology	65	60	5	C	
Geo47138	Geophysics (Seismic and electrical)	60	65	5	C	
Geo47139	Engineering Geology	60	65	5	C	
Geo47140	Geotectonics	60	65	5	C	
Geo47141	Field survey	60	65	5	C	
Geo47142	**Petroleum Exploration**	**60**	**65**	**5**	**C**	

Semester 8 | 30 ECTS

Code	Module	SSWL	USSWL	ECTS	Type	Pre-request
Geo48143	Oi Well Drilling	60	65	5	C	
Geo48144	Geotecnics and Site Investigation	60	65	5	C	
Geo48145	Wel logging	45	80	5	C	
Geo48146	Economic Geology	60	65	5	C	
Geo48147	English language	35	40	3	B	
Geo48148	**Research Project**	**80**	**95**	**7**	**C**	

8. Contact

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بكالوريوس علوم – علوم الأرض التطبيقية

يتضمن هذا الدليل منهاجاً كاملاً للمواد الدراسية لقسم علوم الأرض التطبيقية لدورة دراسية كاملة والتي تتألف من أربع مستويات تقسم الى ثمان فصول دراسية بواقع فصلين لكل مستوى دراسي، يتألف كل فصل دراسي من (6) مواد دراسية. ان عدد الوحدات الاوربية (ECTS) فعددها (240) وحدة موزعة على هذه الفصول بحيث يشمل كل فصل دراسي على (30) وحدة اوربية، ان كل وحدة اوربية (25) ساعة دراسية، وبذلك يكون عدد الساعات الكلية لدورة دراسية كاملة (6000) ساعة بواقع (750) ساعة لكل فصل دراسي. الجداول التالية توضح توزيع هذه الوحدات على المواد الدراسية:

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	One	1	Geo11 01	Physical Geology	جيولوجيا طبيعية	English	2		2			1	4	90	135	225	9	C	
		2	Geo11 02	Crystallography	علم بلورات	English	2		2			1	4	90	135	225	9	C	
		3	Geo11 03	Computer science 1	علم الحاسوب 1	English	2		2				4	40	35	75	3	B	
		4	Geo11 04	Inorganic chemistry	كيمياء لاعضوية	English	2		2				4	60	65	125	5	B	
		5	UNI-1105	Democracy and Human Rights	ديمقراطية وحقوق انسان	English	2						3	25	25	50	2	S	
		6	UNI-1106	Arabic language	لغة عربية	Arabic	2						3	30	20	50	2	S	
							12		8			2	22	335	415	750	30.00		
UGI	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Two	1	Geo12 07	Historical Geology	جيولوجيا تاريخية	English	2		2					90	135	175	9	C	GEO-111
		2	Geo12 08	Mineralogy	علم المعادن	English	2		2					90	110	200	8	C	GEO-112
		3	Geo12 09	Physics	فيزياء	English	2		2					60	65	125	5	B	
		4	Geo12 010	Mathematics	رياضيات	English	2				2			30	45	100	3	B	SCI--114
		5	UOT0 03	English Language	لغة انكليزية	English	2				2			30	20	75	2	S	
		6	UOT0 02	Computer science 2	علم الحاسوب 2	English	2		2					30	45	100	3	B	
						Total	12		8			0	0	330	420	750	30.00		

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Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
U GII	Three	1	Geo23113	Optical Mineralogy	بصرية معادن	English	2		2					60	65	125	5	C	GEO-122
		2	Geo23114	Stratigraphy	علم الطبقات	English	2		2					60	65	125	5	C	
		3	Geo23015	Petrology	علم الصخور	English	2		2					60	65	125	5	C	
		4	Geo23016	Geological Statistics	احصاء جيولوجي	English	2				2			65	60	125	5	B	
		5	Geo12017	Sedimentology	علم الرسوبيات	English	2		2					60	65	125	5	C	
		6	Geo23118	Environmental Geology	جيولوجيا بيئية	English	2		2					60	65	125	5	C	
							12		10					365	385	750	30.00		
	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Four	1	Geo24119	Macropaleontology	علم المتحجرات الكبيرة	English	2		2					60	65	125	5	C	
		2	Geo24120	Sedimentary rocks	الصخور الرسوبية	English	2		2					60	65	125	5	C	GEO-212
		3	Geo24121	Igneous and Metomorphic rocks	صخور نارية ومتحولة	English	2		2					68	57	125	5	C	
		4	Geo24122	Structural Geology	الجيولوجيا التركيبية	English	2		2					68	57	125	5	C	GEO-214
		5	Geo24123	Geomorphology	جيومورفولوجي	English	2		2					60	65	125	5	C	GEO-215
		6	Geo24124	Remote Sensing	استشعار عن بعد	English	2		2					60	65	125	5	C	
							12		12					376	374	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
U GII I	Five	1	Geo3 5125	Structural analysis	تحليل تركيبي	English	2		2					60	65	125	5	C	
		2	Geo3 5126	Hydrology	علم الياه	English	2		2					60	65	125	5	C	
		3	Geo3 5127	Micropaleontology	متحجرات دقيقة	English	2		2					60	65	125	5	C	
		4	Geo3 5128	Quarries and Mines	مناجم ومقالع	English	2		2					65	60	125	5	C	GEO-226
		5	Geo3 5129	Principles of Geochemistry	مبادىء الجيوكيياء	English	2		2					65	60	125	5	C	
		6	Geo3 5130	Geomatics	جيوماتك	English	2		2					60	65	125	5	C	GEO-215
							12		12					370	380	750	30.00		
	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	Six	1	Geo3 6131	Geophysics (Gravity and Magnetic)	جيوفيزياء (جذبية ومغناطيسية)	English	2		2					63	62	125	5	C	
		2	Geo3 6132	Field Geology	الجيولوجيا الحقلية	English	2		2					63	62	125	5	C	
		3	Geo3 6133	Hydrogeology	الهيدروجيولوجيا	English	2		2					60	65	125	5	C	
		4	Geo3 6134	Geology of Iraq	جيولوجيا العراق	English	2		2					60	65	125	5	C	
		5	Geo3 6135	Geochemistry of Rocks	جيوكيمياء الصخور	English	2		2					60	65	125	5	C	
		6	Geo3 6136	Research methodology	منهجية بحث	English	2				2			63	62	125	5	C	
							12		8			0	0	369	381	750	30.00		

Level	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
UG IV	seven	1	Geo47137	Petroleum Geology	جيولوجيا النفط	English	2		2					65	60	125	5	C	
		2	Geo47138	Geophysics (Seismic and electrical)	جيوفيزياء (زلزالية وكهربائية)	English	2		2					60	65	125	5	C	
		3	Geo47139	Engineering Geology	الجيولوجيا الهندسية	English	2		2					60	65	125	5	C	
		4	Geo47140	Geotectonics	جيوتكتونك	English			2					60	65	125	5	C	
		5	Geo47141	Field survey	مسح حقلي	English				4	4			60	65	125	5	C	
		6	Geo47142	Petroleum Exploration	استكشاف نفطي	English	2							60	65	125	5	C	
							8		8			0	0	365	385	750	30.0		
	Semester	No.	Module Code	Module Name in English	اسم المادة الدراسية	Language	SSWL (hr/w)						Exam hr/sem	SSWL hr/sem	USSWL hr/sem	SWL hr/sem	ECTS	Module Type	Prerequisite Module(s) Code
							CL (hr/w)	Lect (hr/w)	Lab (hr/w)	Pr (hr/w)	Tut (hr/w)	Semn (hr/w)							
	eight	1	Geo48143	Oil Wells Drilling	حفر آبار نفطية	English	2		2					60	65	125	5	C	
		2	Geo48144	Geotecnics and Site Investigation	جيوتكنيك وتحري موقعي	English	2		2					60	65	125	5	C	
		3	Geo48145	Well logging	جس بئري	English	2		2					45	80	125	5	C	
		4	Geo48146	Economic Geology	جيولوجيا اقتصادية	English	2		2					60	65	125	5	C	
		5	Geo48147	English language	لغة انكليزية	English	2							35	40	75	3	B	
		6	Geo48148	Research Project	مشروع بحث	English				4	4			80	95	175	7	C	
							10		8	4				340	410	750	30.0		
						Total	90.0	0.0	74.0	4.0	0.0	2.0	22.0	2850.0	3150.0	6000.0	240.0		

Note: The student should complete 4 weeks of Summer Internships to fullfil the requirements of the Bachelor's degree								
Structured SWL (hr/w) type	**CL**	Class Lecture	**Module type**	**B**	Basic learning activities		**SWL:**	Student Workload
	Lab	Laboratory		**C**	Core learning activity		**SSWL:**	Structured SWL
	Pr	Practical Training		**S**	Suport or related learning activity		**USSWL:**	Unstructured SWL
	Tut	Tutorial		**E**	Elective learning activity			
	Lect	Online lecture						
	Semn	Seminar	Note: Columns O, Q and R are progrmaed, protected and should not be edited					

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First Cycle – Bachelor's degree (B.Sc.) – Geology

بكالوريوس علوم – علوم الأرض التطبيقية

Module Information
معلومات المادة الدراسية

Module Title	**Crystallography**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo1102		
ECTS Credits	**9**		
SWL (hr/sem)	**225**		
Module Level	1	**Semester of Delivery**	1
Administering Department	Geo	**College**	Type College Code
Module Leader	Mohamed W. Alkhafaji	**e-mail**	mohamedajeel@tu.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Mohamed W. Alkhafaji	**e-mail**	mohamedajeel@tu.edu.iq
Peer Reviewer Name	Prof. Dr. Sawsan	**e-mail**	E-mail
Scientific Committee Approval Date	18/06/2023	**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	1. To iunderstand how the crystalline materials form. 2. To understand the internal structure of the geological materials. 3. To understand the factors controlling the forms and shapes of the minerals. 4. To interpret to the different shapes and forms of the elements. 5. To understand the formation of cleavage, twinning and other structures in minerals
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognizing the crystalline materials from the non-crystalline materials. 2. Recognizing the different shapes of the mineral crystals. 3. Understand the formation mechanism of these shapes . 4. Understanding the formation of some phenomenon in minerals such as twinning and cleavage. 5. This course is a basic for other topics such as mineralogy.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Crystallographic systems, Definition of crystals, crystallization, crystallographic axes, crystallographic angles, crystallographic systems, symmetry, elements of symmetry [15 hrs] Axial ratios, intercepts, Miller indices. [15 hrs] Crystal forms, types of forms, habitat. [10 hrs] Zone, symbol of zone, extraction of symbol of zone, crystal drawing, type of crystal projections, Stereographic projection. [15 hrs] Revision problem classes [6 hrs] International symbol of symmetry, classes. [22 hrs] Internal structure of the crystals, Braviais lattice. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	

	1. Class lecture 2. Laboratory 3. Quiz 4. Tutorial 5. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	135	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	225		

Module Evaluation
تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All
	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered

Week 1	Introduction – the relationship of crystallography with other geology branches.
Week 2	Crystallization- parts of crystal
Week 3	The crystallographic axes - crystallographic angles- crystallographic systems
Week 4	Crystal symmetry
Week 5	Axial ratios and Intercepts
Week 6	Indices of the faces- Miller indices
Week 7	Mid-term Exam
Week 8	crystal form and habitat
Week 9	Zone
Week 10	Crystal drawing and crystal projection
Week 11	Crystal classes 1
Week 12	Crystal classes 2
Week 13	Internal structure of the crystals
Week 14	Bravais lattices
Week 15	Twinning
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Crystal parts
Week 2	Forms and shapes
Week 3	Crystal systems 1
Week 4	Crystal systems 2
Week 5	Miller and Weiss parameters
Week 6	Zone
Week 7	Stereographic projection 1
Week 8	Stereographic projection 2
Week 9	Mid. Term Examination

Week 10	Crystal classes 1
Week 11	Crystal classes 2
Week 12	Bragg's Law
Week 13	Identification of crystal systems by X-ray
Week 14	Twinning
Week 15	Tutorial before examination

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Crystallography	Yes
Recommended Texts	Introduction to mineralogy	No
Websites	https://www.britannica.com/science/crystallography	

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	**Physical geology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo1101**				
ECTS Credits	**9**				
SWL (hr/sem)	**225**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	YASEEN Saleh Kareem		**e-mail**	y.geologist@tu.edu.iq	
Module Leader's Acad. Title		Assist. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Taher Mahmoud		**e-mail**	E-mail	
Peer Reviewer Name		Sawsan Hameed Faisal	**e-mail**	sawsanalhazaa@tu.edu.iq	
Scientific Committee Approval Date		01/06/2023	**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	1. Covering basics and definitions of earth science 2. Studying the atmosphere, geosphere, biosphere and hydrosphere, their divisions and their importance to planet Earth. 3. Identify minerals and types of rocks in the nature and their economic importance. 4. Identifying natural disasters and how to reduce the problems resulting from them. 5. Learn about desertification problems and w
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After receiving this course, the student will be able to : 1. Identify the types of minerals and rocks and determine their characteristics, distribution and spread in nature. 2. Determine water resources and knowing the methods of exploration for groundwater and types of reservoirs, as well as exploiting the sediment associated with this water. 3. Preparing a specialized cadre to confront natural disasters and limit the damages resulting from them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Geology, The importance of geology, the branches of earth science (Physical Geology , Historical Geology, Petrology, Mineralogy, Crystallography, Structural Geology and Plate Tectonics, Geophysics, Geochemistry, Stratigraphy, Paleontology, Sedimentology, Engineering Geology, Hydrology and Economic Geology) and the Relationship between the geology and the other sciences. - The solar system and theories of the formation of the Earth Earth and Universe, Milky Way Galaxy, Solar System, forming the solar system (nebular hypothesis), Weight and time at planets. - Characteristics of the earth planet and the earth system Atmosphere. Hydrosphere. (Geosphere) Lithosphere and Biosphere - Earth's climate changes and weathering Solar Activity, Earth Orbit, Earth's tilt, Earth's wobble and Volcanic Activity. Weathering, mechanical weathering and chemical weathering - Crystallography and crystal varieties Lattices, Crystal, Crystals properties, Crystal symmetry, Elements of

	symmetry, Crystallographic axes, Crystal systems - Minerals, Mineral Characteristics, Rock-Forming Minerals, Methods of Minerals Formation, mineral classification, physical characteristics, methods of diagnosis, mineral groups and economic use. - Petrology and the rock cycle in nature Igneous rocks, their characteristics, textures of igneous rocks, composition of igneous rocks, classification and economic importance. Metamorphic rocks, their characteristics, agents of metamorphism, classification and economic importance, Sedimentary rocks, their characteristics, textural and mineralogical changes, classification and economic importance - Earthquakes and volcanoes Earthquake, Seismology. Location the source of an Earthquake, Earthquakes at plate boundary. Volcano, The nature of volcanic activity, The nature of volcanic activity eruption, Volcanic structures and eruptive style, Tectonic setting of volcanic activity - structural geology Deformation, Folds, Faults and fractures, Types of faults, Fractures, Continental collisions, Crustal fragments and mountain building. - Earth's tectonic plates Introduction, Types of plate boundary, Divergent boundaries, Convergent boundaries and Transform fault boundaries - Surface water and ground water Hydrological cycle, Water phase changes, Stream characteristic, Valleys and stream-related features Groundwater, Aquifer, Water table, Relationship among the water table, climate and surface water, Soil moisture, Groundwater distribution and Springs and wells - Glaciers and deserts Glaciers and glaciations, Valley glaciers, Ice glaciers and Budget of glacier. Deserts and winds, Distribution and causes of dry land, Desert climate types, Common misconceptions about Deserts and Desert features

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	135	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	225		

Module Evaluation

تقييم المادة الدراسية

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Definition of geology, The most important branches of earth, Science, Relationship between geology and other sciences
Week 2	The earth and the Solar System
Week 3	The characteristics of the earth and earth systems
Week 4	The climate changes on the earth and weathering
Week 5	Crystallography and crystal systems
Week 6	Minerals and their properties
Week 7	Petrology and rocks cycle in the nature
Week 8	Igneous rocks, properties, classifications and economic importance
Week 9	Metamorphic rocks, properties, classifications and economic importance
Week 10	Sedimentary rocks, properties, classifications and economic importance
Week 11	Earthquakes and Volcanoes
Week 12	Structural geology, folds, faults and fractures
Week 13	Earth tectonic plates
Week 14	Hydrology (surface water) and hydrogeology (ground water)
Week 15	**Glaciers and Deserts**
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: identifying crystals and crystal systems
Week 2 and Week 3	Lab 2: identifying minerals depending on their properties

Week 4 and Week 5	Lab 3: identifying and classifying the igneous rocks
Week 6 and Week 7	Lab 4: identifying and classifying the metamorphic rocks
Week 8 and Week 9	Lab 4: identifying and classifying thesedimentary rocks
Week 10	Solving a problems about types of folds
Week 11	Solving a problems about types of Faults
Week 12	Solving a problems about types of Fractures
Week 13	Solving a problems about streams orders and the area ofdrainage basin
Week 14	Solving a problems gradient and discharging of the river
Week 15	Preparing for exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Principles of Earth Science, 2017, Assist. Prof. Dr. Saadi Al Dahaan, Author & Translator	Yes
Recommended Texts	Essential of Geology, 2012 Lutgens F.,k. and Tarbuk, E.J. 11th edition	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	**Historical geology**		**Module Delivery**
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**Geo1207**		
ECTS Credits	**9**		
SWL (hr/sem)	**225**		
Module Level	UGI	**Semester of Delivery**	1
Administering Department	Applied Geology	**College**	College of Science
Module Leader	YASEEN Saleh Kareem	**e-mail**	y.geologist@tu.edu.iq

Module Leader's Acad. Title	Assist. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Taher Mahmoud	**e-mail**	E-mail
Peer Reviewer Name	Faris Najris Hassan	**e-mail**	
Scientific Committee Approval Date	01/06/2023	**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	6. Covering the basics of historical geology and the important principles and laws in determining the geological ages of the rocks that make up the earth's crust. 7. Studying the geological time scale, determining the chronostratigraphy and biostratigraphy, and determining the rock units. 8. Making a knowledge about the fossils and the foundations of preserving the soft and hard parts of them and their role in determining the relative age of the earth. 9. Determining the most important life developments that the earth has gone through the different ages, studying each geological age and the most important neighborhoods that appeared and lived in it. 10. Identifying the most important geological events, as well as the climatic changes that occurred on Earth, and how to use radioactive isotopes that contributed to estimating the absolute age of the Earth.
Module Learning Outcomes	After receiving this course, the student will be able to :

مخرجات التعلم للمادة الدراسية	4. Determining the knowledge of geological events and their chronological sequence. 5. Determining the age of the earth relatively specifically based on life and geological changes, and absolutely based on unstable radioactive elements. 6. Knowing the climatic changes that the earth has gone through and the possibility of expecting the recurrence of such changes
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Historical geology Using Relative Dating to Determine Sequences of Event and most important Principles. - Fossils, their importance and methods of preservation Fossils, Types of Fossilization, Index Fossil, Clues from Fossils - Stratigraphy and divisions of rock units - The Importance of Sedimentary Rocks in the Geologic Scale Time, The Hiatus and Unconformities in Lithological and Faunal Record, Methods of Estimating the Age of Earth, Using of Absolute Dating in Estimating the Age of the Earth. - The importance of sedimentary rocks and discontinuities in the geological record Sedimentary Cycles and Depositional Environments, Recognition of Sedimentary Cycles, Matching (Correlation) Rock Layers and Geologic Map. - geological time column The Geologic Time Scale - Attempts for measuring the age of the Earth - tectonic movements - Continental opening - Ground balance theories - The most important features and events of the hidden life forever (Pre-Cambrian) Geological and Biological Events and Development on Earth, Precambrian Eon, Hadean time, Archaean time, Proterozoic time, - The most important features and events of the Paleozoic Era Paleozoic Era, Paleogeography during the Early Paleozoic Era (Cambrian-Silurian), Caledonian Orogeny, Life in Early Paleozoic Era, Paleogeography during the Late Paleozoic Era, Life in Late Paleozoic Era, Permian Extinction - The most important features and events of the Mesozoic Era Geological events through the Triassic Period, Geological events through the

	Jurassic Period, Geological events through the Cretaceous Period, Life during Triassic period, Life during Jurassic Period, Life during Cretaceous Period, Mass extinction during Mesozoic Era. - The most important features and events of the era of modern life Geological Events and Biological Development During the Cenozoic Era, Life during Cenozoic Era, - Humans and their types and the evolution of mammals, Geologic History of Mammals

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	135	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	9
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	225		

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

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

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	An introduction to historical geology and its most important principles
Week 2	Fossils, their importance and methods of preservation
Week 3	Stratigraphy and divisions of rock units
Week 4	The importance of sedimentary rocks and the hiatus in the geological record
Week 5	Geological time column
Week 6	Attempts for measuring the age of the Earth
Week 7	Relative and Absolute Dating
Week 8	Continental drifts
Week 9	Mountains building orogeny
Week 10	Ground balance theories
Week 11	The most important features and events of the (Pre-Cambrian)
Week 12	The most important features and events of the Paleozoic Era
Week 13	The most important features and events of the Mesozoic Era
Week 14	The most important features and events of the era of modern life
Week 15	Humans and their types and the evolution of mammals
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Solving a problems about the geological time scale
Week 2, Week 3, Week 4 and Week 5	Lab 2: Solving a problems about the relative dating
Week 6 and Week 7	Lab 3: Solving a problems about the absolute dating
Week 8 and Week 9	Lab 4: Solving a problems about the unconformities
Week 10 and Week 11	Lab 4: Solving a problems about the geological maps and stratigraphic columns
Week 12 and Week 13	Lab.5: Solving a problems about correlations
Week 14	reviewing
Week 15	Preparing for exam

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	الجيولوجيا التاريخية ، جاسم علي الجاسموجامعة بغداد	Yes
Recommended Texts	Earth History,1997, Brice J. C. and Smith. M. S. the McGraw-Hill USA.	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	**Stratigraphy**	**Module Delivery**
Module Type	**Cores**	☒ **Theory**

Module Code	Geo23114			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		2	**Semester of Delivery**		1
Administering Department		Department of Applied Earth Sciences	**College**	College of Sciences	
Module Leader	Fari Nijers Hassan		**e-mail**	Faris77@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name		None	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	General geology	**Semester**	1
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	A- Cognitive goals 1. To communicate an overview of stratigraphy. 2. The importance of this science in geology 3. And identify the type of strata in the field 4. Distinguishing geological formations

	B- Program skill goals 1 - After receiving this course, the student will be able to determine the type of geological strata and rock character, whether they are chemical sedimentary, clastic sedimentary rocks, igneous or metamorphic rocks. 2- Identify rock stratigraphic units (group, formation, member, and strata) in the field
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identify the types of rocks in the field 2- How the student can obtain the forms in the field 3- Drawing the stratigraphic sections after taking the thicknesses and rock characteristics of the field 5- How to diagnose a field lithostratigraphic unit 5- Determining the relative ages of rocks by means of fossils or radioactive isotopes 6- Determining the periods of progression and regression through life and litho facies
Indicative Contents المحتويات الإرشادية	1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods:** Evaluation of the student by attending and participating in discussions or answers during the lecture

	Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes Monthly and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Introduction to the science of stratification and the role of scientists in the development of

	this science.
Week 2	Stratigraphy and lith stratigraphic units
Week 3	Classes of lithostratigraphic units
Week 4	**Name the lithostratigraphic units**
Week 5	**Steps used to create a lithostratigraphic unit**
Week 6	**Methods of correlation lithostratigraphic units**
Week 7	Bio**stratigraphic units**
Week 8	**Types of biostratigraphic units and correlation**
Week 9	Chronostratigraphic units
Week 10	Magnetic stratigraphy units, field reversal evidence and magnetic sensitivity
Week 11	**Life groups and geographical distribution of neighborhoods**
Week 12	**Horizontal and vertical stratification relationships**
Week 13	Facies and facies **maps**
Week 14	**Surface and subsurface stratigraphic studies**
Week 15	**Theoretical + practical exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Cross sectional drawing
Week 2	Comparison of four lithostratigraphic sections
Week 3	Comparison of seven lithostratigraphic sections
Week 4	Drawing a composite stratigraphy
Week 5	Draw several composite stratigraphy section
Week 6	Determine the biostratigraphic zone
Week 7	litho facies mapping

Learning and Teaching Resources مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Stratigraphy	Yes
Recommended Texts	Stratigraphy and Sedimentology	Yes
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	**Structural Geology**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☒ **Lab**	
Module Code	**Geo23016**		

ECTS Credits	**5**			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ayyed Hussein Ward		**e-mail**	aiedwarid@tu.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		1/06/2023	**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	Explaining an overview of structural geology as an important in geology and identifying the geological structures in the field
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding**: Cognitive Objectives A1- explaining an overview of synthetic geology. A2- The importance of this science in geology. A3- Identifying the geological structures in the field. A4- Identifying geological formations and their distributions in the field. **B- Subject-specific skills**:

	B1-After receiving this course, the student will be able to determine the types of geological structures in the field and how to collect data. B2 – The possibility of understanding the distribution of rock detectors and their relationship to the presence of folds and cracks. B3 – The possibility of determining the ancient stress causing the presence of folds and faults for geological distortions..
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Structural geology , Defined it and their divisions.
Week 2	Folds and their elements.
Week 3	Geometrical classification of folds.
Week 4	The relationship between folds and plate tectonic.
Week 5	Genetic analysis of folds
Week 6	Folding mechanism
Week 7	Mid-term Exam

Week 8	Fractures
Week 9	Faults and faulting.
Week 10	Veins and fissures
Week 11	The relationship between faults and folds.
Week 12	Paleo-stress
Week 13	Unconformities
Week 14	Diaper structures
Week 15	Igneous structures
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to the structural geology.
Week 2	Lab 2: the relationship between valleys and beds in the map view.
Week 3	Lab 3: geological map of the horizontal beds in map view and section.
Week 4	Lab 4: geological map of the inclined beds in map view and section.
Week 5	Lab 5: three point problem.
Week 6	Lab 6: folds in the geological map view and section.
Week 7	Lab 7: faults in map view and section.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Structural Geology, Fossen, 2012	Yes
Recommended Texts	Structural Geology, Groshong, 2006	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	**Field Geology**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo12017**				
ECTS Credits	5				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ayyed Hussein Ward		**e-mail**	aiedwarid@tu.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	1/06/2023	**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	Explaining an overview of field geology as an important branch in geology and identifying how field data is collected
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Explaining an overview of field geology. 2. The importance of this science in geology. 3. Learn about field data collection methods. 4. Learn about the methods of selecting the appropriate field stations for data collection.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Field geology and its aims.
Week 2	Requirements of the field and safety.
Week 3	How to measure the geological observations.
Week 4	Determining the attitudes of the planes by the touching method.
Week 5	Determining the position of the planes by the bearing method.
Week 6	Determining the position of the planes by the compass.
Week 7	Mid-term Exam
Week 8	Positioning and altimeter systems.
Week 9	Methods of the field investigation.
Week 10	Tabling of data.
Week 11	The field notes.
Week 12	Field sample collection methods.
Week 13	Geological section drawing.
Week 14	Strati graphical section drawing.
Week 15	Structural section drawing.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to the field geology.
Week 2	Lab 2: measuring of areas.
Week 3	Lab 3: Introduction to level.
Week 4	Lab 4: projecting of the points and the area resolving by level.
Week 5	Lab 5: Introduction to the theodolite .
Week 6	Lab 6: measuring of horizontal and vertical angles by theodolite.
Week 7	Lab 7: using of compass, GPS and clinometer.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	GEOLOGICAL FIELD TECHNIQUES. Angela L. Coe. 2010.	Yes
Recommended Texts	Field Methods for Geologists and Hydrogeologists, Assaad, Fakhry A., and LaMoreaux, Philip E. Sr. 2004.	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
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	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	**Geomorphology**		**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**	1	
Administering Department	Applied Geology	**College**	Science	
Module Leader	Najm Abdullah. K.Al-Kraaey	**e-mail**	najimalabdula@tu.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	01/06/2023	**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	يعتبر المنهج الدراسي هذا مكمل لدراسة فروع علم الارض المختلفة ،ويهدف الى اعطاء الطالب نبذة مختصرة عن اساسيات علم الجيومور فولوجي (نشوء وتطور هذا العلم) مع دراسة المفاهيم الأساسية لهذا العلم (دراسة اشكال سطح الارض والاسباب التي ادت الى نشوئها وتطورها عبر الاف وملايين السنين من حيث دراسة ،(العوامل والعمليات)التي ادت الى تشكيل وتحوير شكل الارض بصورته الحالية ،واهم الاشكال المرتبطة بعمليات التعرية والارساب) لاجل تمييزها ووصفها وتوزيعها ،مع تصنيف هذه الاشكال الارضية حسب اهم التصنيفات العالمية المعتمدة (المعهد الدولي للمسوحات الجوية وعلوم الأرض. (I.T.C) This curriculum is complementary to the study of the different branches of earth science, It aims to give the student a brief overview of the basics of geomorphology(The emergence and development of this science) With the study of the basic concepts of this science(Studying the shapes of the Earth's surface and the reasons that led to its emergence and development over thousands and millions of years in terms of a study) The factors and processes that led to the formation and transformation of the earth's shape in its current form, The most important forms associated with erosion and sedimentation processes) in order to identify, describe and distribute them, With the classification of these landforms according to the most important international classifications approved. (International Institute of Atmospheric Surveys and Earth Sciences I.T.C)
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	أ- الأهداف المعرفية 1-يعرف المفاهيم الاساسية لاشكال سطح الارض. 2- تطبيق البرامجيات الحديثة في دراسة بعض الاشكال لطبوغرافية الارض. 3- استخدام البرامج الحديثة في استخلاص نظام الحوض المائي والشبكة المائية له. 4- التعرف على اساسيات ومكونات الخرائط الطبوغرافية والجيومورفولوجية. 5- تفسير الصور الجوية و البرامج المستخدمة في التفسير البصري. ب - الأهداف المهارية الخاصة بالمقرر. 1 – القدرة على استخدام بعض البرامج التطبيقية الخاصة بالدراسات المكانية 2 – التعرف على طرق انشاء والتعامل مع الخرائط الطبوغرافية والجيومورفولوجية . 3 – القدرة على استخلاص القياسات من الخرائط وخاصة ما يتعلق بالتحليل المورفومتري للاحواض المائية A- Cognitive goals 1. Know the basic concepts of Earth's surface shapes. 2. The application of modern software in the study of some forms of land topography. 3. Using modern programs to extract the water basin system and its water

	network. 4. Learn the basics and components of topographic and geomorphological maps. 5. Interpretation of aerial photographs and software used in visual interpretation. B- Skill objectives of the course. 1. The ability to use some applied programs for spatial studies. 2. Learn how to create and deal with topographic and geomorphological maps. 3. The ability to extract measurements from maps, especially with regard to morphometric analysis of water basins
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. عرض المقرر بأسلوب واضح ومبسط مع الاستعانة بالفيديوهات والمخططات التوضيحية وعرضها من خلال تقنية العرض التقديمي Power Point . 2. التدريبات والأنشطة الصفية والمختبرية 3. الواجبات والتقارير الاسبوعية والفصلية. 4. الارشاد الى المصادر العلمية للتوسع في استيعاب مفردات وتفاصيل المادة المقرره . 5. الجولات والزيارات الحقلية . 1. Presentation of the course in a clear and simplified manner, with the help of videos and illustrations, and presenting them through Power Point presentation technology. 2. Classroom and laboratory exercises and activities. 3. Weekly and quarterly assignments and reports. 4. Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material. 5. Tours and field visits to work sites and libraries.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**أ-طرائق التعليم والتعلم :** 1. المحاضرات. 2. السبورة. 3. التعليم الالكتروني ـ حث الطلبة على طلب المعلومات من المواقع الإلكترونية. 4. البيانات الرقمية والخرائط والمرئيات الفضائية . 5. استخدام البرامج التطبيقة المكانية ومنها(GIS) 6. ادارة المحاضرة على نحو تطبيقي مرتبط بالواقع السائد لجذب الطالب الى المادة المقررة دون الابتعاد عن صلب الموضوع لتكون المادة ضمن اطار التطبيق العملي . 7. تكليف الطلبة بالتقارير والواجبات الجماعية . 8. استخدام وسائل العرض الحديثة معززة بالصور والمرئيات الفضائية وافلام قصيرة توضيحية. A-Methods of teaching and learning: 1.Lectures. 2. The blackboard.

	3. E-learning. Encourage students to request information from websites. 4. Digital data, maps and satellite visuals. 5. Using spatial applications, including (GIS) 6. Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the crux of the matter so that the material falls within the framework of practical application. 7. Assign students to reports and group assignments. 8. The use of modern presentation methods, supported by satellite images and visuals, and explanatory short films. ب- - **طرائق التقييم :** 1. الامتحانات اليومية والشهرية. 2. الاسئلة الشفهية داخل قاعة الدرس والمناقشات الجماعية. 3. التقارير وعمل السمنار. 4. كيفية تطبيق البرامج. 1.Daily and monthly exams. 2. Oral questions in the classroom and group discussions. 3. Reports and seminars. 4. How to apply the programs.

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11

assessment	**Assignments**	2	10% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (15)	Continuous	All
	Report	1	10% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (15)	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	-تعريف علم الجيومورفولوجيا,المفاهيم الاساسية في علم الجيومورفولوجيا . -Definition of geomorphology, basic concepts in geomorphology.
Week 2	-التجوية والعوامل المؤثرة عليها ,انواع العمليات الجيومورفولوجية . -Weathering and factors affecting it, types of geomorphological processes.
Week 3	- الانهيارات الكتلية وانواعها والعوامل المسببة لحدوثها (تحرك مواد). - Mass collapses, their types and the factors causing their occurrence (movement of materials).
Week 4	- المياه السطحية الجارية وتصنيفاتها المختلفة , العوامل والدور الجيومورفولوجية للانهار والاشكال الناتجة عنها. - Surface running water and its different classifications, geomorphological factors and role of rivers and the forms resulting from them.
Week 5	- الامتحان الاول-the first exam
Week 6	- العمليات الجيومورفولوجية للرياح والاشكال الارضية الناتجة عنها. - Geomorphological processes of winds and the resulting landforms.
Week 7	- الخصائص الجيومورفولوجية البنيوية و العمليات الجيومورفولوجية الباطنية . - Structural geomorphological characteristics and underground geomorphological processes.
Week 8	- العمليات الجيومورفولوجية للمياه الجوفية والاشكال الناتجة عنها,المظاهر الكارستية وضروف تكوينها. - Geomorphological processes of groundwater and the forms resulting from it, karstic features and conditions of its formation.
Week 9	- العمليات الجيومورفولوجية للامواج والتيارات البحرية والاشكال الناتجة عنها. - Geomorphological processes of waves and ocean currents and the shapes resulting from them.
Week 10	- الجليد واثاره الجيومورفولوجية ,مظاهر سطح الثلاجات,الاشكال الناتجة عن التعرية الجليدية والترسيب.

	- Ice and its geomorphological effects, surface features of refrigerators, shapes resulting from ice erosion and sedimentation.
Week 11	- التعرية انواعها واثارها الايجابية والسلبية . - Erosion types and its positive and negative effects.
Week 12	- تفسير المرئيات الفضائية ودلائلها الجيومورفولوجية. - Interpretation of satellite visuals and their geomorphological evidence.
Week 13	- الارساب النهرى واهم الاشكال الجيوموفولوجية الناتجة عنه . - River sedimentation and the most important geomorphological forms resulting from it
Week 14	-النحت النهرى واهم الاشكال الجيوموفولوجية الناتجة عنه - River sculpture and the most important geomorphological forms resulting from it
Week 15	- انظمة المسح المستخدمة في الجيومورفولوجيا - Survey systems used in geomorphology
Week 16	الامتحان النهائي **Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1-2-3	- قراءة وتحليل الخارطة الطبوغرافية (Read and analyze the topographic map)
Week 4-5	-توظيف نظم المعلومات الجغرافية في استخلاص الانحدار وخطوط الكنتور والمقاطع الطولية والعرضية الطبوغرافية من نماذج الإرتفاعات الرقمية(dem)(- Employing geographic information systems in extracting slope, contour lines, (longitudinal and transverse topographical sections from digital elevation models (dem))
Week 6-7	-توظيف خرائط الاحواض المائية في استخلاص القياسات المورفومترية. -Employment of water basin maps in extracting morphometric measurements.
Week 8	-الامتحان الاول-the first exam
Week 9-10	-استخدام الرموز الجيومورفولوجية في انتاج والية تصميم الخرائط الجيومورفولوجية الرقمية . - The use of geomorphological symbols in the production and mechanism of designing digital geomorphological maps
Week 11-	-تحليل الخريطة الجيومورفولوجية (Geomorphological map analysis)

12	
Week 13-14	-تفسير وتقييم بيانات القمر الصناعي (المرئيات الفضائية)لإجل التعرف على الاشكال الارضية واهم المدلولات لها. - Interpretation and evaluation of satellite data (space visualizations) in order to identify landforms and their most important implications
Week 15	الامتحان النهائي(Final exam)

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	- الكتاب المنهجي المقرر (الجيومورفولوجي)عدنان النقاش واخرون - The prescribed methodology book (Geomorphology) by Adnan Al-Naqqash and others	Yes
Recommended Texts	- اشكال سطح الارض للمؤلف ارثر.ن.ستريلر تعريب وفيق الخشاب. - Shapes of the Earth's Surface, by Arthur N. Streller. Arabization by Wafic al-Khashab. - مباديء التصوير الجوي / منشورات نظام المسح الجيومورفولوجي لمسوحات الفضاء وعلوم الارض (لهيرمان فيرستابن) و(روي فان) تعريب يحيى عيسى فرحان /المرئيات الفضائية والخرائط - Principles of Aerial Photography / Geomorphological Survey System Publications for Space Surveys and Earth Sciences (by Hermann Verstappen) and (Roy Fan)) Arabization of Yahya Issa Farhan / satellite visuals and maps.	No
Websites	- جيومورفولوجيةالاشكال الارضية (محمد صبري محسوب اصول الجيومورفولوجيا (سيد احمد ابو العينين) مواقع شركة ESRI وناسا الامريكية. - Geomorphology of landforms (Mohamed Sabry, calculated by the origins of geomorphology (Sayed Ahmed Abul-Enein), ESRI and NASA 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	**Micropaleontology**			**Module Delivery**	
Module Type	**Cores**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo24120				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		2	**Semester of Delivery**		2
Administering Department		Department of Applied Earth Sciences	**College**	College of Sciences	
Module Leader	Fari Nijers Hassan		**e-mail**	Faris77@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name		None	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	A- Cognitive goals 5. To communicate an overview of paleontology . 6. The importance of this age of the sedimentary rock 7. identify the type of paleoecology 8. identify the type of paleoclimit 9. identify the type of paleogeographic B- Program skill goals 1 - After receiving this course, the student will be able to determine the type of paleoecology , paleoclimit and paleogeographic 2- Identify bio stratigraphic units (taxon , concurrent , assemblage and interval biozones
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1- Identification of the species and genera of the framinifera, indicative of the relative ages of sedimentary rocks 2- Identification of the species and genera of the framinifera indicative of the paleoenvironment 3- Identification of the species and genera of the Framinifera indicative of the paleoclimate 4-Diagnosis of the species and genera of the framinifera indicative of paleogeography 5-Diagnosis of the species and genera of Ostraqua, the function of the paleo environment 6-Determination of the age and Paleoclimatic of rocks by spore and pollen
Indicative Contents المحتويات الإرشادية	1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point

	presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem)	35	**Unstructured SWL (h/w)**	6

الحمل الدراسي غير المنتظم للطالب خلال الفصل		الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	**Introduction to Paleontology**
Week 2	**Microfossil assemblies and their taxonomic positions in paleontology**
Week 3	**Foraminifera**
Week 4	**Introduction to Paleontology**
Week 5	**External manifestations of the foraminifera shell**
Week 6	**Classification of the foraminifera**
Week 7	**The geological history of the foraminifera**
Week 8	**foraminifera environment**

Week 9	**Ostracuda**
Week 10	**Classification of ostracuda**
Week 11	**The paleoenvironment of ostracuda**
Week 12	**calcareous algae;**
Week 13	**Radiolarian**
Week 14	**Spore and pollen**
Week 15	**Morphology in spore and pollen grains**
Week 16	**Theoretical + practical exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Identification of the external features in the shells of the Foraminifera fossils
Week 2	Study of the types and genera of the floating Foraminifera under the microscope, number 4
Week 3	Study of the species and genera of the floating Foraminifera under the microscope, number 4
Week 4	Study of the species and genera of the floating Foraminifera under the microscope, number 4
Week 5	Study of the species and genera of the benthic Foraminifera under the microscope, number 4
Week 6	Study of the species and genera of the benthic Foraminifera under the microscope, number 4
Week 7	Study of the species and genera of the large benthic Foraminifera under the microscope, number 4
Week 8	Study of the types and genera of ostracuda under the microscope, number 4
Week 9	Study of the species and genera of the ostracuda under the microscope, number 4
Week 10	Studying the types and genera of organic wall fossils under the microscope, number 4
Week 11	Practical exam

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Micropaleontology	Yes
Recommended Texts	Stratigraphy and Microfossils	Yes
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	**Structural Geology**	**Module Delivery**
Module Type	**C**	**☒ Theory**

Module Code	**Geo35130**			☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	5				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ayyed Hussein Ward		**e-mail**	aiedwarid@tu.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		1/06/2023	**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	Explaining an overview of structural geology as an important in geology and identifying the geological structures in the field
Module Learning Outcomes مخرجات التعلم للمادة	**A- Knowledge and understanding**: Cognitive Objectives A1- explaining an overview of synthetic geology. A2- The importance of this science in geology. A3- Identifying the geological structures in the field.

الدراسية	A4- Identifying geological formations and their distributions in the field. **B- Subject-specific skills**: B1-After receiving this course, the student will be able to determine the types of geological structures in the field and how to collect data. B2 – The possibility of understanding the distribution of rock detectors and their relationship to the presence of folds and cracks. B3 – The possibility of determining the ancient stress causing the presence of folds and faults for geological distortions..
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Structural geology , Defined it and their divisions.
Week 2	Folds and their elements.
Week 3	Geometrical classification of folds.
Week 4	The relationship between folds and plate tectonic.
Week 5	Genetic analysis of folds
Week 6	Folding mechanism

Week 7	Mid-term Exam
Week 8	Fractures
Week 9	Faults and faulting.
Week 10	Veins and fissures
Week 11	The relationship between faults and folds.
Week 12	Paleo-stress
Week 13	Unconformities
Week 14	Diaper structures
Week 15	Igneous structures
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to the structural geology.
Week 2	Lab 2: the relationship between valleys and beds in the map view.
Week 3	Lab 3: geological map of the horizontal beds in map view and section.
Week 4	Lab 4: geological map of the inclined beds in map view and section.
Week 5	Lab 5: three point problem.
Week 6	Lab 6: folds in the geological map view and section.
Week 7	Lab 7: faults in map view and section.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Structural Geology, Fossen, 2012	Yes
Recommended Texts	Structural Geology, Groshong, 2006	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	**Plate Tectonic**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo24019**				
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level		2	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	

Module Leader	Ayyed Hussein Ward	**e-mail**	aiedwarid@tu.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	1/06/2023	**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	Explaining an overview of Plate tectonic as an important in geology and identifying the geological structures in the cotenants and oceans.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding**: Cognitive Objectives A1- Explaining an overview of synthetic geology. A2- The importance of this science in geology. A3- Identifying the large contact between plates in the cotenants and oceans . **B- Subject-specific skills**: B1-After receiving this course, the student will be able to determine the types of boundaries between plates. B2 – The possibility of understanding the distribution of volcanic seismic activity in the crust. B3 – The possibility of determining the earth layers by understanding the change velocity of earth waves.
Indicative Contents	Indicative content includes the following.

المحتويات الإرشادية	1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem)	125		

الحمل الدراسي الكلي للطالب خلال الفصل	

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 / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 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	Introduction to earth structures
Week 2	Waves and their behavior in earth
Week 3	Origin of the Earth
Week 4	**Continental Drift Theory and its indications**
Week 5	Sea Floor Spreading Theory and its indications
Week 6	Earth's Magnetic Field
Week 7	Mid-term Exam
Week 8	Origin of cotenants
Week 9	Triple Junctions
Week 10	Mid Ocean Ridge
Week 11	Continental margins
Week 12	Plate boundaries
Week 13	Divergent boundaries

Week 14	Convergent boundaries
Week 15	Transform boundaries
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: earth structures and waves velocity.
Week 2	Lab 2: Seismic wave's path through earth layer
Week 3	Lab 3: determine major and miner plate
Week 4	Lab 4: types of the plate boundaries
Week 5	Lab 5: recognition of the plate boundaries in map view and section
Week 6	Lab 6: determine the rate of plate in divergent boundary
Week 7	Lab 7: faults in map view and section.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Plate Tectonics: How It Works: Cox, A. V. and Hart, R. B. 1986.	Yes
Recommended Texts	Paleomagnetism - Paleomagnetism And Plate Tectonic Theory - Magnetic, Minerals, Rift, and Plates: David E. Newton	No
Websites	https://science.jrank.org/pages/4990/Paleomagnetism-Paleomagnetism-plate-tectonic-theory.html#ixzz6SkXhtlZq	

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 Information

معلومات المادة الدراسية

Module Title	**Hydrogeology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code			
ECTS Credits	5		
SWL (hr/sem)	**125**		
Module Level	3	**Semester of Delivery**	5
Administering Department	Geo	**College**	Type College Code
Module Leader	Prof. Dr.Sabbar Abdullah Saleh	**e-mail**	Sabbar.saleh@tu.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Aktefae Taha Abulqader	**e-mail**	Ektifa.taha@tu.edu.iq
Peer Reviewer Name	Prof. Dr. Sawsan	**e-mail**	E-mail
Scientific Committee Approval Date	18/06/2023	**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	The curriculum focuses on the basic concepts in groundwater hydrology, then discusses groundwater regions, types of reservoirs, their relationship with surface water, the laws of their movement and natural discharge, methods of evaluation and calculation, evaluation of the hydraulic characteristics of reservoirs, artificial recharge and subsurface dams, with a brief overview of groundwater hydrology in Iraq, giving a general idea of the hydrochemistry and qualitative characteristics of natural waters and the basis for their evaluation and graphic representation. Educating students on the basic concepts of groundwater science and its relationship with geological sciences, ways of evaluating, managing and investing in groundwater basins, and their qualitative characteristics, as well as their impact on civil, industrial and agricultural facilities.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Enabling the student to complete studies for investing and managing groundwater resources, and supervising executive projects in this field.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2-Classroom and laboratory exercises and activities 3-Weekly and quarterly assignments and reports 4-Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	6. Class lecture 7. Laboratory 8. Quiz 9. Tutorial 10. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	70	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**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	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All
	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	What is Groundwater, Where Groundwater Comes From, Groundwater and Fresh Water, Porosity, Effective Porosity, Porosity and packing, A mixture of particles sizes, Sediment Texture, Texture Classification, Porosity Ranges for sediments.
Week 2	Specific Yield, Specific retention, Specific storage, Storativity, Transmissivity, Permeability
Week 3	hydraulic conductivity, The Saturated Zone, The Water Table, The Unsaturated Zone, Recharge of ground water,
Week 4	Ground-water aquifers, Confined or (Artesian) Aquifer, Unconfined Aquifer, Perched aquifer, Confining layers, Aquitard, Aquiclude, Subsidence because pumping
Week 5	Salt Water Intrusion, Gaining Streams, Losing Streams, Bank Storage, Cone of Depression, Induced Recharge, Well Contribution Zone
Week 6	Darcy's Law, Laboratory Measuring Hydraulic Conductivity, Constant-head permeameter apparatus, Falling-head permeameter apparatus.
Week 7	Ground water hydrographs, Ground-water watersheds, Groundwater Movement, springs
Week 8	Hydraulic Head, Hydraulic Gradients, Velocity of Groundwater Movement, Types Ground Water Flow, Topography and its Effect on Groundwater
Week 9	Field tests to determine Hydraulic conductivity, What is a pumping test, assumption for a pumping test, time-drawdown data Analysis, Theis method of analysis
Week 10	Jacob method of analysis, Steady state pumping test in an unconfined aquifer, unsteady state test of confined aquifer. Pretest Information required
Week 11	Flow Net, Rules for Drawing Flow Nets, Total natural discharge from flow net, flownet beneath dam
Week 12	Artificial Recharge of Groundwater, beneficial, controlling factors, methods of Artificial Recharge.
Week 13	Concept of a subsurface dam, Advantages And disadvantages, Requirements, suitable site for a subsurface dam, Characteristics
Week 14	Hydrogeology of Iraq
Week 15	Qualitative properties of groundwater in Iraq
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab. 1. Determinations of Porosity and Effective Porosity.
Week 2	Lab. 2. Determination of Specific Yield, Specific retention.
Week 3	Lab. 3. Specific storage, Storativity, Transmissivity

Week 4	Lab. 4. Darcy law experiment
Week 5	Lab. 5. Determination hydraulic conductivity, using constant head perimeter
Week 6	Lab. 6. Determination hydraulic conductivity, using falling head perimeter
Week 7	Lab. 7. Ground water hydrographs and derivation of Ground-water watersheds
Week 8	Lab. 8. Calculations of Hydraulic Head, Hydraulic Gradients, Velocity of Groundwater Movement.
Week 9	Lab. 9. Derivation of groundwater flownet.
Week 10	Lab. 10. Pumping test experiment.
Week 11	Lab. 11. Pumping test data analysis by Theis method.
Week 12	Lab. 12. Pumping test data analysis by Jacop method.
Week 13	Lab. 13. Pumping test data analysis by Distance-Drawdown method.
Week 14	Lab. 14. Pumping test data analysis by recovery test method.
Week 15	Lab. 15. Artificial recharge of groundwater.
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Groundwater hydrology by Todd	Yes
Recommended Texts	Hydrogeology by Fetter	yes
Websites	https://www.amazon.com/Groundwater-Hydrology-David-Keith-Todd/dp/0471059374	

Grading Scheme

مخطط الدرجات

Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group	**A -** Excellent	امتياز	90 - 100	Outstanding Performance

(50 - 100)	**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	**Electric and Seismic Methods**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo35125**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		5
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	Riyadh Muhawish Rasheed		**e-mail**	riyadhalazzawi@tu.edu.iq	
Module Leader's Acad. Title		Teacher	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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	Provide an overview of these two methods and their important role in geological survey operations in general, as well as their use in various exploration processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding:** After studying this material, the student will be able to identify types of seismic waves, understand how they occur, and utilize seismic methods in exploring geological structures, including their composition and determining their depth and dimensions. As for the electrical method, it is used for shallow depths, especially in hydrogeological surveys. It helps identify the dimensions of aquifers, determine the quality of groundwater, assess reservoir properties, and identify weak zones in the soil. **B- Subject-Specific skills:** Developing students' analytical and applied skills, enhancing their deductive thinking, and improving their abilities to work with laboratory equipment are important goals.
Indicative Contents المحتويات الإرشادية	1- The curriculum is presented in an advanced and simplified manner, utilizing illustrative figures and detailed diagrams, which are showcased through the presentation techniques of PowerPoint. 2- Daily and monthly exams are conducted, taking into account the classroom activities and laboratory experiments. 3- Guidance will be provided to refer students to scientific sources to further expand their understanding of the vocabulary and details of the course material. 4- Field trips and site visits to work locations will be organized to provide practical

	hands-on experience.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Methods of teaching and learning: The lectures will be managed in an applied manner, closely related to the prevailing reality, to engage students in the course material without deviating from the core subject matter. The aim is to ensure that the material is presented within the framework of practical application. Additionally, students will be assigned individual and group activities and assignments. Modern presentation tools will be utilized, enhanced with drawings and illustrative figures. Evaluation Methods: 1- Engagement Evaluation: Assessing the extent of the student's participation in class discussions and their responsiveness to questions and challenges presented. 2- Contribution Evaluation: Assessing the student's contribution to lectures and discussions by presenting new ideas, providing relevant examples and experiences, and sharing additional readings or sources. 3- Creativity Evaluation: Evaluating the student's ability to creatively apply the concepts introduced in the course and provide innovative solutions to the challenges presented. 4- Collaboration Evaluation: Assessing the student's collaboration with their peers in group work and their contribution to achieving the goals of joint projects. 5- A variety of tools can be used to assess participation, such as participation reports, classroom discussion evaluations, lecturer feedback, and assessment of projects and group activities. Evaluation criteria should be clearly communicated to students from the beginning, and constructive feedback should be provided to enhance continuous improvement. 6- Allocating a percentage of the grade to assignments, daily quizzes, monthly exams,

	and final exams serves as a guide to assess commitment and academic achievement.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (20)	Continuous	All
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	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 and the Role of Scientists in Advancing this Science
Week 2	Principles of Sound Wave Propagation in Rock Media.

Week 3	Sources of energy used in seismic exploration
Week 4	Types of seismic surveys.
Week 5	Modern techniques in seismic reflection methods.
Week 6	Modern techniques in seismic refraction methods.
Week 7	Differences between seismic reflection and seismic refraction surveys.
Week 8	Ambiguity in interpreting seismic data.
Week 9	Introduction to the Electrical Method and its Applications.
Week 10	The Electrical Resistivity Method and Deployment Techniques.
Week 11	Field Measurement Methods for Electrical Conductivity.
Week 12	Methods for interpreting electrical survey results.
Week 13	Presentation of Electrical Resistivity Results.
Week 14	Ambiguity in the Interpretation of Electrical Resistivity Method.
Week 15	Sources of Noise in Electrical Resistivity Measurements.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Lab 1: Basic Units in Geophysics and Elasticity Modulus
Week 2	Lab 2: Seismic Wave Propagation Path and Applications in Seismic Reflection Method.
Week 3	Lab 3: Applications of Refraction Laws and Seismic Refraction Method.
Week 4	Lab 4: Seismic Refraction Profiles and Forward-Reverse Shooting Method for Depth and Thickness Calculation of Layers.
Week 5	Lab 5: Calculation of Electrical Resistivity for All Electrical Array Configurations.
Week 6	Lab 6: Qualitative and Quantitative Description of Electrical Conductivity Measurements.
Week 7	Lab 7: Representation and Interpretation of Self-Potential (SP) Survey Results.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Principle of geophysical methods in geological exploration	Yes
Recommended Texts	Applied 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	**Principles of Geochemistry**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab**
Module Code	**Geo35130**	

ECTS Credits	5			☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		5
Administering Department		Geo	**College**	Type College Code	
Module Leader	Mohamed W. Alkhafaji		**e-mail**	mohamedajeel@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Dr. Ahmed Mohamed Mahmood		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		18/06/2023	**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	6. To understand the Godschmidt laws that controlling the distribution of elements in minerals rocks. 7. To understand the relationship of the elements with each other. 8. This course deals with the basic concept of distribution of elements in rocks. 9. This is the basic subject for ore geology, industrial rock and minerals, and environmental geology.
Module Learning Outcomes	6. Recognizing the distribution of elements in the earth zones. 7. Describe the composition of the Earth´s main geochemical reservoirs 8. Understand the behavior of elements in the geological systems.

مخرجات التعلم للمادة الدراسية	9. Understanding the main minerals and elemental constituents of the earth zones. 10. Understanding the variation in the structure of the earth from core to crust. 11. Understanding the factors controlling the variations in rock types. 12. Explain fractionation of stable isotopes and how such data can be used to understand various geochemical and geobiological processes. 13. Describe the use of geochronology to date magmatic and metamorphic events 14. Describe how radiogenic isotope signatures can be used to trace the source of minerals, rocks and fluids 15.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. The Big Bang: the beginning of the Universe, Nucleosynthesis: creation of the elements, The Solar System, Solar System abundances of the Elements. [10] [15 hrs] Geochemistry of the solid earth, The crust, the Earth's mantle, estimating mantle and bulk earth composition, the Earth's core and its composition, mantle geochemical reservoirs. [15 hrs] The hydrosphere, Composition of modern seawater, Evolution of the oceans over geologic time, Origin of the oceans, Composition of the oceans, . [15 hrs] Revision problem classes [6 hrs] The present atmosphere, Temperature and pressure distribution in the atmosphere, Photochemical reactions in the atmosphere, The Ozone layer in the stratosphere, Composition of the atmosphere, Evolution of the Earth's atmosphere over geologic time,. [15 hrs] Organic geochemistry, the carbon cycle, Organic matter in natural waters and soils, Sedimentary organic matter and coal and oil formation, The carbon cycle and climate. [7 hrs] Radiogenic isotope geochemistry, basics of radiogenic isotope geochemistry, decay

	systems and their applications, stable isotope geochemistry, isotope geothermometry . [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Class lecture 2. Laboratory 3. Quiz 4. Tutorial 5. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**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	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All
	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7

assessment	**Final Exam**	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction – definition of geochemistry- the relationship with other geology branches.
Week 2	Solar system
Week 3	The main information sources on the earth's interior
Week 4	Meteorites
Week 5	The composition of the earth's crust
Week 6	The composition of the earth's upper mantle
Week 7	Mid-term Examination
Week 8	The composition of the earth's transition zone and lower mantle
Week 9	The composition of the earth's core
Week 10	Theories about the origin of earth
Week 11	The geochemistry of the hydrosphere
Week 12	The geochemistry of the atmosphere
Week 13	Organic geochemistry
Week 14	Radiogenic isotopes
Week 15	Stable isotopes
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	Calculate the precision for the concentration of heavy elements in the sample

Week 3	Calculation of heavy metal concentrations in terms of absorption
Week 4	Calculation of residence time in sea water for some dissolved elements
Week 5	Calculate the ionic strength of sea water
Week 6	Deposition of the mineral wolfenite
Week 7	Calculation of mineral ratios of the chemical fraction of calcium sulfate rocks
Week 8	Calculation of the proportions of minerals in the clast fraction of calcium sulphate rocks
Week 9	Method for calculating the enrichment coefficient of metals
Week 10	Calculation of loss and gain during the weathering process
Week 11	Redox diagrams
Week 12	Estimation of calcium and magnesium in river and well water
Week 13	How to collect samples from the field
Week 14	Lake water geochemistry
Week 15	Calculating the ionic strength of river water

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	Geochemistry	No
Recommended Texts	Introduction to Geochemistry	No
Websites	https://www.sciencedirect.com/topics/chemistry/geochemistry	

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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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	تحسس نائي - Remote Sensing			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☐ **Seminar**	
Module Code	**Geo35126**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level	3		**Semester of Delivery**	1	
Administering Department	Applied Geology		**College**	Science	
Module Leader	Najm Abdullah. K.Al-Kraaey		**e-mail**	najimalabdula@tu.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	01/06/2023		**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	-يعتبر المنهج الدراسي هذا مكمل لدراسة الموارد الارضية المختلفة وطرق الاستكشاف والمسح الجيولوجي واختيار معطيات رقمية وطرق التفسير البصري والمعالجة الرقمية لاستخدامها في تطبيقات جيولوجية مختلفة . -This curriculum is considered complementary to the study of various earth resources, exploration and geological survey methods, selection of digital data, visual interpretation methods and digital processing for use in various geological applications.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	-بعد ان يكمل الطالب المنهاج الدراسي يصبح قادرا على كيفية اختيار معطيات انظمة الاستشعار عن بعد وطرق تفسير المعطيات و طرق المعالجة الرقمية وخصائص المنصات الجوية والفضائية وكيفية اختيار المعطيات لتفسيرها في المجالات الجيولوجيةالمتعددة.-ويصبح الطالب قادر على استخدام بعض البرامج التطبيقية الخاصة بالاستشعار عن بعد ،و تفسير بيانات الاقمار الصناعية (المرئيات الفضائية) After the student completes the curriculum, he becomes able to choose the data of remote sensing systems, data interpretation methods, digital processing methods, characteristics of air and space platforms, and how to choose data for interpretation in the various geological fields. The student becomes able to use some remote sensing application programs, and Interpretation of satellite data (satellite visuals)
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 6. عرض المقرر بأسلوب واضح ومبسط مع الاستعانة بالفيديوهات والمخططات التوضيحية وعرضها من خلال تقنية العرض التقديمي Power Point . 7. التدريبات والأنشطة الصفية والمختبرية 8. الواجبات والتقارير الاسبوعية والفصلية. 9. الارشاد الى المصادر العلمية للتوسع في استيعاب مفردات وتفاصيل المادة المقرره . 10. تطبيقات برامج الاستشعار عن بعد . 6. Presentation of the course in a clear and simplified manner, with the help of videos and illustrations, and presenting them through Power Point presentation technology. 7. Classroom and laboratory exercises and activities. 8. Weekly and quarterly assignments and reports. 9. Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material.

	10. Remote sensing software applications.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**أ-طرائق التعليم والتعلم :** 9. المحاضرات. 10. السبورة. 11. التعليم الالكتروني ـ حث الطلبة على طلب المعلومات من المواقع الإلكترونية. 12. البيانات الرقمية والخرائط والمرئيات الفضائية . 13. استخدام وتطبيق البرامج التطبيقة ومنها(ERDAS IMAGINES-ENVI-) 14. ادارة المحاضرة على نحو تطبيقي مرتبط بالواقع السائد لجذب الطالب الى المادة المقررة دون الابتعاد عن صلب الموضوع لتكون المادة ضمن اطار التطبيق العملي . 15. تكليف الطلبة بالتقارير والواجبات الجماعية . 16. استخدام وسائل العرض الحديثة معززة بالصور والمرئيات الفضائية وافلام قصيرة توضيحية. A-Methods of teaching and learning: 1.Lectures. 2. The blackboard. 3. E-learning. Encourage students to request information from websites. 4. Digital data, maps and satellite visuals. 5. Use and application of application software, including (ERDAS IMAGINES-ENVI-) 6. Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the crux of the matter so that the material falls within the framework of practical application. 7. Assign students to reports and group assignments. 8. The use of modern presentation methods, supported by satellite images and visuals, and explanatory short films. **ب- - طرائق التقييم :** 5. الامتحانات اليومية والشهرية. 6. الاسئلة الشفهية داخل قاعة الدرس والمناقشات الجماعية. 7. التقارير وعمل السمنار. 8. كيفية تطبيق البرامج. 1.Daily and monthly exams. 2. Oral questions in the classroom and group discussions. 3. Reports and seminars. 4. How to apply the programs.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	80	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	25	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (15)	Continuous	All
	Report	1	10% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (15)	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	- تعريف علم الاستشعار عن بعد واسسه ومراحل التحسس النائي.(مفاهيم اساسية) - Definition of remote sensing science, its foundations and stages of remote sensing. (Basic concepts)
Week 2	- المميزات الاساسيه للمعطيات وتطبيقاته وانواع الاقمار الاصطناعية.(لمحة تاريخية) -The basic characteristics of data, its applications, and types of satellites. (Historical overview)
Week 3	- مصادر الطاقة ومباديء الاشعاع طبقات الغلاف الجوي تفاعلات الطاقة في الغلاف الجوي. -Sources of energy and principles of radiation, layers of the atmosphere, energy interactions in the atmosphere.
Week 4	- تفاعلات الطاقة مع معالم سطح الارض , خصائص الانعكاس الطيفي للماء والصخور.(تحليل الطيف الكهرومغناطيسي) - Energy interactions with Earth's surface features, spectral reflection properties of water and rocks. (Electromagnetic spectrum analysis)

Week 5	- المنصات والمجسات الفضائية للموارد الارضية -Space platforms and sensors for terrestrial resources
Week 6	- المميزات الاساسية لمعطيات التحسس النائي. -Basic features of remote sensing data.
Week 7	-الامتحان الاول-the first exam
Week8	- منظومات ومصادر التصوير الفوتوغرافي -Photographic systems and sources
Week 9	- منظومات ومصادر التصوير الغير الفوتوغرافي (الوسائل الجوية –الوسائل الفضائية) - Non-photographic imaging systems and sources (aerial means - space means)
Week 10	-مصطلحات الاقمار الصناعية . -Satellite terminology.
Week 11	-دراسة بعض الاقمار الصناعية ومواصفاتها . - Study some satellites and their specifications.
Week 12	-التحليل والتفسير البصري للبيانات الجوية والفضائية. -Analysis and visual interpretation of weather and space data.
Week 13	-التحليل والتفسير الالي للبيانات الجوية والفضائية. - Automatic analysis and interpretation of air and space data.
Week 14	- مجالات تطبيقات معطيات الاستشعار عن بعد. - Fields of remote sensing data applications.
Week 15	-الاقمار الصناعية تصميمها ووظائفها . -الاقمار الصناعية تصميمها ووظائفها .
Week 16	الامتحان النهائي Final exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	جولة تعريفية لبرنامج (ERDAS IMAGINEI-)وكيفية تنصيبه .
Week 2-3	-التصحيح الهندسي Geometric Correction
Week 4	-الموزائيك Mosaic
Week 5	التصنيف المراقب Supervised classification:
Week 6	- التصنيف غير المراقب Unsupervised classification
Week 7	- الامتحان الاول the first exam-
Week8	- دمج الحزم الطيفية في مرئية واحدة (Merging of spectral bands into a single visual)
Week 9	-تفسير وتقييم بيانات القمر الصناعي (المرئيات الفضائية)لإجل التعرف على الاشكال الارضية واهم المدلولات لها. - Interpretation and evaluation of satellite data (space visualizations) in order to identify landforms and their most important implications

Week10	جولة تعريفية لبرنامج (ENVI)وكيفية تنصيبه
Week11	- مقدمة في تحليل البيانات الفائقة الطيفية - Introduction to Hyperspectral Data and Analysis
Week12	- تحديد الأطياف باستخدام محلل الطيف - Identify Spectra Using the Spectral Analyst
Week13	- تحويل الباندات الحرارية NOAA AVHRR إلى درجة حرارة - Converting NOAA AVHRR thermal bands to temperature
Week 15	الامتحان النهائي(Final exam)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	- مباديء الاستشعار عن بعد وتفسير المرئيات - Principles of remote sensing and interpretation of visuals	Yes
Recommended Texts	- مباديء التصوير الجوي - Principles of aerial photography.	No
Websites	- Principles of remote Sensing Image Interpretation–	

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	**Structural analysis**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo36136**				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level		2	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ayyed Hussein Ward		**e-mail**	aiedwarid@tu.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		1/06/2023	**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	Explaining an overview of Plate tectonic as an important in geology and identifying the methods of analysis to determine fold and fault type and paleo-stress.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding**: Cognitive Objectives A1- Explaining an overview of synthetic geology. A2- The importance of this science in geology. A3- Identifying the folds and faults with mechanisms of their growth . **B- Subject-specific skills**: B1-After receiving this course, the student will be able to determine the types of folds and folds and causes of their growth. B2 – The possibility of understanding the mechanism of earth deformation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos.

	Evaluation Methods: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Introduction to structural geology and structural analysis
Week 2	Force and stress in rocks
Week 3	Strain and rock deformation
Week 4	Folds and fold analysis
Week 5	Fold classification
Week 6	Folding mechanism
Week 7	Mid-term Exam
Week 8	Thickness measurement of beds
Week 9	Fractures and their classification by using stereographic projection
Week 10	Fold analysis by using stereographic projection
Week 11	Faults and their types
Week 12	Fault analysis and paleo-stress
Week 13	Structures associated with faults
Week 14	Diaper structures
Week 15	Igneous structures
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: determine the Attitude of plane from to apparent dip by geometrical projection method
Week 2	Lab 2: determine the Attitude of plane from to apparent dip by stereographic projection method
Week 3	Lab 3: direct and indirect methods of thickness determination
Week 4	Lab 4: joints analysis by stereographic projection
Week 5	Lab 5: folds analysis by stereographic projection
Week 6	Lab 6: faults analysis by stereographic projection

Week 7	Lab 7: faults in map view and section.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Structural Geology, Fossen, 2012	Yes
Recommended Texts	Structural Geology, Groshong, 2006	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
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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	**Hydrology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		6
Administering Department		Applied Geology	**College**	Type College Code	
Module Leader	Prof. Dr.Sabbar Abdullah Saleh		**e-mail**	Sabbar.saleh@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Maha Shaher Badowi		**e-mail**	maha.shaher@tu.edu.iq	
Peer Reviewer Name		Prof. Dr. Sawsan	**e-mail**	E-mail	
Scientific Committee Approval Date		18/06/2023	**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	The curriculum focuses on basic concepts in surface water hydrology, methods and techniques for quantification of surface waters, related hydrometric elements, analysis of hydrological data, derivation and analysis of hydrographs, unit hydrographs, routing of reservoirs and rivers, and water harvesting techniques. The aim of teaching the curriculum:

	Teaching students the basic concepts of surface water science and its relationship with geological sciences, ways of evaluating, managing and investing surface water, preventing its risks and ways of storing and recycling. Education Outcomes: Enable the student to complete studies for the investment and management of surface water resources, and supervise executive projects in this field.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Enable the student to complete studies for the investment and management of surface water resources, and supervise executive projects in this field.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2-Classroom and laboratory exercises and activities 3-Weekly and quarterly assignments and reports 4-Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	6. Class lecture 7. Laboratory 8. Quiz 9. Tutorial 10. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	70	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4

Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**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	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All
	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Hydrological cycle, precipitation, methods of measuring rain, unregistered measuring devices, registered devices.
Week 2	Rain gauge networks, rain average estimation methods, arithmetic mean method, isohyet map method, Thyssen method.
Week 3	Missing hydrometric information calculations, check the homogeneity of logs.
Week 4	Basic specifications of rain fall, intensity, duration, frequency, fall area, rainstorm analysis...
Week 5	The depth-duration relationship, the intensity-duration relationship, the intensity-duration-frequency relationship, the depth-space-time relationship.
Week 6	Evaporation, influencing factors, methods of measuring evaporation, evapotranspiration, methods of measuring evapotranspiration, filtration, infiltration measuring devices.
Week 7	Rain-runoff modeling, base runoff, runoff water curve (hydrograph), methods of separating base runoff, basic factors affecting the shape of the hydrograph.
Week 8	Surface runoff, factors affecting surface runoff, calculation of the discharge rate of the watercourse
Week 9	River drainage, water level, level gauges, ruler, recorded gauges, higher level gauges.

Week 10	Flow velocity measuring devices, estimation of flow velocity rate, current meter, relationship between level and discharge.
Week 11	Flood routing, storage equation.
Week 12	Flood routing.
Week 13	The relationship of surface water with groundwater.
Week 14	water harvesting
Week 15	Surface hydrology of Iraq
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Rain gauging
Week 2	Training about Rain average estimation methods, arithmetic mean method, isohyet map method, Thyssen method.
Week 3	Training to check the homogeneity of logs.
Week 4	Calculations of intensity, duration, frequency, fall area, rainstorm analysis...
Week 5	Graphical presentation of depth-duration relationship, the intensity-duration relationship, the intensity-duration-frequency relationship, the depth-space-time relationship.
Week 6	Measurements of Evaporation, evapotranspiration, and infiltration measuring devices.
Week 7	Separation of base flow
Week 8	Hydrograph analyses
Week 9	Unit hydrograph derivation level gauges.
Week 10	Flow velocity measuring using current meter
Week 11	Discharge measurements using ADCP
Week 12	Flood routing.
Week 13	The relationship of surface water with groundwater.
Week 14	Derivation of geometric elements from DEM
Week 15	Geometric analyses and relationships of dam reservoir
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Hydrology: Principles, Analysis and Design By Raghunath, H.	Yes
Recommended Texts	Engineering Hydrology of wilson	yes
Websites	https://www.amazon.com/Hydrology-Principles-Analysis-H-Raghunath/dp/8122436188	

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	**Geochemistry of Rocks**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo36135**		
ECTS Credits	5		
SWL (hr/sem)	**125**		

Module Level	3	**Semester of Delivery**	5
Administering Department	Geo	**College**	Type College Code
Module Leader	Mohamed W. Alkhafaji	**e-mail**	mohamedajeel@tu.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Ahmed Mohamed Mahmood	**e-mail**	E-mail
Peer Reviewer Name	Prof. Dr. Sawsan Al-Hazaa	**e-mail**	E-mail
Scientific Committee Approval Date	18/06/2023	**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	

	10. Rock analyses can identify the tectonic origin of bedrock, which helps geoscientists to interpret regional geology and define mineral potential. 11. Analyses of rocks collected from mineralized bedrock or float can reveal economic concentrations of metals. 12. Geochemical analyses can show whether mineralizing fluids have altered rock composition. Such alteration can be associated with economic mineral deposits. 13. Analyses of soil, till, and stream or lake sediments can indicate geochemical anomalies caused by mineralization in nearby bedrock. 14. High carbon content of a bedrock horizon may indicate its potential as a source rock for oil or natural gas.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	16. Recognizing the distribution of elements in the different types of rocks. 17. Understand the behavior of elements in the sedimentary environment. 18. Understanding the main factors controlling the weathering of minerals. 19. Understanding the chemical weathering process and their effects on rocks.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Geochemistry of Igneous rocks, phase rule, one component system, two component system [10 hrs]. Ionic substitution in crystals, Goldschmidt's rules, Ringwood's rule, distribution of elements in igneous rocks[15 hrs]. Behavior of the elements, distribution of trace elements between coexisting phases, Factors governing the value of partition coefficients, Trace element distribution during partial melting, Trace element distribution during crystallization [20 hrs]. The Geological Framework of Surface Geochemistry, Physical Constraints, Chemical Effects, Chemical Elements and Associations in Surface Environments. [15 hrs] Weathering, factors governing the weathering intensity, physical weathering, processes of physical weathering, chemical weathering, processes of chemical weathering. [20 hrs] Distribution of elements in sedimentary rocks, factors governing the behavior of elements in sedimentary rocks. [20 hrs] Colloids, types of colloids, importance of colloids, adsorption, the types of adsorption, importance of adsorption. [10 hrs]

	Clay minerals, structure of clay minerals, types of clay minerals, importance of cay minerals, identification of clay minerals [10 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Class lecture 2. Laboratory 3. Quiz 4. Tutorial 5. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**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	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All
	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7

assessment	**Final Exam**	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction
Week 2	Geochemistry of igneous rocks Phase rule- one component
Week 3	Phase rule- two component
Week 4	Chemical composition of the igneous rocks
Week 5	Behaviors of major and trace elements during crystallization of melt.
Week 6	The factors controlling the distribution of elements in igneous rocks
Week 7	Mid-term Examination
Week 8	Generation and crystallization of magma.
Week 9	Behavior of trace elements during partial meting- compatible and incompatible elements
Week 10	Geochemical periodic table-volatile elements-semi-volatile elements
Week 11	Geochemistry of metamorphic rocks.
Week 12	Geochemistry of sedimentary rocks-weathering- type of weathering
Week 13	Chemical weathering and their processes
Week 14	The factors controlling the distribution of elements in sedimentary rocks
Week 15	Colloids
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Estimation of the proportions of dark and light minerals in igneous rocks
Week 2	Distribution of elements in igneous rocks

Week 3	An evaluation of GoldSchmidt's laws of substitution
Week 4	Calculation of the differential coefficient
Week 5	Correlation coefficient calculation method
Week 6	Mit. examination
Week 7	Calculate the chemical formula for gypsum and pyrite
Week 8	Mid Examination
Week 9	Effect of common ion on mineral precipitation
Week 10	Calculate the chemical formula for pyroxene
Week 11	Calculate the Atomic Packing Factor
Week 12	Bragg's law derivation
Week 13	Types of crystals used in x-rays
Week 14	Effect of common ion on mineral precipitation
Week 15	Calculate the chemical formula for pyroxene

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Geochemistry	Yes
Recommended Texts	Introduction to Geochemistry	No
Websites	https://www.sciencedirect.com/topics/chemistry/geochemistry	

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	**Structural analysis**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo36136**				
ECTS Credits	5				
SWL (hr/sem)	150				
Module Level		2	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Ayyed Hussein Ward		**e-mail**	aiedwarid@tu.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		1/06/2023	**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	Explaining an overview of Plate tectonic as an important in geology and identifying the methods of analysis to determine fold and fault type and paleo-stress.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding**: Cognitive Objectives A1- Explaining an overview of synthetic geology. A2- The importance of this science in geology. A3- Identifying the folds and faults with mechanisms of their growth . **B- Subject-specific skills**: B1-After receiving this course, the student will be able to determine the types of folds and folds and causes of their growth. B2 – The possibility of understanding the mechanism of earth deformation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos.

	Evaluation Methods: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Introduction to structural geology and structural analysis
Week 2	Force and stress in rocks
Week 3	Strain and rock deformation
Week 4	Folds and fold analysis
Week 5	Fold classification
Week 6	Folding mechanism
Week 7	Mid-term Exam
Week 8	Thickness measurement of beds
Week 9	Fractures and their classification by using stereographic projection
Week 10	Fold analysis by using stereographic projection
Week 11	Faults and their types
Week 12	Fault analysis and paleo-stress
Week 13	Structures associated with faults
Week 14	Diaper structures
Week 15	Igneous structures
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: determine the Attitude of plane from to apparent dip by geometrical projection method
Week 2	Lab 2: determine the Attitude of plane from to apparent dip by stereographic projection method
Week 3	Lab 3: direct and indirect methods of thickness determination
Week 4	Lab 4: joints analysis by stereographic projection
Week 5	Lab 5: folds analysis by stereographic projection
Week 6	Lab 6: faults analysis by stereographic projection

Week 7	Lab 7: faults in map view and section.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Structural Geology, Fossen, 2012	Yes
Recommended Texts	Structural Geology, Groshong, 2006	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	**Field Geology**			**Module Delivery**	
Module Type	**C**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo12017**				
ECTS Credits	**5**				
SWL (hr/sem)	**150**				
Module Level	2		**Semester of Delivery**	7	
Administering Department	Type Dept. Code		**College**	Type College Code	
Module Leader	Ayyed Hussein Ward		**e-mail**	aiedwarid@tu.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	1/06/2023		**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	Explaining an overview of field geology as an important branch in geology and identifying how field data is collected
Module Learning	

Outcomes مخرجات التعلم للمادة الدراسية	5. Explaining an overview of field geology. 6. The importance of this science in geology. 7. Learn about field data collection methods. 8. Learn about the methods of selecting the appropriate field stations for data collection.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Field geology and its aims.
Week 2	Requirements of the field and safety.
Week 3	How to measure the geological observations.
Week 4	Determining the attitudes of the planes by the touching method.
Week 5	Determining the position of the planes by the bearing method.
Week 6	Determining the position of the planes by the compass.
Week 7	Mid-term Exam
Week 8	Positioning and altimeter systems.

Week 9	Methods of the field investigation.
Week 10	Tabling of data.
Week 11	The field notes.
Week 12	Field sample collection methods.
Week 13	Geological section drawing.
Week 14	Strati graphical section drawing.
Week 15	Structural section drawing.
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Introduction to the field geology.
Week 2	Lab 2: measuring of areas.
Week 3	Lab 3: Introduction to level.
Week 4	Lab 4: projecting of the points and the area resolving by level.
Week 5	Lab 5: Introduction to the theodolite .
Week 6	Lab 6: measuring of horizontal and vertical angles by theodolite.
Week 7	Lab 7: using of compass, GPS and clinometer.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	GEOLOGICAL FIELD TECHNIQUES. Angela L. Coe. 2010.	Yes
Recommended Texts	Field Methods for Geologists and Hydrogeologists, Assaad, Fakhry A., and LaMoreaux, Philip E. Sr. 2004.	No
Websites		

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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Fail Group (0 – 49)	**FX** – Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded
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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	**GEO-47140**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		4	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Mohammed Rashid Abood		**e-mail**	mrabood@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.

Module Tutor	Mohammed Rashid Abood	**e-mail**	mrabood@tu.edu.iq
Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	19/06/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Structural Geology	**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	The student gets acquainted with the characteristics of the different rock formations and their resistance to different pressures, then he studies the bearing of rock layers to loads and pressures. Introduction, Types engineering properties. Definition of Rock Masses, Stress-strain relationships, intact rock and discontinuity surfaces. Physical and mechanical properties of intact rock. Nature of orientation of discontinuity surfaces. Engineering properties of discontinuity surfaces.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After the student completes the curriculum, he will be able to understand the characteristics and properties of different rock formations and their tolerance to different pressures. Definition of Rock Masses, Stress-strain relationships, intact rock and discontinuity surfaces. Physical and mechanical properties of intact rock. Classification system of intact rocks. Nature of orientation of discontinuity surfaces. Engineering properties of discontinuity surfaces.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Theoretical lectures Introduction, The role of geology in engineering projects, Soil engineering properties, engineering properties of rocks, Field and laboratory methods for finding geological parameters, foundations, Building materials and roads and bridges Exam Part B – Practical labs

	Physical properties of soil such as (water content, specific gravity), atterberge limits such as (liquid limit , plastic limit, consistency index), Soil granular classification such as (Sieve analysis, Road authority classification, uniform classification), Unconfined compression test, direct shear test, triaxial test. Field density test.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Therefore, a science linking geosciences with the interests of civil engineering of all kinds and applications was developed. This science was called Engineering Geology with its practical applications, which are considered an important tributary in absorbing scientific experiments and increasing technical expertise and knowledge in the practical aspect. The science of engineering geology provides an accurate understanding The reality and data of the engineering project for the geologist, and the science of engineering geology provides a good natural and geological database for the engineer to deal with. civil society in an effective and proper manner. How to teach the student to distinguish between types of rocks and the suitability of using them for engineering purposes and understanding the behavior of soil or rocks under loads, as well as calculating the stresses they bear, the stresses applied to them and the form of their failure.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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)	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)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	The role of geology in engineering projects
Week 2	Soil engineering properties
Week 3	Soil engineering properties
Week 4	Soil engineering properties
Week 5	Engineering properties of rocks
Week 6	Engineering properties of rocks
Week 7	Engineering properties of rocks
Week 8	Field and laboratory methods for finding geological parameters
Week 9	Field and laboratory methods for finding geological parameters
Week 10	Sliding
Week 11	Foundations
Week 12	Building materials, roads and bridges
Week 13	Exam
Week 14	Consolidation settlement
Week 15	Final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Water Content.
Week 2	Lab 2: Specific Gravity.
Week 3	Lab 3: Atterberg Limits.
Week 4	Lab 4: Field Density.
Week 5	Lab 5: Sieve Analysis.
Week 6	Lab 6: Standard Proctor Test.
Week 7	Lab 7: Unconfined Compression Test.
Week 8	Lab 8: direct shear test.
Week 9	Lab9: Triaxial Compression test.
Week10	Lab 10: point load test.
Week 11	Lab 11: Consolidation Test.
Week 12	Lab 12. Final Lab. Exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**Deere,D. and Miller.,(1966) "** Engineering Classification and Index Properties For Intact Rock " Tech.Rept.No.Afwl-TR-65-116.Air Force Weapons Lab.Kirtl and AFB.New Mexico. **Bell,F.G.,(1999).,"**Engineering properties of soil and rock., Fourth Edition, Blackwell Pub. LTD **Waltham, T. (2009).** Foundations of engineering geology. CRC press. **Záruba, Q. (2012).** Engineering geology (Vol. 10). Elsevier.	Yes Yes
Recommended Texts	**Bell, F. G. (2016).** Fundamentals of engineering geology. Elsevier. **Reddy, D. V. (2010).** Engineering geology. Vikas Publishing House.	Yes No
Websites	https://books.google.iq/books?hl=ar&lr=&id=ViNDDAAAQBAJ&oi=fnd&pg=PR2&dq=engineering+geology+books&ots=svvfcdS3iK&sig=fl0o_7RaWw1ySVD9dBh2vI5CyfA&redir_esc=y#v=onepage&q=engineering%20geology%20books&f=false	

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	**Oil wells drilling techniques**			**Module Delivery**	
Module Type	Core			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo48143				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		UGI	**Semester of Delivery**		1
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	YASEEN Saleh Kareem		**e-mail**	y.geologist@tu.edu.iq	

Module Leader's Acad. Title	Assist. Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	
Peer Reviewer Name	Sawsan Hameed Faisal	**e-mail**	sawsanalhazaa@tu.edu.iq
Scientific Committee Approval Date	01/06/2023	**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	11. Making an overview of the techniques and basics of drilling wells and the role of the geologist in pursuing geological control in the oil industry. 12. The importance of this science in geology and in oil extraction. 13. Identify drilling methods, their types and the problems they face, and study drilling fluids, their characteristics, additives and related measurements. 14. Studying the techniques related to drilling, cementing wells, stratigraphic examinations, and treatment methods 15. Learn how to stimulate and rehabilitate the oil reservoir, leading to oil production.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After receiving this course, the student will be able to : 7. This curriculum is considered complementary to the practical aspects that the department seeks to achieve and guide the graduate's future work within the oil sector. 8. It is also considered a complement to the concepts of petroleum geology, oil reservoir evaluation and geological control through the drilling of oil wells.

	9. Preparing a specialized cadre capable of initiating the management of oil operations and drilling operations of oil wells and addressing future problems that appear in these aspects.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Objectives of drilling oil wells, the assignment of the field geologist and its most important needs, Types of Oil Wells, Designing of Well, - Drilling methods (percussion "striking" drilling, rotary drilling, turbo drilling) Advantages and disadvantages of each method. - Types of drilling rigs in submerged areas and how to choose them Swamp barges, Drilling jackets, Jack-up rig, Semi-submersible and Drilling ships - Parts of the drilling rig and its ancillary equipment Hoisting and Rotation System, Mud circulation System, Well Control System and Power Generation System - Drilling mud (components, types, functions and uses, specifications, physical and chemical properties, how to measure them in the field and laboratory, pollution) - Types of drilling (vertical, directional, inclined, horizontal, slender, multi-directional, long-range, coiled tube) - Coring and description Rock core taking, analysis, side wall sampling and methods for describing core and cutting samples - Drilling problems (their causes and methods of treatment) Stuck pipes, Hole enlargement, Caving and heaving, Drilling Mud Lost and Groundwater flow. - Preparing wells and for running casing - Cementation of wells (The aim of cementing of casing, properties and specifications of cement, cement additives, purpose of cementation) - Types of cement operations and cement equipment - Cementation steps (single-stage cementation, multi-stage cementation, cement plugs) - Drilling Stem Testing DST The Main Functions of D.S.T, The Aims of Drill Stem Testing (D.S.T), Affecting Pressures on D.S.T, Drill Stem Equipment, Opening the Well to

	Flow, Ending the Drill Stem Testing and Types of Drill Stem Testing - Fishing Fishing Tools, Pack – Off and Bridge, Cutting Recycling, - Induction and rehabilitation of oil wells for the purpose of production Acidizing Method, Chemical treatments Method, Hydraulic blasting Method and Injection Method.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

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

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

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

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Objectives of drilling oil wells, the assignment of the field geologist and its most importance needs
Week 2	Drilling methods (percussion “striking” drilling, rotary drilling, turbo drilling)
Week 3	Types of drilling rigs in submerged areas and how to choose them
Week 4	Parts of the drilling rig and its ancillary equipment
Week 5	Drilling mud
Week 6	Types of drilling
Week 7	Coring and description
Week 8	Drilling Problems
Week 9	Preparing wells and for running casing
Week 10	Cementation of wells
Week 11	Types of cement operations and cement equipment
Week 12	Cementation steps
Week 13	Drilling Stem Testing DST
Week 14	Fishing Induction
Week 15	Rehabilitation of oil wells for the purpose of production
Week 16	**Preparing for Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Solution to calculate the lag time
Week 2,	Lab 2: Solution to increasing the density of the drilling mud
Week 3	Lab 3: Solution to decreasing the mud drilling density
Week 4	Lab 4: Solution to calculate the rheological properties of drilling mud
Week 5	Lab 5: description of samples using geological working sheet.
Week 6	Lab.6: Solution to Primary Cementing Calculation
Week 7,8	Lab. 7: Calculation of Slurry's Volume and Volume of Displacement Liquid in Primary Cementing
Week 9	Lab. 8: Cementing of Reduction Casing
Week 10	Lab.9 cement Plugs
Week 11, 12, 13	Lab.10 : solutions in drilling problems
Week 14	Lab. 11: calculating the force causing stuck pipe
Week 15	Lab. 12: reducing the hydrostatic pressure

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the**

		Library?
Required Texts	1- . 2- Well Drilling Engineering 3- هندسة الحفر	Yes
Recommended Texts	اعتماد عدد من مناهج الدورات التدريبية في شركة نفط الشمال اطيان الحفر والعمليات النفطية	No
Websites	5- الانترنيت	

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	**Petroleum Geology**	**Module Delivery**
Module Type	**Core**	☒ **Theory**

Module Code	Geo47137			☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	**Semester of Delivery**		7
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	Sawsan Hameed Al-Hazaa		**e-mail**	sawsanalhazaa@tu.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		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	ترسيخ المفاهيم الاساسية لجيولوجيا النفط من حيث نشأته وتولده , نضوجه , هجرته , ومن ثم احتباسه ضمن ما يعرف بالمصائد النفطية . Establishing the basic concepts of petroleum geology in terms of its origin, generation, maturity, migration, and then retention within what is known as oil traps.
Module Learning Outcomes	**أ- المعرفة والفهم:** دراسة أصل ونشوء النفط وصفات الصخور المولده للنفط ومن ثم دراسة نضوج المادة العضوية ومراحل

مخرجات التعلم للمادة الدراسية	تحولها الى هيدروكربونات وتحليل طرق هجرة النفط وصولا الى فهم ميكانيكية عملية الاحتباس النفطي ضمن المصائد النفطية. **ب- المهارات الخاصة بالموضوع:** تطوير القدرات التحليلية والتطبيقية للطلبة، تطوير الفكر الاستنتاجي للطلبة , تطوير المهارات وطرق التعامل مع الاجهزة المختبرية. **A- Knowledge and understanding**: Studying the origin and emergence of oil and the characteristics of oil-generating rocks, then studying the maturation of organic matter and the stages of its transformation into hydrocarbons and analyzing the ways of oil migration in order to understand the mechanics of the oil retention process within the oil traps. **B- Subject-specific skills**: Developing students' analytical and applied abilities, developing students' deductive thinking, developing skills and methods of dealing with laboratory equipment.
Indicative Contents المحتويات الإرشادية	**يتضمن المحتوى الإرشادي ما يلي:** 1- عرض المقرر بـأسلوب واضح ومبسط مع الاستعانة بالمرتسمات والمخططات التوضيحية وعرضها من خلال تقنية العرض التقديمي Power Point . 2- التدريبات والأنشطة الصفية والمختبرية 3- الواجبات والتقارير الاسبوعية والفصلية 4- الارشاد الى المصادر العلمية للتوسع في استيعاب مفردات وتفاصيل المادة المقرره 5- الجولات والزيارات الحقلية لمواقع العمل 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries -

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	**- طرائق التعليم والتعلم :** ادارة المحاضرة على نحو تطبيقي مرتبط بالواقع السائد لجذب الطالب الى المادة المقررة دون الابتعاد عن صلب الموضوع لتكون المادة ضمن اطار التطبيق العملي . تكليف الطلبة بالأنشطة والواجبات الجماعية . استخدام وسائل العرض الحديثة معززة بالمرتسمات والموديلات التوضيحية وافلام قصيرة توضيحية. **Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **- طرائق التقييم :** تقييم المشاركة الفاعلة والمتميزة للطالب الالتزام بتقديم التمرينات المختبرية والتقارير تخصيص نسبة من الدرجة للواجبات والاختبارات اليومية الامتحانات الشهرية والنهائية دليل الالتزام والتحصيل المعرفي **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL) The student's academic load is calculated for 15 weeks			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5 and 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2 and 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (20)	Continuous	All
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	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	تعريف جيولوجيا النفط ونظريات اصل النفط Definition of petroleum geology and theories of the origin of oil
Week 2	مراحل وظروف تحول ونضوج المواد العضوية Stages and conditions of transformation and maturation of organic matter
Week 3	مياه المكمن النفطي Water of reservoir
Week 4	محتويات المكمن النفطي (نفط وغاز) Content of Reservoir (Oil and Gas)
Week 5	الصفات الفيزيائية والكيميائية للنفط الخام Physical and chemical properties of crude oil
Week 6	الصفات الاساسية لصخورالمكامن النفطية Basic characteristics of oil reservoir rocks
Week 7	امتحان شهري midterm exam
Week 8	الصخور المصدرية Source rocks
Week 9	هجرة النفط انواعها ودلائلها Oil migration types and evidence
Week 10	اسباب هجرة النفط Reasons for the migration of oil
Week 11	تقييم المكمن النفطي Oil reservoir evaluation

Week 12	**المصائد النفطية** **Oil Traps**
Week 13	**دراسة حقول نفط الجنوب** **Studying the oil fields of the southern Iraq**
Week 14	**دراسة حقول نفط الوسط** **Studying the oil fields of the central Iraq**
Week 15	**دراسة حقول نفط شمال العراق** **Studying the oil fields of the northern Iraq**
Week 16	**الامتحان النهائي** **Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab-1 Contour map and cross section and best site of drilling
Week 2	Lab-2: Correction of oil wells
Week 3+4	Lab-3: Subsurface Geological Maps
Week 5+6	Lab-4: Structural Contour Map for Layers Crossing by a normal Fault
Week 7+8	Lab-5: Structural Contour Map for Layers Crossing by a reverse Fault
Week 9	Lab-6: Maturity, kerogen types of source rocks
Week 10	Lab-7: Geologic Age - Rate of Sedimentation - Depth Relationship
Week 11+12	Lab-8: Crosse Sections from oil wells
Week 13+14+15	Lab-9: Oil reserve account

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	❖ **كتب المقرر المطلوبة** Elements of Petroleum Geology. – By: Richard C.	Yes

	Selley.	
Recommended Texts	Petroleum Geology: A concise Study. – By: R. E. Chapman. Petroleum. By: V. Sokolov	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	**Economic Geology**	**Module Delivery**
Module Type	Core	☒ **Theory** ☐ **Lecture** ☐ **Lab**
Module Code	Geo48146	

ECTS Credits	4			☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
SWL (hr/sem)	100				
Module Level		4	**Semester of Delivery**		8
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	**Sawsan Hameed Al-Hazaa**		**e-mail**	sawsanalhazaa@tu.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		01/06/2023	**Version Number**		

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module		**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	**تعليم الطلبة مفهوم الترسبات الاقتصادية وطرق تصنيفها و تكوينها واستثمارها وكذلك التعرف على المواد الصناعية المتواجدة في القطر مثل الاطيان والصخور الرملية والرمال والحجر الجيري وغيرها و بيان اهميتها الصناعية واستخداماتها لتعزيز واقع الصناعة الحكومية والقطاع الخاص في العراق** **Teach students the concept of economic deposits, their methods of classification, formation and investment, as well as the industrial materials present in the country such as clay, sandstone, sand, limestone, etc. Explaining their industrial importance and their uses in Iraq to enhance the reality of government industry and the private sector in Iraq** .
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	لقدرة على تصنيف المعادن والصخور المختلفة واستخداماتها الصناعية وخواصها الخاصة بكل صناعة وفق المواصفات القياسية العالمية فهم كيف ولماذا تتشكل أنواع مختلفة من الرواسب المعدنية كيفية التقليل من المشكلات البيئية التي تنطبق على الرواسب المعدنية واستغلال الموارد الطبيعية ، وتجنبها إن أمكن اكتساب معرفة عميقة في مجال الصناعة استثمار النواتج العرضية في الانتاج وتقدير اقل الطرق كلفة في عملية الانتاج

	The ability to classify different minerals and rocks, their industrial uses, and their specific properties for each industry, according to international standards • Understand how and why different types of mineral deposits are formed • How to minimize the environmental problems that apply to mineral deposits and the exploitation of natural resources, and avoid them if possible Gain deep industry knowledge Investing by-products in production and estimating the least expensive methods in the production process
Indicative Contents المحتويات الإرشادية	عرض نماذج للصخور والمعادن الصناعية عرض افلام قصيرة عن الصخور الصناعية وكيفية قلعها او تصنيعها زيارات حقلية للمقالع ومعامل السمنت display samples of industrial rocks Show short films about the industrial rocks that were extracted or manufactured Field visits to quarries and cement factories

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	استثمار الصخور والمعادن الصناعية تقدير اقل كلفه في عمليات الانتاج تقدير الاحتياطي المتوقع من المواد المستثمرة الحفاظ على البيئة بعد عمليات القلع **Industrial rock and mineral investment** **Estimating the lowest cost in production processes. Estimating the expected reserve of invested materials** **Preserving the environment after extractions**

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	49	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	51	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3.4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

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

		mber			Outcome
Formative assessment	Quizzes	2	10% (10)	5 and 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2 and 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (20)	Continuous	All
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	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	
Week 1	مقدمة : تعريف ومميزات الصخور والمعادن الصناعية Introduction: Definition and features of industrial rocks and minerals
Week 2	انواع وتصنيف الصخور والمعادن الصناعية Types and classification of industrial rocks and minerals
Week 3	تاثير التنقيب والاستخراج المعدني على البيئة The impact of mineral exploration and extraction on the environment
Week 4	المواصفات والاستخدامات الصناعية للصخور النارية (كرانايت وبازلت) Uses and properties of Igneous rocks (Granite and Basalt)
Week 5	المواصفات والاستخدامات الصناعية للصخور المتحولة (سليت والمرمر) Uses and properties of Metamorphic rocks (Slate and Marble)
Week 6	المواصفات والاستخدامات الصناعية للحصى والرمل Uses and properties of gravel and sand
Week 7	امتحان ومناقشة بحوث Exam and research discussion
Week 8	المواصفات والاستخدامات الصناعية للصخور الرملية ورمل الزجاج Uses and properties of sandstone and glass sand
Week 9	المواصفات والاستخدامات الصناعية للحجر الجيري والدولومايت Uses and properties of limestone and dolomite
Week 10	المواصفات والاستخدامات الصناعية للصخور للجبسوم والفوسفات Uses and properties of Gypsum and phosphate
Week 11	طرق تصنيع السمنت وانواعه Methods of manufacturing cement and types of cement
Week 12	طرق تصنيع وتقييم الطابوق الهندسي Methods and evaluation of manufacturing engineering bricks
Week 13	امتحان ومناقشة البحوث Exam and research discussion
Week 14	مفهوم الخزن الجوفي واهدافة ومشاكله The concept of underground storage, its objectives and problems
Week 15	اهم اماكن الخزن الجوفي في العراق والعالم The most important underground storage places in Iraq and the world

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	**الجيولوجيا الاقتصادية** (خالد وهيام – جامعة الموصل	Yes
Recommended Texts	**Industrial Minerals and Rocks** **Kogel et al.,2006** **An Introduction to Economic Geology and its Environmental Impact** **Evans, 2005**	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	**Environmental Geology**	**Module Delivery**	
Module Type	**Core**	☒ **Theory** ☐ **Lecture** **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	Geo23118		
ECTS Credits	**4**		
SWL (hr/sem)	**100**		

Module Level	4	**Semester of Delivery**	7
Administering Department	Applied Geology	**College**	College of Science
Module Leader	Mahmood Fadhil Abed	**e-mail**	**dr.mahmood@tu.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	01/06/2023	**Version Number**	1.0

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module		**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	تعريف الطلاب بالجيولوجيا البيئية ومفاهيمها وأهميتها في معالجة المشكلات التي تحدث نتيجة التفاعل بين البشر والبيئات الجيولوجية مثل الغلاف الجوي للأرض والغلاف المائي والغلاف الجوي وما يترتب عليها من مخاطر وكوارث متعلقة بالجيولوجيا مثل الانهيارات الأرضية والفيضانات والزلازل وغيرها. وكذلك محاولة التنبؤ بهذه الكوارث الجيولوجية من خلال العلامات التي سبقت هذه الكوارث ، وكذلك استخدام بعض المعادلات الرياضية والإحصائية. وكذلك تعريف الطالب بالموارد الطبيعية وكيفية الحفاظ عليها من خلال تعلم مفهوم الاستدامة. Introducing students to environmental geology, its concepts, and its importance in addressing problems that occur as a result of interaction between humans and geological environments such as the Earth's atmosphere, hydrosphere, and atmosphere, and the consequent risks and disasters related to geology, such as landslides, floods, earthquakes, and others. Also, trying to predict these geological disasters through the signs that precede these disasters, as well as using some mathematical and statistical equations. As well as introducing the student to natural resources and how to preserve them by learning the concept of sustainability.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**أ- المعرفة والفهم:** دراسة أهمية الجيولوجيا البيئية في التعرف على المخاطر الطبيعية كالزلازل والفيضانات والانزلاقات الأرضية وكذلك تأثير النشاطات البشرية على تلوث الموارد الطبيعية كالمياه والتربة. **ب- المهارات الخاصة بالموضوع:** تطوير القدرات التحليلية والتطبيقية للطلبة، تطوير الفكر الاستنتاجي للطلبة , تطوير المهارات. **A- Knowledge and understanding**: Studying the importance of environmental geology in identifying natural hazards such as earthquakes, floods and landslides, as well as the impact of human activities on the pollution of natural resources such as water and soil. **B- Subject-specific skills**: Developing students' analytical and applied abilities, developing students' deductive thinking, developing skills.
Indicative Contents المحتويات الإرشادية	**يتضمن المحتوى الإرشادي ما يلي:** 6- عرض المقرر بـأسلوب واضح ومبسط مع الاستعانة بالمرتسمات والمخططات التوضيحية وعرضها من خلال تقنية العرض التقديمي Power Point . 7- التدريبات والأنشطة الصفية 8- الواجبات والتقارير الاسبوعية والفصلية

	9- الارشاد الى المصادر العلمية للتوسع في استيعاب مفردات وتفاصيل المادة المقرره 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom exercises and activities 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material -

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**- طرائق التعليم والتعلم :** ادارة المحاضرة على نحو تطبيقي مرتبط بالواقع السائد لجذب الطالب الى المادة المقررة دون الابتعاد عن صلب الموضوع لتكون المادة ضمن اطار التطبيق العملي . تكليف الطلبة بالأنشطة والواجبات الجماعية . استخدام وسائل العرض الحديثة معززة بالمرتسمات والموديلات التوضيحية وافلام قصيرة توضيحية. **Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **- طرائق التقييم :** تقييم المشاركة الفاعلة والمتميزة للطالب الالتزام بتقديم التمرينات المختبرية والتقارير تخصيص نسبة من الدرجة للواجبات والاختبارات اليومية الامتحانات الشهرية والنهائية دليل الالتزام والتحصيل المعرفي

	Evaluation Methods: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL)

The student's academic load is calculated for 15 weeks

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	45	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	100		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	2	10% (10)	5 and 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2 and 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (20)	Continuous	All
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	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	مدخل الى الجيولوجيا البيئية Introduction to Environmental Geology
Week 2	مفاهيم الجيولوجيا البيئية Concepts of Environmental Geology
Week 3	دراسة المخاطر الطبيعية وتصنيفها Study and classify natural hazards
Week 4	مخاطر النظام الشمسي solar system hazards
Week 5	المعادن والصخور من وجهة نظر بيئية Minerals and rocks from an environmental point of view
Week 6	تكتونية الصفيح وتأثيرها البيئي Plate tectonics and its environmental impact
Week 7	امتحان شهري monthly exam
Week 8	البراكين والمخاطر المتعلقة بها Volcanoes and related hazards
Week 9	الزلازل والمخاطر المتعلقة بها Earthquakes and related hazards
Week 10	الفيضانات Flooding
Week 11	الانزلاقات الأرضية Landslides
Week 12	التربة والبيئة Soil and environment
Week 13	الموارد المعدنية Mineral resources
Week 14	التلوث وإدارة الفضلات Pollution and waste management
Week 15	امتحان شهري Monthly exam
Week 16	الامتحان النهائي Final exam

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	Available in the Library?

Required Texts	❖ **كتب المقرر المطلوبة** - Environmental Geology By: Richard S. James.	No
Recommended Texts	- Introduction to environmental geology. By: **Keller**. A. **Edward**	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
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	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
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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية					
Module Title	**Geomatics**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code					
ECTS Credits	5				
SWL (hr/sem)	**125**				
Module Level		5	**Semester of Delivery**		5
Administering Department		Applied Geology	**College**	Type College Code	
Module Leader	Prof. Dr.Sabbar Abdullah Saleh		**e-mail**	Sabbar.saleh@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Ahmed Jumaah Hussein		**e-mail**	ahmedjumaa@tu.edu.iq	
Peer Reviewer Name		Prof. Dr. Sawsan	**e-mail**	E-mail	
Scientific Committee Approval Date		18/06/2023	**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	The curriculum focuses on Geomatics that is the discipline of gathering, storing, processing, and delivering spatially referenced information. It encompasses the fields of surveying, mapping, photogrammetry, hydrography, global positioning systems (GPS), and geographic information systems (GIS). It is often an umbrella term for every method and tool from data acquisition, to distribution including math, computers, and

	Earth science. The aim of teaching the curriculum: Teaching students the basic concepts of Cartography, digital mapping, land surveying, underwater soundings LiDAR/photogrammetry from an airplane or UAV and its relationship with geological sciences. Education Outcomes: Enable the student to complete studies to recognizing the spatial databases and Imagery and DEMs that can be generated from all available instruments or sources as an input and process the data in the proper software, then export that data to used for data analysis
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Enable the student to complete studies to recognizing the spatial databases and Imagery and DEMs that can be generated from all available instruments or sources as an input and process the data in the proper software, then export that data to used for data analysis
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1-Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2-Classroom and laboratory exercises and activities 3-Weekly and quarterly assignments and reports 4-Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	6. Class lecture 7. Laboratory 8. Quiz 9. Tutorial 10. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ أسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	70	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**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	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All
	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Review of coordinate systems and use the GPS
Week 2	RTK and GNSS differences with GPS and the differential GPS Uses
Week 3	The concepts of the parallax, DEM and the derivation of DTM from DSM
Week 4	Photogrammetry
Week 5	Introduction of GIS, vectors, raster, attribute table, and geodatabase
Week 6	Georeferencing of the inputs and generation of Study location map
Week 7	Derivation of drainage network

Week 8	Surfer software
Week 9	Global mapper introduction, contour lines, , contour lines digitizing.
Week 10	Global mapper, cut and fill, layout and exportation of the out put.
Week 11	Rock work inputs, Borehole manager (profiles and sections) .
Week 12	Rock work, hydrochemistry analyses, isopach map and coordinate converter
Week 13	Grapher
Week 14	Aquifer win
Week 15	Dips and SMR
Week 16	Rocklap

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Review of coordinate systems and use the GPS
Week 2	RTK and GNSS differences with GPS and the differential GPS Uses
Week 3	The concepts of the parallax, DEM and the derivation of DTM from DSM
Week 4	Photogrammetry
Week 5	Introduction of GIS, vectors, raster, attribute table, and geodatabase
Week 6	Georeferencing of the inputs and generation of Study location map
Week 7	Derivation of drainage network
Week 8	Surfer software
Week 9	Global mapper introduction, contour lines, , contour lines digitizing.
Week 10	Global mapper, cut and fill, layout and exportation of the out put.
Week 11	Rock work inputs, Borehole manager (profiles and sections) .
Week 12	Rock work, hydrochemistry analyses, isopach map and coordinate converter
Week 13	Grapher
Week 14	Aquifer win
Week 15	Dips and SMR
Week 16	Rocklap

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Remote Sensing and Image Interpretation by Thomas Lillesand	Yes
Recommended Texts	Software's manuals	yes
Websites	https://www.amazon.com/Remote-Sensing-Interpretation-Thomas-Lillesand/dp/111834328X	

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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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	**Potential and Magnetic Methods**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo48146**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		4	**Semester of Delivery**		8
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	Riyadh Muhawish Rasheed		**e-mail**	riyadhalazzawi@tu.edu.iq	
Module Leader's Acad. Title		Teacher	**Module Leader's Qualification**		Master
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**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	Providing an overview of these two methods and their significant role in geological survey operations in general and their utilization in various exploration processes.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding:** 1. Providing an overview of the gravitational method and the magnetic method and their significant role in exploration operations. 2. Highlighting the importance of these methods in geology. 3. Determining the type, depth, and dimensions of geological structures. 4. Distinguishing geological formations. **B- Subject-Specific skills:** 1. After receiving this material, the student will be able to measure relative variations in the Earth's gravitational field. 2. Additionally, they will be able to use the outputs of the gravitational method in exploring geological structures, determining the depth and dimensions of these structures. 3. They will gain knowledge about the Earth's magnetism and its utilization in identifying, describing, and determining the content of formations and reservoirs for investment purposes.
Indicative Contents المحتويات الإرشادية	1- The curriculum is presented in an advanced and simplified manner, utilizing illustrative figures and detailed diagrams, which are showcased through the presentation techniques of PowerPoint. 2- Daily and monthly exams are conducted, taking into account the classroom activities and laboratory experiments. 3- Guidance will be provided to refer students to scientific sources to further expand their understanding of the vocabulary and details of the course material. 4- Field trips and site visits to work locations will be organized to provide practical hands-on experience.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Methods of teaching and learning: 1- Delivering lectures using modern presentation tools.

	2- Student teams (Team Projects). 3- The standard method. 4- Practical lectures by dividing students into groups and presenting a weekly report for each lecture. Evaluation Methods: 1- Monthly exams. 2- Daily exams. 3- Oral questions during lecture time that rely on brainstorming.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (20)	Continuous	All
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	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 the Gravitational Method and the Role of Scientists in its Development and History.
Week 2	Gravitational Force and Attraction
Week 3	The Universal Law of Gravitation and its Assumptions
Week 4	Changes in the Values of Gravity
Week 5	Gravity Measurements and Their Types
Week 6	Devices for Gravity Measurement
Week 7	Field Procedures in Gravity Measurement
Week 8	Local Anomaly, Regional Anomaly, Interpretation of Gravity Anomalies, and Correction of Gravity Measurements
Week 9	Introduction to the Magnetic Method and Its Applications
Week 10	Principles and Basic Concepts of the Magnetic Method
Week 11	Sources of Magnetic Force and Their Devices
Week 12	Magnetic Variations with Time and Their Corrections
Week 13	Interpretation of Magnetic Anomalies
Week 14	Calculation of Depth and Dimensions to the Metallic Body
Week 15	Types of Interpretations
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Calculating the Value of Gravity and the Universal Theoretical Equation of Gravity
Week 2	Lab 2: Calculating Gravitational Corrections
Week 3	Lab 3: Interpretation of Gravity Anomalies
Week 4	Lab 4: Determining Local and Regional Anomalies and Differentiating Between Them, and Interpreting Bouguer Gravity Maps.

Week 5	Lab 5: Magnetic Interpretations and How to Conduct Them.
Week 6	Lab 6: Calculating the Depth and Extension of a Metallic Body.
Week 7	Lab 7: Applications of the Magnetic Method.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Principles of the Gravity and Magnetic Methods. Principle of geophysical methods in geological exploration	Yes
Recommended Texts	Applied 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	**Petroleum exploration and well logging**		**Module Delivery**	
Module Type	**Core**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo48143**			
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	UGIV	**Semester of Delivery**	1	
Administering Department	Applied Geology	**College**	College of Science	
Module Leader	YASEEN Saleh Kareem	**e-mail**	y.geologist@tu.edu.iq	
Module Leader's Acad. Title	Assist. Professor	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**		
Peer Reviewer Name	Sawsan Hameed Faisal	**e-mail**	sawsanalhazaa@tu.edu.iq	
Scientific Committee Approval Date	01/06/2023	**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	16. Making an overview of oil exploration and the role of geologists in the exploration. 17. Identify the stages and methods of exploration. This approach contributes to increasing scientific knowledge of the concept of oil exploration and investigation using geological survey methods, geophysical methods, geochemical analyzes, interpretations of well logging, and the role of geologists in exploration and valuation of reservoir rocks as well as source rocks. 18. Identifying the source rocks and the source rocks and their importance. 19. Knowing the types of kerogen and identifying the origin of hydrocarbons and the stages of their formation. 20. Identifying the well logging and its interpretations and employing them in determining the characteristics of the reservoir rocks
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After graduation, the student will be able to: 10. familiarize himself with all the concepts of oil exploration operations, the use of various well logging techniques in field work, oil and gas exploration, and the examination and diagnosis of subsurface geological formations 11. It is also considered a complement to the concepts of petroleum geology, geophysics, and organic geochemistry, as well as the use of logs and their interpretations in evaluating oil reservoirs. 12. Preparing a specialized cadre capable of initiating the management of oil exploration and exploration operations, assessing the oil-bearing layers
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - An overview of oil exploration, its objectives and stages Preliminary Stage, Regional Stage and Detailed Stage - Oil exploration methods

	Geological survey (Land Geological Survey, Aerial Geological Survey), Geophysical exploration (Gravity surveys, Magnetic Survey, Seabed Logging CSEM, Seismic Survey), Drilling Exploration Method (Preliminary Wells, Parametric Wells, Structural Wells, Searching Wells, Exploration Wells and Delineation Well. Geochemical Methods. - Kerogen and its types Type 1, type2,type 3 and type 4 - Converting organic matter into hydrocarbons Conditions of converting, the suitable depositional environments for converting. - Stages of petroleum maturation and the oil window Diagenesis, Catagenesis and Metagenesis, the importance of the oil window. - Geochemical analyzes in oil exploration and investigation operations Total Organic Carbon (TOC), Pyrolysis, Kerogen Analysis, Gas Analysis, Bitumen and Oil Analysis and Comparing the Petroleum with Source Rock. - Well logging (Normal Gamma Ray Log GR, Spectral Gamma Ray Log SGR and their interpretations) - The Formation Density Compensated Log FDC and its interpretations - The Compensated Neutron Log CNL and its interpretations - The Borehole Compensated Log BHC and its interpretations - The Spontaneous Potential Log SP and its interpretations - Electrical resistivity logs and their interpretations - Evaluation of reservoir rocks based on logs interpretations and oil reserves calculation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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**	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	12	10% (10)	7	LO # 1-7
	Final Exam	15	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	An overview of oil exploration, its objectives and stages

Week 2	Oil exploration methods (geological survey, geophysical exploration)
Week 3	Drilling method and types of exploratory wells
Week 4	Geochemical methods in oil exploration
Week 5	Kerogen and its types
Week 6	Converting organic matter into hydrocarbons
Week 7	Stages of petroleum maturation and the oil window
Week 8	Geochemical analyzes in oil exploration and investigation operations
Week 9	Well logging (Normal Gamma Ray Log GR, Spectral Gamma Ray Log SGR and their interpretations)
Week 10	The Formation Density Compensated Log FDC and its interpretations
Week 11	The Compensated Neutron Log CNL and its interpretations
Week 12	The Borehole Compensated Log BHC and its interpretations
Week 13	The Spontaneous Potential Log SP and its interpretations
Week 14	Electrical resistivity logs and their interpretations
Week 15	Evaluation of reservoir rocks based on logs interpretations and oil reserves calculation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Drawing a subsurface section from geological surface survey using Pasic method.
Week 2	Lab 2: Probability of producing or dry oil wells
Week 3	Lab 3: Determining the type of kerogen and maturity from geochemical analysis.

Week 4	Lab 4: Calculating the volume of shale using Gamma Ray log
Week 5 and Week 6	Lab 5: Calculating the porosity using the FDC and CNL logs
Week 7	Lab. 6: Qualitative interpretation of the Formation Density – Neutron combined logs
Week 8 and Week 9	Lab. 7: Calculating the primary porosity using BHC and the secondary porosity using BHC, FDC and CNL logs
Week 10	Lab. 8: Determining the thickness of permeable and impermeable zones using the SP log.
Week 11, Week 12	Lab.9: Determining the R_{mf}, R_W and R_t using the Resistivity Logs
Week 13, Week 14 and Week 15	Lab. 10: Evaluation of reservoir rocks based on the porosity, permeability, v_{shale} and S_w using GR, FDC, CNL, BHC, SP and Resistivity logs.
Week 16	Preparing for exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elements of Petroleum Geology. By: Richard C. Selle اساسيات الجس البئري. مؤيد حامد خيوكة	Yes
Recommended Texts	Principles of well logging Wellsite geology reference guide, 1996, Baker Huges INTEQ Basic well log analysis for geologists, 1992, Asiquith G. and Gibson, C., The American Association of Petroleum Geologists	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

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Quarries and Mines**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo35128				
ECTS Credits	5				
SWL (hr/sem)	**175**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Geo	**College**	Type College Code	

Module Leader	Mahmood Fadel	**e-mail**	mohamedajeel@tu.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr. Mohamed Fadel	**e-mail**	mohamedajeel@tu.edu.iq
Peer Reviewer Name	Prof. Dr. Sawsan	**e-mail**	E-mail
Scientific Committee Approval Date	18/06/2023	**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	Curriculum description: The student studies theoretical lectures supported by scientific films related to each lecture on the characteristics and types of surface and subsurface mine extraction methods and quarries, as well as the economic feasibility of extracting and exploiting mineral deposits. The aim of teaching the curriculum: Introducing the student to the various types of mining extraction methods and what are the appropriate methods for extracting different types of mineral deposits Education Outcomes: After completing the chapter, the student will be able to identify the mining extraction methods, their types and characteristics, and the operational processes related to the various types of surface and subsurface mines.
Module Learning Outcomes	define the Quarries and mines . Identify and use scientific processes and the scientific methods as used by

مخرجات التعلم للمادة الدراسية	geologists and with other related scientific disciplines. List tools and concepts commonly used by geologists. .
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	11. Class lecture 12. Laboratory 13. Quiz 14. Tutorial 15. Assignments

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**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	5% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	5% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	15% (10)	Continuous	All

	Report	2	5% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	20% (10)	7	LO # 1-7
	Final Exam	2 hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	. Brief history of the development of mining science
Week 2	Terms and definitions
Week 3	Physical and mechanical properties of ores and rocks
Week 4	Evaluation of the preliminary geological studies of the ore
Week 5	Mine extraction methods, their types, characteristics and advantages
Week 6	Surface mining methods
Week 7	Midterm exam
Week 8	Subsurface mining methods
Week 9	Subsurface mining methods that need artificial support
Week 10	Subsurface mining methods that need natural support
Week 11	Quarries
Week 12	The concept of a mineral reserve
Week 13	Methods for calculating mineral reserves
Week 14	Mine closure operations, land leveling and environmental preservation
Week 15	Environmental impact
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the**

		Library?
Required Texts		
Recommended Texts	Applied Mining Geology By: Marat Abzalov	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

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MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية		
Module Title	Geological Statistics	**Module Delivery**
Module Type	**Basic**	☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial**
Module Code	Geo23016	
ECTS Credits	5	

SWL (hr/sem)	**125**			☐ **Practical** ☒ **Seminar**	
Module Level		4	**Semester of Delivery**		7
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	Zainab Hassan Ahmed		**e-mail**	**zahamed@tu.edu.iq**	
Module Leader's Acad. Title		assistant teacher	**Module Leader's Qualification**		Master's
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module		**Semester**	7
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	ترسيخ المفاهيم الاساسية لعلم الاحصاء من حيث نشأته وتولده , نضوجه ومن ثم استخدام الاساليب الاحصائيه المتنوعه للوصول الى الاهداف المنشودة اليها . Establishing the basic concepts of statistics in terms of its origin, birth, maturity, and then using various statistical methods to reach the desired goals.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**أ- المعرفة والفهم:** يعتبر علم الاحصاء واحدا من اهم العلوم الحديثة والتاي تلعب دورا حيويا في الكثير من العلوم والدراسات المختلفة . كما يعتبر علم الاحصاء من اقدم العلوم حيث ظهرمع حاجة الانسان الاولى للتعامل مع القيم والاعداد لتيسير امور الحياة له .وهذا العلم يعمل على استخدام اساليب العلمية في طرق جمع البيانات او النتائج .

	A- Knowledge and understanding: Statistics is considered one of the most important modern sciences, which plays a vital role in many different sciences and studies. Statistics is also considered one of the oldest sciences, as it appeared with the first human need to deal with values and numbers to facilitate life matters for him. This science works on using scientific methods in methods of collecting data or results. **B- Subject-specific skills**: Developing students' analytical and applied abilities, developing students' deductive thinking, developing skills and methods of dealing with laboratory equipment.
Indicative Contents المحتويات الإرشادية	**يتضمن المحتوى الإرشادي ما يلي:** 10- عرض المقرر بـأسلوب واضح ومبسط مع الاستعانة بالمرتسمات والمخططات التوضيحية وعرضها من خلال تقنية العرض التقديمي Power Point . 11- التدريبات والأنشطة الصفية . 12- الواجبات والتقارير الاسبوعية والفصلية 13- الارشاد الى المصادر العلمية للتوسع في استيعاب مفردات وتفاصيل المادة المقرره 14- الامتحانات اليومية والمناقشه داخل القاعة. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5- 5- Daily exams and discussion inside the hall -

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**- طرائق التعليم والتعلم :** ادارة المحاضرة على نحو تطبيقي مرتبط بالواقع السائد لجذب الطالب الى المادة المقررة دون الابتعاد عن صلب الموضوع لتكون المادة ضمن اطار التطبيق العملي .

	تكليف الطلبة بالأنشطة والواجبات الجماعية . استخدام وسائل العرض الحديثة معززة بالمرتسمات والموديلات التوضيحية وافلام قصيرة توضيحية. **Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. - **طرائق التقييم :** تقييم المشاركة الفاعلة والمتميزة للطالب الالتزام بتقديم التمرينات والتقارير تخصيص نسبة من الدرجة للواجبات والاختبارات اليومية الامتحانات الشهرية والنهائية دليل الالتزام والتحصيل المعرفي **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL)

The student's academic load is calculated for 15 weeks

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5 and 10	LO #1, 2, 10 and 11
	Assignments	1	5% (5)	2 and 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	20% (20)	Continuous	All
	Report	1	5% (5)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	2 hr	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	مقدمة عامة عن علم الاحصاء General introduction to statistics
Week 2	الرموز الاحصائية والتوزيع التكراري للبيانات Statistical rhythm and frequency distribution of the data
Week 3	المدرج التكراري والمضلع التكراري Histogram and frequency polygon
Week 4	مقاييس التمركز او التوسط Concentration or median measures
Week 5	المنحنيات التكرارية –انواعها-اشكالها Frequency curves - types – shapes
Week 6	مقاييس التشتت والاختلاف Measures of dispersion and difference
Week 7	امتحان شهري midterm exam
Week 8	مقاييس النزعة المركزية measures of central tendency
Week 9	الوسط الحسابي والتباين Arithmetic mean and variance
Week 10	نظرية الاحتمال probability theory
Week 11	نظرية ذي الحدين Binomial theory
Week 12	امتحان شهري midterm exam
Week 13	معامل الارتباط correlation coefficient

Week 14	**معامل ارتباط سبيرمان** **Spearman correlation coefficient**
Week 15	**الاحتمال الشرطي** **Conditional probability**
Week 16	**الامتحان النهائي** **Final exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	❖ **كتب المقرر المطلوبة** - Elements of Petroleum Geology. By: Richard C. Selley.	Yes
Recommended Texts	- Petroleum Geology: A concise Study. By: R. E. Chapman. Petroleum. By: V. Sokolov	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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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	**Cores**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo23114		
ECTS Credits	**5**		
SWL (hr/sem)	**125**		
Module Level	2	**Semester of Delivery**	1
Administering Department	Department of Applied Earth Sciences	**College**	College of Sciences
Module Leader	Abdulsalam Mehdi salih	**e-mail**	Abdulsalam_mehdi@tu.edu.iq
Module Leader's Acad. Title	Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	None	**e-mail**	E-mail
Peer Reviewer Name	None	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Minerals	**Semester**	2
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of teaching the curriculum: This curriculum is complementary to the study and classification of minerals based on the physical properties seen with the naked eye or the lens of large (manual) samples, which is taught to students of earth sciences in the first stage. In this course, minerals are studied and classified based on the physical properties that are observed under a polarizing microscope. Which is based on relying on the analysis and interpretation of the optical properties of the polarized light after passing through a metal slice with a thickness of (0.03 mm) that appears (interference effects) on the eyepiece of the polarizing microscope, leading to the distinction of metal aggregates with common optical characteristics, and thus naming them.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After the student completes the curriculum, he becomes able to distinguish between minerals, classify them, and determine their aggregates, so that he qualifies to study mineral chemistry in the second semester, study crystallized and amorphous rocks under a polarizing microscope, and classify their mineral content, and thus be able to classify rocks based on mineral aggregates in each type. of rocks in the third stage.
Indicative Contents المحتويات الإرشادية	1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods:** Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes Monthly and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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	**Quizzes**	2	10% (10)	5, 10	LO #1, 2, 10 and 11

assessment	**Assignments**	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	. Optical properties of minerals, waves and the electromagnetic spectrum
Week 2	Reflection and refraction of light, polarized light, methods of obtaining polarized light
Week 3	Optically homogeneous minerals, and their relationship to the atomic structure of minerals
Week 4	Light interference, path difference calculation, light passage in homogeneous and heterogeneous minerals.
Week 5	Factors Affecting Color Overlap, Bulletin of Michael Levy, Slide Compensator
Week 6	Optical monocoque metallurgy, indicatrix, the relationship between beam path and parallel light
Week 7	The nature of interference forms
Week 8	Visual examination of minerals, optical uniaxial metal, interpretation of phenomena resulting from visual examination.
Week 9	Using compensating slides to distinguish minerals
Week 10	Optical properties of optical uniaxial minerals, color and discoloration, elongation sign
Week 11	Optical properties of optical uniaxial minerals, color and discoloration, elongation mark
Week 12	Recontoured optic biaxial, biaxial indicatrex
Week 13	Interference shapes in optical biaxial crystals.
Week 14	**Theoretical + practical exam**
Week 15	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Give an idea about microscopes in general
Week 2	Characterize the optical properties of minerals
Week 3	Study isotropic minerals visually
Week 4	Uniaxial optical mineralogy
Week 5	study Optical biaxial mineralogy
Week 6	A study of the use of compensated slides in the study and distinction of the extraction mark and the optical mark of minerals Study the forms of interference for single and dual minerals in the optical focus
Week7	A study of the use of compensated slides in the study and distinction of the extraction mark and the optical mark of minerals Study the forms of interference for single and dual minerals in the optical focus
Week8	A study of the use of compensated slides in the study and distinction of the extraction mark and the optical mark of minerals Study the forms of interference for single and dual minerals in the optical focus

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Optical mineralogy	Yes
Recommended Texts	Physical properties of opticals	Yes
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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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	Geotecnics and Site Investigation			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GEO-48144**				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level		4	**Semester of Delivery**		7
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Mohanad essa khidher		**e-mail**	Mohanad droesh@tu.edu.iq	
Module Leader's Acad. Title		Asst.Prof	**Module Leader's Qualification**		Asst.Prof
Module Tutor	Mohanad essa khidher		**e-mail**	Mohanad droesh@tu.edu.iq	

Peer Reviewer Name	Name	**e-mail**	E-mail
Scientific Committee Approval Date	21/06/2023	**Version Number**	1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Structural Geology	**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	The student gets acquainted with the characteristics of the different rock formations and their resistance to different pressures, then he studies the bearing of rock layers to loads and pressures. Introduction, Types engineering properties. Definition of Rock Masses, Stress-strain relationships, intact rock and discontinuity surfaces. Physical and mechanical properties of intact rock. Nature of orientation of discontinuity surfaces. Engineering properties of discontinuity surfaces.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After the student completes the curriculum, he will be able to understand the characteristics and properties of different rock formations and their tolerance to different pressures. Definition of Rock Masses, Stress-strain relationships, intact rock and discontinuity surfaces. Physical and mechanical properties of intact rock. Classification system of intact rocks. Nature of orientation of discontinuity surfaces. Engineering properties of discontinuity surfaces.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A – Theoretical lectures Introduction, The role of geology in engineering projects, Soil engineering properties, engineering properties of rocks, Field and laboratory methods for finding geological parameters, foundations, Building materials and roads and bridges Exam Part B – Practical labs Physical properties of soil such as (water content, specific gravity), atterberge limits such as (liquid limit , plastic limit, consistency index), Soil granular classification such

	as (Sieve analysis, Road authority classification, uniform classification), Unconfined compression test, direct shear test, triaxial test. Field density test.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Therefore, a science linking geosciences with the interests of civil engineering of all kinds and applications was developed. This science was called Engineering Geology with its practical applications, which are considered an important tributary in absorbing scientific experiments and increasing technical expertise and knowledge in the practical aspect. The science of engineering geology provides an accurate understanding The reality and data of the engineering project for the geologist, and the science of engineering geology provides a good natural and geological database for the engineer to deal with. civil society in an effective and proper manner. How to teach the student to distinguish between types of rocks and the suitability of using them for engineering purposes and understanding the behavior of soil or rocks under loads, as well as calculating the stresses they bear, the stresses applied to them and the form of their failure.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	75	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	50	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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)	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)

المنهاج الأسبوعي النظري

	Material Covered
Week 1	The role of geology in engineering projects
Week 2	Soil engineering properties
Week 3	Soil engineering properties
Week 4	Soil engineering properties
Week 5	Engineering properties of rocks
Week 6	Engineering properties of rocks
Week 7	Engineering properties of rocks
Week 8	Field and laboratory methods for finding geological parameters
Week 9	Field and laboratory methods for finding geological parameters
Week 10	Sliding
Week 11	Foundations
Week 12	Building materials, roads and bridges
Week 13	Exam
Week 14	Consolidation settlement
Week 15	Final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	**Deere,D. and Miller.,(1966) "** Engineering Classification and Index Properties For Intact Rock " Tech.Rept.No.Afwl-TR-65-116.Air Force Weapons Lab.Kirtl and AFB.New Mexico. **Bell,F.G.,(1999).,"**Engineering properties of soil and rock., Fourth Edition, Blackwell Pub. LTD **Waltham, T. (2009).** Foundations of engineering geology. CRC	Yes Yes

	press. **Záruba, Q. (2012).** Engineering geology (Vol. 10). Elsevier.	
Recommended Texts	**Bell, F. G. (2016).** Fundamentals of engineering geology. Elsevier. **Reddy, D. V. (2010).** Engineering geology. Vikas Publishing House.	Yes No
Websites	https://books.google.iq/books?hl=ar&lr=&id=ViNDDAAAQBAJ&oi=fnd&pg=PR2&dq=engineering+geology+books&ots=svvfcdS3iK&sig=fl0o_7RaWw1ySVD9dBh2vI5CyfA&redir_esc=y#v=onepage&q=engineering%20geology%20books&f=false	

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	**Petroleum exploration and well logging**	**Module Delivery**
Module Type	**Core**	☒ **Theory** ☒ **Lecture**
Module Code	**Geo47142**	

ECTS Credits	5			☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
SWL (hr/sem)	125				
Module Level		UGIV	**Semester of Delivery**		1
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	YASEEN Saleh Kareem		**e-mail**	y.geologist@tu.edu.iq	
Module Leader's Acad. Title		Assist. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Sawsan Hameed Faisal	**e-mail**	sawsanalhazaa@tu.edu.iq	
Scientific Committee Approval Date		01/06/2023	**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	21. Making an overview of oil exploration and the role of geologists in the exploration. 22. Identify the stages and methods of exploration. This approach contributes to increasing scientific knowledge of the concept of oil exploration and investigation using geological survey methods, geophysical methods, geochemical analyzes, interpretations of well logging, and the role of

	geologists in exploration and valuation of reservoir rocks as well as source rocks. 23. Identifying the source rocks and the source rocks and their importance. 24. Knowing the types of kerogen and identifying the origin of hydrocarbons and the stages of their formation. 25. Identifying the well logging and its interpretations and employing them in determining the characteristics of the reservoir rocks
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After graduation, the student will be able to: 13. familiarize himself with all the concepts of oil exploration operations, the use of various well logging techniques in field work, oil and gas exploration, and the examination and diagnosis of subsurface geological formations 14. It is also considered a complement to the concepts of petroleum geology, geophysics, and organic geochemistry, as well as the use of logs and their interpretations in evaluating oil reservoirs. 15. Preparing a specialized cadre capable of initiating the management of oil exploration and exploration operations, assessing the oil-bearing layers
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - An overview of oil exploration, its objectives and stages Preliminary Stage, Regional Stage and Detailed Stage - Oil exploration methods Geological survey (Land Geological Survey, Aerial Geological Survey), Geophysical exploration (Gravity surveys, Magnetic Survey, Seabed Logging CSEM, Seismic Survey), Drilling Exploration Method (Preliminary Wells, Parametric Wells, Structural Wells, Searching Wells, Exploration Wells and Delineation Well. Geochemical Methods. - Kerogen and its types Type 1, type2,type 3 and type 4 - Converting organic matter into hydrocarbons Conditions of converting, the suitable depositional environments for converting. - Stages of petroleum maturation and the oil window Diagenesis, Catagenesis and Metagenesis, the importance of the oil window. - Geochemical analyzes in oil exploration and investigation operations

	Total Organic Carbon (TOC), Pyrolysis, Kerogen Analysis, Gas Analysis, Bitumen and Oil Analysis and Comparing the Petroleum with Source Rock. - Well logging (Normal Gamma Ray Log GR, Spectral Gamma Ray Log SGR and their interpretations) - The Formation Density Compensated Log FDC and its interpretations - The Compensated Neutron Log CNL and its interpretations - The Borehole Compensated Log BHC and its interpretations - The Spontaneous Potential Log SP and its interpretations - Electrical resistivity logs and their interpretations - Evaluation of reservoir rocks based on logs interpretations and oil reserves calculation

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	2
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	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	Midterm Exam	12	10% (10)	7	LO # 1-7
	Final Exam	15	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	An overview of oil exploration, its objectives and stages
Week 2	Oil exploration methods (geological survey, geophysical exploration)
Week 3	Drilling method and types of exploratory wells
Week 4	Geochemical methods in oil exploration
Week 5	Kerogen and its types
Week 6	Converting organic matter into hydrocarbons
Week 7	Stages of petroleum maturation and the oil window
Week 8	Geochemical analyzes in oil exploration and investigation operations
Week 9	Well logging (Normal Gamma Ray Log GR, Spectral Gamma Ray Log SGR and their interpretations)
Week 10	The Formation Density Compensated Log FDC and its interpretations
Week 11	The Compensated Neutron Log CNL and its interpretations
Week 12	The Borehole Compensated Log BHC and its interpretations
Week 13	The Spontaneous Potential Log SP and its interpretations

Week 14	Electrical resistivity logs and their interpretations
Week 15	Evaluation of reservoir rocks based on logs interpretations and oil reserves calculation
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Drawing a subsurface section from geological surface survey using Pasic method.
Week 2	Lab 2: Probability of producing or dry oil wells
Week 3	Lab 3: Determining the type of kerogen and maturity from geochemical analysis.
Week 4	Lab 4: Calculating the volume of shale using Gamma Ray log
Week 5 and Week 6	Lab 5: Calculating the porosity using the FDC and CNL logs
Week 7	Lab. 6: Qualitative interpretation of the Formation Density – Neutron combined logs
Week 8 and Week 9	Lab. 7: Calculating the primary porosity using BHC and the secondary porosity using BHC, FDC and CNL logs
Week 10	Lab. 8: Determining the thickness of permeable and impermeable zones using the SP log.
Week 11, Week 12	Lab.9: Determining the R_{mf}, R_W and R_t using the Resistivity Logs
Week 13, Week 14	Lab. 10: Evaluation of reservoir rocks based on the porosity, permeability, v_{shale} and S_w using

and Week 15	GR, FDC, CNL, BHC, SP and Resistivity logs.
Week 16	Preparing for exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Elements of Petroleum Geology. By: Richard C. Selle اساسيات الجس البئري. مؤيد حامد خيوكة	Yes
Recommended Texts	Principles of well logging Wellsite geology reference guide, 1996, Baker Huges INTEQ Basic well log analysis for geologists, 1992, Asiquith G. and Gibson, C., The American Association of Petroleum Geologists	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 MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Igneous and Metamorphic rocks			**Module Delivery**	
Module Type	**Cores**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo23114				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		3	**Semester of Delivery**		2
Administering Department		Department of Applied Earth Sciences	**College**	College of Sciences	
Module Leader	Abdulsalam Mehdi salih		**e-mail**	Abdulsalam_mehdi@tu.edu.iq	
Module Leader's Acad. Title		Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	None		**e-mail**	E-mail	
Peer Reviewer Name		None	**e-mail**	E-mail	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	This curriculum is complementary to the applied aspects that the department seeks to achieve and guide the graduate's work in the future, with regard to the presence and distribution of crystalline rocks, the amount of their resistance to weathering factors, and their stability during geological time.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Teaching the graduate student the concepts of crystallized rocks, their mineral components, the processes that lead to their formation, and their mineral transformations, in addition to their industrial uses.
Indicative Contents المحتويات الإرشادية	1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports 4- Guidance to scientific sources to expand the comprehension of the vocabulary and details of the prescribed material 5-Tours and field visits to work sites and libraries

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods:** Evaluation of the student by attending and participating in discussions or answers during the lecture

	Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes Monthly and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	90	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	35	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Igneous rocks, crystal fragmentation, magmatic chamber

Week 2	magmatic differentiation, pronouncement, mineral composition of igneous rocks
Week 3	Classification of igneous rocks
Week 4	Classification of igneous rocks
Week 5	The morphological classification of igneous rocks
Week 6	Distribution of igneous rocks and forms of igneous inserts
Week 7	Metamorphic rocks
Week 8	Metamorphic rock tissues, metamorphic factors
Week 9	Transformation environments
Week 10	Classification of metamorphic environments, and the types of rocks resulting from them
Week 11	Classification of metamorphic environments, and the types of rocks resulting from them
Week 12	Transformational environments
Week 13	Igneous rocks, crystal fragmentation, magmatic chamber
Week 14	magmatic differentiation, pronouncement, mineral composition of igneous rocks
Week 15	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Study of minerals
Week 2	Study of physical properties of minerals
Week 3	Study of mineral association in igneous rocks
Week 4	Study of mineral association in metamorphic minerals rocks
Week 5	Properties of igneous rocks (basic)
Week 6	Properties of igneous rocks (intermediet)
Week7	Properties of igneous rocks (acidic)
Week8	Metamorphic rocks properties (local extent)
Week	Metamorphic rocks properties (regional extent)

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Igneous rocks Metamotphic rocks Texture of igneous and metamorphic rocks	Yes
Recommended Texts	Petrology of igneous and metamorphic rocks	Yes
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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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	**Macro-Paleontology (متحجرات لا فقرية)**			**Module Delivery**	
Module Type	**C**			☒ **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		Department of applied geology	**College**	Faculty of Science	
Module Leader	Muthanna Y. Mohammed		**e-mail**	E-mail: paleontologist64@tu.edu.iq	
Module Leader's Acad. Title		Ass.Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name		Prof.Dr.Faris N. Hassan	**e-mail**	E-mail: geofaris777@gmail.com	
Scientific Committee Approval Date		01/06/2023	**Version Number**		1.0

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Historical Geology Course	**Semester**	2
Co-requisites module	Physical Geology Course	**Semester**	1

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	The aim of the module is to present an overview of the evolution (fundamental understanding of evolution), anatomy and fossil record of major marine invertebrate animal groups , and to provide practical knowledge and skills for identifying fossils of these groups at high taxonomical level. The lectures will cover introductions to the following invertebrate groups: Ediacaran fauna, Porifera, Cnidaria, Annelida, Bryozoa, Brachipoda, Mollusca (especially Gastropoda, Bivalvia and Cephalopoda), Arthropoda and Echinodermata. The course consists of lectures and practicals, student assignment (fossil database practise), and the end exam. In the practicals, the students will examine fossils representing the major invertebrate groups and learn to recognise them by making observations, discussing in small groups and discussing with the teacher.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Learning outcomes: overview of the evolution, anatomy and fossil record of major invertebrate groups and plants, ability to make observations from the shape and visible structures of fossils, and learning how to base identifications on these observations. • Students should be able to interpret the mode of life (terrestrial vs. aquatic, autotrophic vs. heterotrophic, benthic vs. planktonic) of fossil organisms based on their morphology to evaluate diversity and the non-randomness of form. • Students should be able to evaluate the fossils (identification, mode of life, taphonomy) and characteristics of sedimentary rocks (lithology, stratigraphy) of unfamiliar outcrops to be able to predict the outcrops depositional environment and age. • Students should be able to apply paleontological data to the exploration of critical problems such as mass extinctions and climate change.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following : INDICATIVE MODULE SYLLABUS Studying fossils; preservation and classification Origin of life, microbes and protists Precambrian life; aspects of micropalaeontology Sponges, corals and reefs Molluscs Echinoderms Brachiopods and graptolites Arthropods

	A brief introduction to vertebrates: vertebrates as fossils and a selection of key evolutionary advances (endoskeleton, jaws, legs, eggs, feathers, mammal ear) Trace fossils and fossils through time

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 and by considering type of simple experiments involving some sampling activities that are interesting to the students. Students in invertebrate paleontology module typically are required to identify, sketch morphologic features, and memorize chronostratigraphic ranges of major fossil taxa . Integrating new learning strategies involving specific case studies into an invertebrate paleontology module creates a dynamic learning environment. This improves students' observational and critical-thinking skills as well as their understanding of the utility of the fossil record and key geologic concepts This will provide students with opportunities to develop good deductive reasoning and metacognitive skills. Strengthening these types of skills, which include comprehension, the ability to problem-solve, and the analysis and interpretation of data, will prepare students to be more successful as scientists.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	60	**Structured SWL (h/w)**	2 Cl +

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	2 Lab
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Introduction , History of paleontology and Origin of life, STROMATOLITE fossils.
Week 2	Fossils and Taphonomy,Fossils and fossil preservation types (Taphonomy), Ichnology Classification of major invertebrate phyla and classes,
Week 3	Phylum Porifera 3 Phylum Porifera (Sponges) and Cnidaria (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends).
Week 4	Phylum Bryozoa 4 Phylum Bryozoa: Morphology of two genera: 1- Bowerbankia, 2-Smittina; (taxonomy and

	higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends).
Week 5	Phylum Brachiopoda 5 Phylum Brachiopoda(taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends).
Week 6	Phylum Mollusca 6 Phylum Mollusca gastropods, cephalopods and bivalves) (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends).
Week 7	Phylum Echinodermata 7 Phylum Echinodermata (taxonomy and higher level classification , morphology, paleoecology (life habits and environments), geological history and evolutionary trends).
Week 8	Phylum: Arthropoda 8 Class : Trilobites (Trilobites), (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends).
Week 9	Phylum : Arthropoda 9 Class : Ostracoda (taxonomy and higher level classification , morphology, paleo-ecology (life habits and environments), geological history and evolutionary trends).
Week 10	Phylum Graptolites
Week 11	Trace Fossils & Ichnology (Paleoecology & Paleoclimatology) and depositional Interpretations.
Week 12	Types of Ichnology Genera : Classification & Depth Indication
Week 13	
Week 14	
Week 15	
Week 16	

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: (Fossils& Fossilization) The lab component will emphasize taphonomy (how organisms are transformed into fossils) and ethology (as shown by their trace fossils)
Week 2	Lab 2: Study and description of sponge and coral fossil specimens
Week 3	Lab 3: Study and description of bryozoan fossil specimens
Week 4	Lab 4: Study and description of brachiopod fossil specimens
Week 5	Lab 5: Part II, Bivalves
Week 6	Lab 6: Part I, Gastropods and Cephalopods
Week 7	Lab 7: Study and description of Graptolites specimens
Week 8	Lab 8: Trilobite fossil specimens
Week 9	Lab 9: Ostracoda fossils specimens
Week 10	Lab 10: Study and description of Graptolites specimens.
Week 11	Lab 11: Study & Depositional Interpretation Of Trace Fossils.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Required books: 1- Donald R. Prothero & Robert H. Dott, Jr., 7th ed., 2004, The Evolution of the Earth: MacGraw-Hill, New York. 2- Clarkson, E.N.K., 1998. Invertebrate Palaeontology and Evolution. 4th ed. Blackwell, NYC. 3- Nichols, G. 2009. Sedimentology and Stratigraphy. 2nd ed. Wiley-Blackwell.	Yes
Recommended Texts	1- Prothero, D. R., 2004, Bringing fossils to life: An introduction to paleobiology 2nd Edition. WCB/McGraw-Hill,	No

	Boston. 2- Levin, H. J., 1999. Ancient Invertebrates and Their Living Relatives. Prentice Hall. Low level.	
Websites	https://www.digitalatlasofancientlife.org/learn/	

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	**Sedimentary rocks**	**Module Delivery**
Module Type	C	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**
Module Code	**Geo24120**	
ECTS Credits	5	
SWL (hr/sem)	125	

Module Level	UGI 2	**Semester of Delivery**	4
Administering Department	Applied Geology	**College**	College of Science
Module Leader	Amaar Jamad Mohammed	**e-mail**	geoamaar1977t@tu.edu.iq
Module Leader's Acad. Title	Assist. Professor Dr.	**Module Leader's Qualification**	Ph.D.
Module Tutor		**e-mail**	E-mail
Peer Reviewer Name		**e-mail**	
Scientific Committee Approval Date	01/06/2023	**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	26. Covering the basics of sedimentary rocks and introduction decomposition and rocks the important principles and laws in determining the sedimentary rocks . 27. Studying the sedimentary rocks, determining the types and sedimentary structures , and determining environments . 28. Making a knowledge about the sedimentary rocks and the foundations of preserving the soft and hard parts of them and their 29. Determining the most important life developments that the sedimentary rocks (clastic and carbonates). 30. Identifying the most important sedimentary rocks and processes diageneses their environments and to get to Platform carbonates
Module Learning	

Outcomes مخرجات التعلم للمادة الدراسية	After receiving this course, the student will be able to : 16. Determining the sedimentary rocks types and environments. 17. Determining the processes sedimentary rocks in continental and marine 18. Knowing the clastic and carbonates rocks and environments changes
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Sedimentary rocks Using Relative dating to determine lithofacies of event and most important Principles. - Sediments, their importance and methods of preservation sediments, types of rocks , minerals, environments - Divisions of clastic and carbonates rocks - The Importance of Sedimentary Rocks in the Geologic - The importance of sedimentary rocks and discontinuities in the geological record Sedimentary Cycles and depositional Environments. - Geological time column of sediments - Attempts for measuring the age of the Earth - Tectonic movements and basin analysis - Continental and oceanic opening and Closure and formation of sedimentary rocks

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	70	**Structured SWL (h/w)**	7

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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**	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1 / 2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	16	10% (10)	7	LO # 1-7
	Final Exam	16	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	An introduction sedimentary rocks
Week 2	Sedimentary of structures
Week 3	Types of Clastic rocks
Week 4	Transportation and deposition of sediments clastic
Week 5	Gravel sediment, Texture Characteristics
Week 6	Sandstone sediments, Texture Characteristics, Heavy minerals nature
Week 7	Classifications Sandstone and their types
Week 8	Mudstone, sediment, Texture characteristics
Week 9	Carbonate minerals, structure, characters, environments

Week 10	Minerals carbonates , Environments, natures, origin.
Week 11	Diageneses processes and their types
Week 12	Diageneses of environments and their types
Week 13	Platform and their types
Week 14	Environments carbonates and clastic
Week 15	Basins analysis carbonates and clastic rocks
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Sedimentary structures
Week 2, Week 3, Week 4 and Week 5	Lab 2: Description a sedimentary structures in field
Week 6 and Week 7	Lab 3: Classification sandstone
Week 8 and Week 9	Lab 4: Study sandstone in microscope thin section
Week 10 and Week 11	Lab 4: Classification of carbonates

Week 12 and Week 13	Lab.5: Study carbonates in microscope thin section
Week 14	Reviewing
Week 15	Preparing for exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	**1.Sedimentary petrology An Introduction to the Origin of Sedimentary Rocks. Tucker,2001** 2. Petrology of Sedimentary rocks. Boggs,Jr,2009	Yes
Recommended Texts		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.

3MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information

معلومات المادة الدراسية

Module Title	**Sedimentology**		**Module Delivery**	
Module Type	**C**		☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo12017**			
ECTS Credits	**5**			
SWL (hr/sem)	**125**			
Module Level	UGI 2	**Semester of Delivery**	3	
Administering Department	Applied Geology	**College**	College of Science	
Module Leader	Amaar Jamad Mohammed	**e-mail**	geoamaar1977t@tu.edu.iq	
Module Leader's Acad. Title	Assist. Professor Dr.	**Module Leader's Qualification**	Ph.D.	
Module Tutor		**e-mail**	E-mail	
Peer Reviewer Name		**e-mail**		
Scientific Committee Approval Date	01/06/2023	**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	31. Covering the basics of sedimentology and introduction decomposition and weathering the important principles and laws in determining the sedimentary rocks that make up the earth's crust. 32. Studying the sedimentary rocks, determining the types and minerals, and determining the rock units. 33. Making a knowledge about the sediments and the foundations of preserving the soft and hard parts of them and their 34. Determining the most important life developments that the sedimentary clastic and carbonate. 35. Identifying the most important geological events, as well as the climatic changes that occurred on Earth and sedimentary processes
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After receiving this course, the student will be able to : 19. Determining the sedimentary types rocks and sequence. 20. Determining the processes rivers , aeolian, glacial and marine. 21. Knowing the climatic changes that the earth has gone through and the possibility of expecting the recurrence of such changes
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. - Sedimentology Using Relative dating to determine Sequences of event and most important Principles. - sediments, their importance and methods of preservation sediments, Types of rocks , minerals, environments - Divisions of rocks - The Importance of types Sedimentary rocks in the Geologic Scale Time, know Lithological and Faunal record, Methods of estimating the Age of Earth. - The importance of sedimentary rocks and discontinuities in the geological record Sedimentary cycles and depositional Environments, Recognition of Sedimentary cycles.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	70	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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**	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1 / 2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	16	10% (10)	7	LO # 1-7
	Final Exam	16	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	An introduction Sedimentology
Week 2	Sedimentary rocks formation ,properties and origin
Week 3	Types of sedimentary rocks
Week 4	Source rocks and characteristics
Week 5	weathering and erosion : Chemical and Physical weathering ,transportation and deposition of Sediments (water , wind , glaciers).
Week 6	Clastic sediment, texture characteristics (Quartz+ Feldspar types) , origin
Week 7	Heavy minerals nature, types, classifications.
Week 8	Clay minerals, Minerals, types, classifications, Characters.
Week 9	Mica , minerals ,types, origin, importance
Week 10	Carbonate minerals, structure, characters, environments
Week 11	Evaporites minerals natures, origin , environments,
Week 12	Phosphate occurrence ,origin, environments
Week 13	Ironstone minerals, environments, occurrence.
Week 14	Types of continental and marine environments
Week 15	Basins environments
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Field description of rocks
Week 2, Week 3, Week 4	Lab 2: Gravel mechanical analysis and statistics transactions

and Week 5	
Week 6 and Week 7	Lab 3 Sand volumetric analysis
Week 8 and Week 9	Lab 4: Mudstone of analysis and interpreted
Week 10 and Week 11	Lab 4: Separation heavy minerals and description
Week 12 and Week 13	Lab.5: Undissolved residue analysisi
Week 14	reviewing
Week 15	Preparing for exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	**Available in the Library?**
Required Texts	1.Sedimentary rocks in the field. Tucker,2003 2. **Petrology of** Sedimentary rocks. Boggs,Jr,2009 3.Sedimentology.Brasier et al., 2023	Yes
Recommended Texts		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
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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	Geology of Iraq			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**UoB12345**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		UGIII	**Semester of Delivery**		6
Administering Department		Dept. Of Applied Geology Code : Geo.	**College**	Faculty Of Science Code : Sci.	

Module Leader	Dr.Muthanna Y. Altharb	**e-mail**	Paleontologist64@tu.edu.iq
Module Leader's Acad. Title	Ass.Professor	**Module Leader's Qualification**	Ph.D.
Module Tutor	Dr.Muthanna Y. Altharb	**e-mail**	Paleontologist64@tu.edu.iq
Peer Reviewer Name	Prof.Dr. Sawsan H. Alhazaa	**e-mail**	E-mail
Scientific Committee Approval Date	01/06/2023	**Version Number**	1.0

Relation with other Modules

العلاقة مع المواد الدراسية الأخرى

Prerequisite module	The prerequisites include: Historical Geology Physical Geology Sedimentology Stratigraphy Mineralogy, Paleontology Structural Geology	**0** **2** **1** **3** **3** **2** **4** **4**	
Co-requisites module	None	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Aims أهداف المادة الدراسية	The geology of Iraq is a topic which attempts to define and divide the outcropped and subsurface rock column. Dividing the layers into small stratigraphic units enable one to better understand and deal with rock beds. These small units (formations) can be grouped according to tectonic

	development and depositional history of the area.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Learning Outcomes: By the end of this course, the students will be familiar to: • identify the tectonic zones of Iraq; • understand geological history of the region and especially of Iraq; • recognize rock units (formations); • use geological map; • prepare geological reports about the area; • guess seismic risk of the area; • predict groundwater accumulation of an area; • predict oil and gas accumulation of an area; • Find raw material for cement, marble, and gypsum; • understand the engineering properties of formations. • work safely in the field; and • use suitable equipment and instruments.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following: -The subject of the geology of Iraq depends on many facts and materials which are mentioned below as: 1- Language (used terms or wordology) The most important factor for learning geology of Iraq is that The students must know that, as all sciences, the geology of Iraq has its language (wordology) which taken from the science of stratigraphy, petrology, tectonic and sedimentology. The student must know the definitions of the scientific words or terms in order to understand Geology of Iraq. Some of these terms are such as 1-Group, formation, member, beds, 2- Eon, Era, Period, Epoch, Age, 3-Eonothem, Erathem, System, Series, Stage. 4-Paleozoic, Mesozoic, Cenozoic, 5-Cambrican, Ordovician, Silurian, Devonian, Carbnoniferous, Triassic, Permian, Jurassic, Cretaceous, Paleogene, Neogene. 5-Ooid (Oolite), peloid, pellet, bioclasts, foraminifera, gastropod, pelecypod, rudist, bivalve, coral, algae. Other term such as pelagic, neritic, benthonic, planktonic, shelf, reef, littoral, sublittoral, thrust, overloading, isostasy, tectonics and others 2- Geology of Iraq deals mainly with formation as the main rock stratigraphic unit (lithostratigraphic units).

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	Strategy • Theoretical (70% of total course marks) • The average of two written examinations will stand for 30% of the total course marks. • The weekly quizzes will stand for 5% of the total course marks. • The report and power point presentation will stand for 15% of the total course marks. • A Theoritical and Practical Final examinations will stand for the remaining 50% of the total course marks constructed as following: • Practical (15% of total course marks) • Teoritical (35% of total course marks)

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	60	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	65	**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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7

assessment	**Final Exam**	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	المقدمة ، تاريخ االستكشاف في العراق ، طوبوغرافية وجيولوجية السطح في العراق ، المظاهر الجيومورفولوجية السطحية للعراق ، الجيولوجيا السطحية للعراق.
Week 2	التاريخ الحركي البنائي للمنطقة History of Tectonic Movement of the Region الدرع العربي – النوبي وتركيب صخور القاعدة المعقدة: Tectonic Setting Of Nubio-Arabian Platform & composition of basement rocks سمك وطبيعة تأثير صخور القاعدة المعقدة على الرواسب في العراق Depth and influence of Basement Complex Rocks on deposition in Iraq
Week 3	الوضع التكتوني للعراق Tectonic Setting of Iraq التقسيمات التكتونية للعراق Tectonic Divisions of Iraq علاقة الترسيب بالوضع التكتوني في العراق Deposition and its relation to Tectonic Setting of Iraq مختصرالتأريخ الحركي للعراق خالل الزمن الجيولوجي Review of Tectonic History of Iraq Through Geologic Time
Week 4	مفهوم و تصنيف الأحواض الترسيبية Depositional Basin Concept and Classification (تعريف الحوض الراسخ أو المجن

	(Craton) الحافات الصفائحية النشطة والحافات الخاملة Passive And Active Margins العمود الترسيبي الطباقي للعراق Depositional and Stratigraphic Coulomn of Iraq الحدود بين الدورات الترسيبية الرئيسة Boundaries Between Major Depositional Cycles of Iraq دورات ترسيب الباليوزوي-(AP 1 -AP 5) (فانديان -يوفيميان/البيرمي المتأخر)
Week 5	1-(الدورة الترسيبةالأولى)AP(Megasequence Infracambrian فانديان/واخر النيوبروتيروزوي -الكامبري) المتأخر) 2– اواخر الكامبري المبكر- اشجل المبكر/نهاية الكامبري(أو) الكامبرو- أوردفيشيان() AP(الدورة الترسيبية الثانية) 3– اشكل متأخر/ أوردوفيشيان المتأخر-فراسينيان/أواخر الديفونيان ()AP(الدورة الترسيبة الثالثة) 4- فراسينيان/ ديفوني متأخر-ويست فاليان المكافئ للبنسلفانيان أوسط/ الكاربوني ( ) Ap(الدورة الترسيبة الرابعة) :)المتأخر
Week 6	5-)ويستفاليان/ نهاية البنسلفانيان- يوفيميان/ البيرمي المبكر( ) AP(الدورة الترسيبية الخامسة) 6 - من البيرمي المتأخر الى اللياسك(APدورة ترسيب حدود الباليوزوي – الميسوزوي
Week 7	7 -)جاسم و بدي 5556() APالدورة الترسيبية السابعة))تتابع الجوراسي األوسط) توريسيان متأخر-كالوفيان ترسبات) كاربونيتية-فتاتية(للرصيف الداخلي)أحواض الرصيف الخارجي المغلقة) المحصورة
Week 8	(تيثوني متأخر- تورنيان مبكر)(جاسم و بدي2006) /(AP8)الدورة الترسيبية الثامنة .Thamama Group))تتابع(التيثوني المتأخر – أبتيان) سمي بمجموعة ثمامة ترسبات الرصيف الداخلي والرصيف الداخلي العميق ترسبات الرصيف الخارجي والحوض العميق

	الدورة الترسيبية الثامنة (AP8)/ (2006 جاسم و بدي)(تيثوني متأخر- تورنيان مبكر). تتابع باريميان- أبتيان/ الكريتاسي المبكر تتابع (السينومانيان- تورونيان مبكر)/ كريتاسي متأخر الترسبات الكاربونيتية- الفتاتية للرصيف الداخلي. ترسبات الحوض والرصيف الخارجي
Week 9	تتابع البيان- تورونيان مبكر/ مجموعة الوسيع ترسبات كاربونيتية – فتاتية للرصيف المستقر لاكون الرصيف الداخلي
Week 10	الترسبات الكاربونيتية- الفتاتية للرصيف الداخلي سحنات عميقة لرصيف داخلي/ تكوين الرميلة/ السينومانيان- تورونيان مبكر الشعاب المرجانية سحناتRudist reefs متبخرات لاكونية لرصيف داخلي سحنة أحواض عميقة محصورة
Week 11	ترسبات الدورة التاسعة (AP9)(2006 جاسم و بدي). تتابع التورونيان المتأخر- الكامباني المبكر سحنات لاكونية والحوض العميق للرصيف الداخلي سحنات الرصيف الخارجي والحوض العميق الكامباني المتأخر- الماسترختي الترسبات الكاربونيتية للرصيف الداخلي
Week 12	حوض الرصيف الخارجي الحوض المحصور لنطاق (بلمبو- تناجيرو) الحوض المحصور لنطاق الزحف الشمالي تتابع الدانيان. فوسفات الرصيف الخارجي
Week 13	الدورة الترسيبية العاشرة (AP10)(2006 جاسم و بدي). تتابع الباليوسين ألأوسط- الأيوسين المبكر حوض الرصيف الخارجي

	ترسبات الحاجز الكاربونيتي كاربونيت الرصيف الداخلي تتابع الأيوسين ألأوسط- المتأخر كاربونيت الرصيف الداخلي اللاكوني والضحل السحنة الفوسفاتية لرصيف داخلي عميق ترسبات حوض الرصيف الخارجي الترسبات النهرية
Week 14	الدورة الترسيبية الحاديةعشر(AP11)(2006جاسم و بدي). تتابع الأيوسين المتأخر- ألأوليكوسين ترسبات الحوض ترسبات الريفreef تتابع المايوسين المبكر والأوسط كاربونيت الرصيف الداخلي ترسبات الحوض
Week 15	المتبخرات اللاكونية متبخرات لاكونية/ تكوين الفتحة(الفارس ألأسفل) تتابع المايوسين المتأخر- البليوسين ترسبات المراوح الغرينية للرصيف المستقر نظام الترسبات النهرية

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	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 مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	• Jassim, S.Z., and J.C. Goff, eds., 2006: Geology of Iraq, first edition: Brno, Czech Republic, Prague and Moravian Museum, 345 p	Yes
Recommended Texts	• Buday, T., 1980: The regional geology of Iraq, v. 1, stratigraphy and paleogeography: Mosul, Iraq, Dar Al-Kutub Publishing House, University of Mosul, 445 p. • Bellen, R.C. van, H.V. Dunnington, R. Wetzel, and D.M. Morton, eds., 1959, Lexique stratigraphic international: Paris, v. III, Asie, Fascicule 10a Iraq, 333 p. • Alsharhan, A.S., and A.E.M. Nairn, 2003, Sedimentary basins and petroleum geology of the Middle East: Amsterdam, Netherlands, Elsevier Science B. V., 843 p.	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	Mathematics			**Module Delivery**	
Module Type	**Basic**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	Geo12010				
ECTS Credits	3				
SWL (hr/sem)	75				
Module Level		2	**Semester of Delivery**		2
Administering Department		Geo	**College**	Type College Code	
Module Leader	Manar I.Khalil		**e-mail**	manar.ismael@tu.edu.iq	
Module Leader's Acad. Title		Assistant Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor	Manar I.Khalil		**e-mail**	manar.ismael@tu.edu.iq	
Peer Reviewer Name		Prof. Dr. Sawsan	**e-mail**	E-mail	
Scientific Committee Approval Date		18/06/2023	**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	1. Provide learners with many scientific terms. 2. Introduce learners to scientific concepts. 3. keeping pace with scientific development.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Develop students' mathematical thinking and provide them with basic mathematical concepts, and make them able to solve any mathematical activity related to the vocabulary assigned to them.
Indicative Contents المحتويات الإرشادية	Logarithmic functions Natural logarithmic functions definition, properties and applications Logarithmic functions in general, their definition, properties, and applications Derivatives of logarithmic functions of all kinds Integration of logarithmic functions of all kinds Exponential functions, their definition, properties, and applications Dependent exponential functions Integration of exponential functions Trigonometric functions, definition and applications The derivative of trigonometric functions Integration of trigonometric functions Inverse trigonometric functions, definition and application The derivative of inverse trigonometric functions Integration of inverse trigonometric functions Discuss solutions and exercises
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Class lecture 2. Quiz

	3. Assignments

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	30	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	45	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	75		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	5, 10	
	Assignments	2	10% (10)	2, 12	
	Projects / Lab.	-	-	-	
	Report	2	5% (10)	13	
Summative assessment	Midterm Exam	2 hr	25% (10)	7	
	Final Exam	2 hr	50% (50)	16	
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)

المنهاج الاسبوعي النظري

	Material Covered
Week 1	Logarithmic functions
Week 2	Natural logarithmic functions definition, properties and applications

Week 3	Logarithmic functions in general, their definition, properties, and applications
Week 4	Derivatives of logarithmic functions of all kinds
Week 5	Integration of logarithmic functions of all kinds
Week 6	Exponential functions, their definition, properties, and applications
Week 7	Dependent exponential functions
Week 8	Integration of exponential functions
Week 9	Trigonometric functions, definition and applications
Week 10	The derivative of trigonometric functions
Week 11	Integration of trigonometric functions
Week 12	Inverse trigonometric functions, definition and application
Week 13	The derivative of inverse trigonometric functions
Week 14	Integration of inverse trigonometric functions
Week 15	Discuss solutions and exercises
Week 16	General review of all subjects

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر (لايوجد)	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	
Week 8	
Week 9	
Week 10	
Week 11	

Week 12	
Week 13	
Week 14	
Week 15	

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	calculus	Yes
Recommended Texts		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	**Geotectonic**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo47140**		
ECTS Credits	**5**		
SWL (hr/sem)	**150**		

Module Level	2	**Semester of Delivery**	7
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Ayyed Hussein Ward	**e-mail**	aiedwarid@tu.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	1/06/2023	**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	Explaining an overview of Plate tectonic as an important in geology and identifying the

أهداف المادة الدراسية	geological structures in the cotenants and oceans.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**A- Knowledge and understanding**: Cognitive Objectives A1- Explaining an overview of synthetic geology. A2- The importance of this science in geology. A3- Identifying the large contact between plates in the cotenants and oceans . **B- Subject-specific skills**: B1-After receiving this course, the student will be able to determine the types of boundaries between plates. B2 – The possibility of understanding the distribution of volcanic seismic activity in the crust. B3 – The possibility of determining the earth layers by understanding the change velocity of earth waves.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Classroom and laboratory exercises and activities 3- Weekly and quarterly assignments and reports.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**: Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes

	Monthly and final exams guide to commitment and knowledge achievement

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Introduction to earth structures

Week 2	Waves and their behavior in earth
Week 3	Origin of the Earth
Week 4	**Continental Drift Theory and its indications**
Week 5	Sea Floor Spreading Theory and its indications
Week 6	Earth's Magnetic Field
Week 7	Mid-term Exam
Week 8	Origin of cotenants
Week 9	Triple Junctions
Week 10	Mid Ocean Ridge
Week 11	Continental margins
Week 12	Plate boundaries
Week 13	Divergent boundaries
Week 14	Convergent boundaries
Week 15	Transform boundaries
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: earth structures and waves velocity.
Week 2	Lab 2: Seismic wave's path through earth layer
Week 3	Lab 3: determine major and miner plate
Week 4	Lab 4: types of the plate boundaries
Week 5	Lab 5: recognition of the plate boundaries in map view and section
Week 6	Lab 6: determine the rate of plate in divergent boundary
Week 7	Lab 7: faults in map view and section.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Plate Tectonics: How It Works: Cox, A. V. and Hart, R. B. 1986.	Yes
Recommended Texts	Paleomagnetism - Paleomagnetism And Plate Tectonic Theory - Magnetic, Minerals, Rift, and Plates: David E. Newton	No
Websites	https://science.jrank.org/pages/4990/Paleomagnetism-Paleomagnetism-plate-tectonic-theory.html#ixzz6SkXhtlZq	

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	**Research methodology**	**Module Delivery**
Module Type	**C**	☒ **Theory**

Module Code	**Geo36136**			☒ **Lecture** ☐ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
ECTS Credits	5				
SWL (hr/sem)	**125**				
Module Level		UGI 3	**Semester of Delivery**		6
Administering Department		Applied Geology	**College**	College of Science	
Module Leader	Amaar Jamad Mohammed		**e-mail**	geoamaar1977t@tu.edu.iq	
Module Leader's Acad. Title		Assist. Professor Dr.	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**	E-mail	
Peer Reviewer Name			**e-mail**		
Scientific Committee Approval Date		01/06/2023	**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	1- Researching a new subject that has not been researched before, and deducing new rulings for it. 2- A journal on the progress of science in all respects, through recent discoveries and the development of old discoveries. 3- Make the payment. 4- Carry out the process of collecting related scientific texts and documents. 5- Performing an unprecedented re-review of the old information.

Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After receiving this course, the student will be able to : 1. Clarifying the scientific theories that have been reached or verifying their validity with an indication of the contradictory facts in human understanding and choosing the correct ones. 2. Correcting erroneous research methodologies, including the uses of statistical analysis methods and indicators, and feedback to correct them. 3. Creating new technologies and advanced lifestyles by taking advantage of the undiscovered natural availability, which contributes to increasing human civilization knowledge.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. -Help the researcher determine the purpose of the study. -Informed to identify the easiest methods and procedures that achieve the researcher's goal of the research. -A guide that the researcher follows according to the steps written inside. -Determine the theoretical and scientific value of the research. -Identify the problems that could stand in the way of the researcher and develop the necessary solutions. -Enlightened determine what needs a temporary program for the organization's time needed Iranian researcher.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Write something like: The main strategy that will be adopted in introducing this unit is to encourage students to participate, while at the same time improving and expanding their critical thinking skills. This will be achieved through classes, interactive tutorials and through student reflection.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	70	**Structured SWL (h/w)**	7

الحمل الدراسي المنتظم للطالب خلال الفصل		الحمل الدراسي المنتظم للطالب أسبوعيا	
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	55	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
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**	1	10% (10)	5, 10	LO #1, 2, 10 and 11
	Assignments	8	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1 / 2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	16	10% (10)	7	LO # 1-7
	Final Exam	16	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	An introduction research methodology
Week 2	Methods of scientific research and steps to write it
Week 3	Scientific research methods based on experience, experiment, and observation
Week 4	Steps for writing a scientific research ,fundamentals of research methods and fundamentals of research methods
Week 5	characteristics of scientific research, General methods and approaches for scientific
Week 6	Errors during the different stages of scientific research, Errors in reviewing previous studies and research Search report errors
Week 7	Research materials and methods, Writing references in scientific research.

Week 8	The role of scientific research in the progress of the individual, family and society.
Week 9	characteristics of scientific research, General methods and approaches for scientific research
Week 10	Factors affecting the validity of scientific research
Week 11	Late preparation of scientific research methodology
Week 12	Criteria can be classified scientific research methods
Week 13	Stages of scientific research preparation
Week 14	Methods of collecting data for research purposes
Week 15	Data processing and conclusions
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	
Week 2, Week 3, Week 4 and Week 5	
Week 6 and Week 7	
Week 8 and Week 9	

Week 10 and Week 11	
Week 12 and Week 13	
Week 14	
Week 15	

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	1.Tuchman. B. Conduding Education Research, 1999 2.Kerlinger , f. multiple regression in behavioral research , 2001	Yes
Recommended Texts		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	**FX –** Fail	راسب (قيد المعالجة)	(45-49)	More work required but credit awarded

(0 – 49)	**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	**Field Survey**	**Module Delivery**	
Module Type	**C**	☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo47141**		
ECTS Credits	**5**		
SWL (hr/sem)	**150**		
Module Level	2	**Semester of Delivery**	7
Administering Department	Type Dept. Code	**College**	Type College Code
Module Leader	Ayyed Hussein Ward	**e-mail**	aiedwarid@tu.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	1/06/2023	**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	Explaining an overview of field geology as an important branch in geology and identifying how field data is measured, analyzed and interpreted.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	9. Explaining an overview of field Survey. 10. The importance of this science in geology. 11. Learn about field data measuring methods. 12. Learn about the methods of selecting the appropriate field stations for data collection.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1- Presenting the course in a clear and simplified manner, with the help of graphs pictures ,videos and illustrations, and presenting them through the Power Point presentation technology. 2- Field and laboratory exercises and activities

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	**Methods of teaching and learning:** Managing the lecture in an applied manner linked to the prevailing reality in order to attract the student to the prescribed material without straying from the heart of the matter so that the material is within the framework of practical application. Assign students to group activities and assignments. Use of up-to-date presentation strategies supported by graphs and illustrative models and short videos. **Evaluation Methods**:

	Evaluation of the student by attending and participating in discussions or answers during the lecture Commitment to submit lab exercises and reports Allocate a percentage of the grade for daily assignments and quizzes **Monthly** and final exams guide to commitment and knowledge achievement

Student Workload (SWL)

الحمل الدراسي للطالب محسوب لـ ١٥ اسبوع

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	79	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب اسبوعيا	5.27
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	46	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب اسبوع	3
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)	5, 10	LO #1, 2, 10 and 11
	Assignments	2	10% (10)	2, 12	LO # 3, 4, 6 and 7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-7
	Final Exam	2hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (day Syllabus)

المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Field Survey and its aims.
Week 2	Equipment's of the field survey and safety.
Week 3	Maps and previous studies preparation about the suggested field survey area.
Week 4	Summary about geology, geomorphology, tectonic, stratigraphy and sedimentary of the suggested field survey area.
Week 5	Explaining and interpreting the field observations by exploration journey for the suggested field survey area.
Week 6	Map orientation and determine of the location, as well as determine the suitable sections to carrying out the aims of the field survey.
Week 7	Mid-term Exam
Week 8	Field survey for the first section.
Week 9	Field survey for the second section.
Week 10	Field survey for the third section.
Week 11	Field survey for the fourth section.
Week 12	Field survey for the fifth section.
Week 13	Drawing maps of geology, geomorphology and structures.
Week 14	Drawing geological, stratigraphic and structural sections.
Week 15	Final report construction about the surveyed area.
Week 16	**Final exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج اليومي للمختبر	
	Material Covered
Week 1	Lab 1: using of compass, GIS and clinometer to determining the attitude of beds with fractures and the location of the selected stations.
Week 2	Lab 2: field dada analysis of the first section.
Week 3	Lab 3: field dada analysis of the second section.

Week 4	Lab 4: field dada analysis of the third section.
Week 5	Lab 5: field dada analysis of the fourth section.
Week 6	Lab 6: field dada analysis of the fifth section.
Week 7	Lab 7: drawing maps and sections.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	GEOLOGICAL FIELD TECHNIQUES. Angela L. Coe. 2010.	Yes
Recommended Texts	Geology of Iraq, Jassim and Guff, 2006	No
Websites		

Grading Scheme
مخطط الدرجات

Group	Grade	التقدير	Marks (%)	Definition
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Mineralogy			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**Geo1208**				
ECTS Credits	**8**				
SWL (hr/sem)	**200**				
Module Level		1	**Semester of Delivery**		1
Administering Department		Type Dept. Code	**College**	Type College Code	
Module Leader	Taher Mahmood Taha		**e-mail**	Taher.mahmood2@tu.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		01/06/2023	**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	1. To develop problem solving skills and understanding of Minerals. 2. To understand element, mineral and rock. 3. This course deals with the basic concept of mineralogy. 4. This is the basic subject for all solid earth materials. 5. To understand chemical component for minerals. 6. To understand solid state of geosphere. 7. To understand minerals component of earth crust.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Recognize how mineral form. 2. List the various terms associated mineralogy. 3. Summarize the environment of minerals formation. 4. Discuss the reaction in the crust that led to product minerals. 5. Describe and classify minerals. 6. Mineral naming rules. 7. Identify the basic elements of earth, crust. 8. Discuss the operations of mineral and ore formation.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - introduction to mineralogy naming of mineral , genetic and formation minerals, magmatic environment, stages of magma crystallizations, Sedimentary Environment, Metamorphic Environment [15 hrs] principles of minerals classification [15 hrs] Native Elements, Sulfides, Oxides, Hydroxides, Halides, Carbonates, Nitrates, Borates, Sulfates, Chromates, Phosphates, Arsenates, and Vanadates, Tungstates and Molybdates. [15 hrs] Part B – Silicates Nesosilicates, Cyclosilicates, Inosilicates , Phylisilicates, Tectosilicates [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
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 type of simple experiments involving some sampling activities that are interesting to the students.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	109	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	7
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	91	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	200		

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 / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO # 5, 8 and 10
Summative assessment	**Midterm Exam**	2 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	Introduction to Mineralogy
Week 2	Genetic and formation minerals
Week 3	Stages of magma crystallization
Week 4	Classification of minerals
Week 5	Native Elements, Sulfides, Oxides,
Week 6	Hydroxides, Halides, Carbonates

Week 7	Nitrates, Borates, Sulfates
Week 8	Chromates, Phosphates,
Week 9	Arsenates, and Vanadates, Tungstates and Molybdates.
Week 10	Silicates
Week 11	Nesosilicates
Week 12	Cyclosilicates
Week 13	Inosilicates
Week 14	Phylisilicates
Week 15	Tectosilicates
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Physical properties of mineral
Week 2	Lab 2: Color **, streak ,**
Week 3	Lab 3: luster, Transparency
Week 4	Lab 4: Cohesive Properties
Week 5	Lab 5: Hardness , Cleavage, fracture
Week 6	Lab 6: Specific Gravity
Week 7	Lab 7: Mid-term examination
Week 8	Lab 8: Physical properties of native elements
Week 9	Lab 9: Physical properties of oxide and hydroxide elements
Week 10	Lab 10: Physical properties of carbonate elements
Week 11	Lab 11: Physical properties of sulphate minerals
Week 12	Lab 12: Physical properties of suhphide minerals
Week 13	Lab 13: Physical properties of silicate minerals
Week 14	Lab 14: Physical properties of silicate minerals

Week 15	Lab 15: Physical properties of silicate minerals

Learning and Teaching Resources مصادر التعلم والتدريس		
	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 Copyright Year: 2020, dissidents.	No
Websites	https://www.coursera.org/browse/physical-science-and-engineering/electrical-engineering	

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.

وصف المقرر الدراسي لمادة الكيمياء العضوية للصف الاول من قسم علوم الحياة / كلية العلوم / جامعة تكريت

وصف المقرر:

يوفر وصف المقرر هذا إيجازاً مقتضياً لأهم خصائص المقرر ومخرجات التعلم المتوقعة من الطالب تحقيقها مبرهنا التعلم المتاحة.

ولابد من الربط بينها وبين وصف ٍعما إذا كان قد حقق الاستفادة القصوى من فرص البرنامج.؛

. 1المؤسسة التعليمية جامعة تكريت	. 1المؤسسة التعليمية جامعة تكريت
. 2القسم العلمي / المركز كلية العلوم /قسم الكيمياء	. 2القسم العلمي / المركز كلية العلوم /قسم الكيمياء

. 3اسم / رمز المقرر102 chemi	. 3اسم / رمز المقرر102 chemi
. 4أشكال الحضور المتاحة اسبوعي/اجباري	. 4أشكال الحضور المتاحة اسبوعي/اجباري
. 6عدد الساعات الدراسية (الكلي) 30	. 6عدد الساعات الدراسية (الكلي) 30
. 7تاريخ إعداد هذا الوصف 2016/8/3	. 7تاريخ إعداد هذا الوصف 2016/8/3
. 8أهداف المقرر	
تعليم الطالب التفاعلات الكيميائية العضوية والتراكيب الكيميائية ومعرفة البنية للمركبات العضوية وكيفية توضيح ميكانيكة التفاعلات العضوية وتطبيقاتها العملية الهادفة الى التطوير ومواكبة التطور العلمى للكيمياء العضوية	
تدريس وتعليم الطلبة على كافة المعلومات الضرورية واللازمة الخاصة بمادة الكيمياء العضوية مما يؤهلهم للعمل والبحث في كافة مجالات الكيمياء العضوية	

.مخرجات المقرر وطرائق التعليم والتعلم والتقييم
الأأهداف المعرفية تمكين الطلبة من الحصول على المعرفة والفهم للكيمياء العضوية أ2 - تمكين الطلبة من الحصول على المعرفة والفهم للتراكيب الكيميائية للمركبات العضوية أ3 - تمكين الطلبة من الحصول على المعرفة والفهم لميكانيكة التفاعلات العضوية أ4 - تمكين الطلبة من الحصول على المعرفة والفهم للتجارب العملية للكيمياء العضوية
ب - الأهداف المهارات ية الخاصة بالمقرر . ب1 – مهارات المعرفة -التذكر ب2 - مهارات التذكير والتحليل ب 3 - مهارات الاستخدام والتطوير
طرائق التعليم والتعلم
-طريقة المحاضرة واستخدام السبورة التفاعلية -الشرح والتوضيح -تزويد الطلبة بالاساسيات والمواضيع الاضافية المتعلقة بمخرجات التفكير والتحليل الكيميائي العضوي -تكوين مجموعات نقاشية خلال المحاضرات لمناقشة مواضيع الكيمياء العضوية تتطلب التفكير والتحليل -الطلب من الطلبة مجموعة من الاسئلة التفكيرية خلال المحاضرات مثل ماذا وكيف ومتى ولماذا لمواضيع محددة -اعطاء الطلبة واجبات بيتية تتطلب تفسيرات ذاتية بطرق سببية
طرائق التقييم
- 1الاختبارات العمليه - 2الاختبارات النظريه - 3تقارير ودراسات - 4امتحانات يومية باسئلة حلها ذاتيا - 5درجات محددة بواجبات بيتية -ج الأهداف الوجدانية والقيمية
ج الأهداف الوجدانية والقيمية ج1 - تمكين الطلبة من حل المشاكل المرتبطة بالاطار الفكري للكيمياء العضوية ج2 - تمكين الطلبة من حل المشاكل في تحضير وتشخيص المركبات العضوية ج3 - تمكين الطلبة من حل المشاكل المرتبطة بالكيمياء العضوية وباللغة الانكليزية
طرائق التعليم والتعلم
-طريقة المحاضرة واستخدام السبورة التفاعلية -الشرح والتوضيح -تزويد الطلبة بالاساسيات والمواضيع الاضافية المتعلقة بمخرجات التفكير والتحليل الكيميائي العضوي -تكوين مجموعات نقاشية خلال المحاضرات لمناقشة مواضيع الكيمياء العضوية تتطلب التفكير والتحليل -الطلب من الطلبة مجموعة من الاسئلة التفكيرية خلال المحاضرات مثل ماذا وكيف ومتى ولماذا لمواضيع محددة -اعطاء الطلبة واجبات بيتية تتطلب تفسيرات ذاتية بطرق سببية
طرائق التقييم
-الاختبارات العملية - 2الاختبارات النظرية - 3التقارير والدراسات - 4امتحانات يومية باسئلة حلها ذاتيا - 5درجات محددة بواجبات بيتية
د المهارات العامة والتأهيلية المنقولة (المهارات الأخرى المتعلقة بقابلية التوظيف والتطور الشخصي .(متابعة التطور العلمي من خلال الاتصال بالجامعات العالمية عن طريق الانترنيت -المشاركة في المؤتمرات العلمية داخل وخارج القطر -الزيارات الميدانية في المشاريع الصناعية العضويةالمشاركة في الورش والندوات العلمية داخل وخارج القطر -الزيارات الميدانية في المشاريع الصناعية العضوية

11. بنية المقرر					
الاسبوع	الساعات	مخرجات التعلم المطلوبة	أسم الوحدة/ أو الموضوع	طريقة التعلم	طريقة التقييم

1	2	تعريف الطالب بالكيمياء العضوية واهميتها في حياتنا والمجموعة الفعالة وأنواع التفاعلات العضوية	مقدمة عن الكيمياء العضوية	السبوره والداتا شو	امتحانات يومية وواجبات بيتية بالاضافة الى الامتحانات الشهرية
2	2	تعرف الطالب بالتهجين وانواعه التهجين	التهجين	=	=
3	2	تعريف الطالب بالهيدروكربونات وانواعها وجذور الالكيل	الهيدروكاربونات	=	=
4	2	تعريف الطالب بالالكانات وتسميتها	تسمية الالكانات	=	=
5	2	تعريف الطالب بتحضير الالكانات وتفاعلاتها	تحضير الالكانات	=	=
6	2	تعريف الطالب بالالكينات وتسميتها وتحضيرها	الالكينات	=	=
7	2	تعريف الطالب بتقاعلات الالكينات والكشف عنها	تفاعلات الالكينات والكشف عنها	=	=
8	2	تعريف الطالب بهاليدات الالكيل وتسميتها وتحضيرها	هاليدات الالكيل وتسميتها	=	=
9	2	تعريف الطالب بتفاعلات هاليدات الالكيل ومقدمة عن الكحولات وتسميتها	هاليدات الالكيل والكحولات	=	=
10	2	تسمية الفينولات وتحضير الكحولات والفينولات	الكحولات والفينولات	=	=
11	2	تفاعلات الكحولات والفينولات ومقدمة عن المركبات والخاصية الاروماتية	الكحولات والفينولات	=	=
12	2	تسمية مشتقات البنزين ومصادرها	المركبات الاروماتية	=	=
13	2	تفاعلات المركبات الاروماتية	المركبات الاروماتية	=	=
14	2	الفعالية والتوجيه في مشتقات البنزين	مشتقات البنزين	=	=

MODULE DESCRIPTION
وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Petrology**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**GEO-221**				
ECTS Credits	**5**				
SWL (hr/sem)	**125**				
Module Level		2	**Semester of Delivery**		4
Administering Department		Geology	**College**	Science	
Module Leader	**Amaar Jamad Mohammed**		**e-mail**	**geoamaar1977@tu.edu.iq**	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Msc.
Module Tutor			**e-mail**		
Peer Reviewer Name		**Abdulsalam Mehdi salih**	**e-mail**	**Abdulsalam_mehdi@tu.edu.iq**	
Scientific Committee Approval Date		01/06/2023	**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	1. To understand the optical petrology and history. 2. To understand different between petrology and petrography 3. To understand the Igneous rocks texture under microscope 4. To understand the Sedimentary rocks texture under microscope 5. To understand the Metamorphic rocks texture under microscope 6. distinguish the structures of rocks under microscope 7. Identification of rocks types under microscope (
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. - The Course intends to investigate the rocks using the polarizing microscope 2. Provide the students with knowledge of the rocks Optics. 3. Initiating cognitive skill to generate the abilities of identifying the the physical properties of rocks. 4. Skillfulness in dealing with optics characteristics to identify, interpret the mineral- bearing of the rocks, and analyzing its genesis. 5. Skillfulness in communication with others to generate the strategically scientific thinking. 6. Skillfulness in operating the computer with different types of software programs, and applying them.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – introduction of optical petrology</u> 1. What is an optical petrology? 2. rocks Identification.Rock Fabric in igneous rocks General Rock Textures Based On Degree Of Crystallinity Textures of igneous rocks by microscopic, Classification igneous rocks by microscope [24 hrs] Sedimentary Rocks under the Microscope(Clastic Rocks) Sandstone Diagenesis, The origin of the silica for cementation, Calcite Cementation Sedimentary Rocks under the Microscope(carbonates Rocks) Sedimentary Rocks under the Microscope(Evaporite rocks), Classification sedimentary rocks by microscope [20 hrs] Metamorphic rocks under microscope The Texture and Microstructure of Metamorphic rocks by microscopeShape of Individual Crystals ,Alteration of rocks ,Alteration of rocks [20 hrs]

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The High Impact Teaching Strategies (HITS) that will be adopted in delivering this module comprise: - Structuring lessons: structured lessons can compact the curriculum and push student progress. This will help engage and motivate students. - Explicit teaching: students benefit from explicit teaching. They will know what they are learning, why they are learning it, and what they need to do to achieve. - Feedback: Feedback provides information about how a student is going as they work towards their learning goals. Feedback can redirect or refocus teacher and student actions. - Setting goals: It also helps students to see the purpose in learning. - Metacognitive: how they think, how they use strategies and skills. When students understand how they learn, they gain control over their own learning. - Questioning: Questioning is a powerful tool to motivate students to learn. - Worked examples: They support skill acquisition and reduce a student's cognitive load. - Collaborative learning: Collaborative learning happens when students work in small groups.

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	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	3	15% (15)	4, 8, 10	LO #1, 2, 3,4and 5
	Assignments	1	10% (10)	continuous	All
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	5% (5)	9	LO # 5, 6 and 7
Summative assessment	Midterm Exam	2 hr	10% (10)	7	LO # 1,2,3,4 and 5
	Final Exam	4hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to Petrology & Petrography
Week 2	Rock Fabric in igneous rocks
Week 3	General Rock Textures Based On Degree Of Crystallinity (igneous rocks)
Week 4	Textures of igneous rocks by microscopic
Week 5	Textures of igneous rocks by microscopic(continued)
Week 6	Classification igneous rocks by microscope
Week 7	Sedimentary Rocks under the Microscope(Clastic Rocks)
Week 8	Sandstone Diagenesis
Week 9	Sedimentary Rocks under the Microscope(carbonates Rocks)
Week 10	Sedimentary Rocks under the Microscope(Evaporite rocks)
Week 11	Classification sedimentary rocks by microscope
Week 12	Metamorphic rocks under microscope
Week 13	The Texture and Microstructure of Metamorphic rocks by microscope
Week 14	Alteration of rocks
Week 15	Alteration of rocks (continued)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction
Week 2	Igneous rocks texture under microscope (Myrmekitic and Ophitic textures)
Week 3	Igneous rocks texture under microscope (Poikilitic and Perthitic textures)
Week 4	Igneous rocks texture under microscope (Sieve and Oscillatory zoning textures)
Week 5	Igneous rocks texture under microscope (Coronas or reaction rims and Trachytic texture)
Week 6	Granite under microscope
Week 7	Basalt under microscope
Week 8	Gabbro under microscope
Week 9	Sedimentary rocks texture under microscope
Week 10	Sandstone under microscope
Week 11	Limestone under microscope
Week 12	Dolomite under microscope
Week 13	Metamorphic rocks texture under microscope
Week 14	Gneiss under microscope
Week 15	Shiest under microscope

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	Kerr, p . Optical Mineralogy 4 th ed, mc Graw- Hill book co.	No
Recommended Texts	1-Nesse , W. D . 1991. Introduction to optical mineralogy 2 nd . ed . oxford univ. press, New York . 2- Petrology: Igneous, Sedimentary, and Metamorphic 2nd edition Harvey Blatt, Robert J. Tracy W.H. Freeman and Company	No
Websites	1- https://www.earth.ox.ac.uk/~oesis/micro/index.html 2- https://serc.carleton.edu/NAGTWorkshops/mineralogy/optical_mineralogy_petrography.html 3- https://www.alexstrekeisen.it/english/index.php	

Grading Scheme مخطط الدرجات				
Group	**Grade**	التقدير	**Marks (%)**	**Definition**
Success Group (50 - 100)	**A** - Excellent	امتياز	90 - 100	Outstanding Performance
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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.

Ministry of Higher Education and
Scientific Research - Iraq
University of Tikrit
College of Science
Department of Chemistry

MODULE DESCRIPTOR

وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Human and democracy** **الديمقراطية وحقوق الانسان**			**Module Delivery**	
Module Type	**Suplement**			**Theory** **Seminar**	
Module Code	**UoT- 1105**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester (s) offered**	1	
Administering Department	**Apply Geology**		**College**	Science	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		
Module Tutor	None		**e-mail**	None	
Peer Reviewer Name			**e-mail**		

Review Committee Approval	05/06/2023	**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	التعرف على مبادئ حقوق الانسان والمواثيق الدولية ومفهوم الديمقراطية واسس تحقيق الديمقراطية		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	بعد الانتهاء من المقرر يتعلم الطالب - مفهوم الديموقراطية ومميزاتها ونشاءتها . - الاسس العامة للنظام الديمقراطي - الركائز الاساسية للديمقراطية - الانتخابات وتفاصيلها العامة - الفساد الاداري وطرق معالجته - معرفة بعض المصطلحان السياسية السائدة		
Indicative Contents المحتويات الإرشادية			
Course Description			
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			
Strategies	The learning and teaching strategy is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and, where possible practical) examples. Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems		

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل **In class lectures 30** **In class tests 5** **Seminars 4**	**25**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**1.7**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل **Library, dorm, home memorizing 30** **Preparation for tests 20** **Homework's 16**	**25**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**1.7**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	50		

Module Evaluation
تقييم المادة الدراسية

		Time (hr)	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	**Quizzes**	3	10% (10)	5, 10, 12, 14	LO #1, 2, 3, and 4
	Assignments	2	5 % (5)	2, 4, 6, 8, 10, 12	LO # 1, 2, 3, 4, 5 and 6
	Lab	6	15% (15)		
	Tut.	2	10% (10)	Continuous	
Summative assessment	**Midterm Exam**	2	10% (10)	7	LO # 1-3
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	تعريف الديمقراطية، مفهوم الديمقراطية، مميزات الديمقراطية، التطور التاريخي للديمقراطية والحرية في العصور التاريخية القديمة
Week 2	العلاقة بين الحقوق والحريات العامة للأفراد والديمقراطية، الفرق بين الحرية تقيم النظام الديمقراطي ومراحل تطبيقه في العراق
Week 3	انواع الديمقراطية.
Week 4	الشروط العامة لنجاح النظام الديمقراطي.
Week 5	مكونات وركائز الديمقراطية
Week 6	مفهوم الانتخابات وتكيفها القانوني
Week 7	Midterm exam
Week 8	الادارة الانتخابية، المبادئ العامة للإدارة الانتخابية، نظم الانتخابات، نظام الاغلبية والتمثيل النسبي
Week 9	الديمقراطية في العراق
Week 10	ايجابيات النظام الديمقراطي، سلبيات النظام الديمقراطي، مراحل النظام الديمقراطي في العراق، اهم مواد الدستور العراقي 2005م في مجال الديمقراطية وحقوق الانسان
Week 11	الفساد الاداري مفهومه و تعريفه،
Week 12	انواع الفساد، اسباب الفساد، معالجات الفساد
Week 13	بعض المصطلحات السياسية
Week 14	بعض المصطلحات السياسية(العلمانية ، الارستقراطية، الليبرالية).
Week 15	بعض المصطلحات السياسية(البيروقراطية، المعاهدات، الامبريالية).
Week 16	**Final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	1- الانسان في القران الكريم . 1996، عباس محمود العقاد . 2- تاريخ نشأة مفاهيم حقوق الانسان ، 2006 ، رائد سليمان الفقير. 3- حقوق الإنسان والديمقراطية والحريات العامة د. ماهر صبري كاظم	Yes
Recommended Texts		No
Websites	.	

Ministry of Higher Education and Scientific Research - Iraq
University of Tikrit
College of Science
Department of Chemistry

MODULE DESCRIPTOR

وصف المادة الدراسية

Module Information معلومات المادة الدراسية			
Module Title	**computer program 1**	**Module Delivery**	
Module Type	**Basic**		
Module Code	**CoS- 12011**	**Lab.** **Tutorial**	
ECTS Credits	**3**		
SWL (hr/sem)	**75**		
Module Level	1	**Semester (s) offered**	2

Administering Department	**Apply Geology**	**College**	Science
Module Leader		**e-mail**	
Module Leader's Acad. Title		**Module Leader's Qualification**	
Module Tutor	None	**e-mail**	None
Peer Reviewer Name		**e-mail**	
Review Committee Approval	05/06/2023	**Version Number**	1.0

Relation With Other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	-	**Semester**	-
Co-requisites module	-	**Semester**	-
Module Aims, Learning Outcomes, Indicative Contents and Brief Description أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية مع وصف مختصر			
Module Aims أهداف المادة الدراسية	التعرف على اساسيات الحاسوب ومكوناته وكيفية استعماله واهم التطبيقات الحاسوبية في الكيمياء		
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	بعد الانتهاء من المقرر يتعلم الطالب - مكونات الحاسب الالي . - اهم انظمة الحاسوبية - اهم البرامج المستخدمة في الحاسوب - برنامج الورد وتطبيقاته في الكيمياء		
Indicative Contents المحتويات الإرشادية			
Course Description			
Learning and Teaching Strategies استراتيجيات التعلم والتعليم			

Strategies	The learning and teaching strategy is designed to: Carefully cover in lectures the necessary fundamental material and analytical techniques, and demonstrate concepts with appropriate (and, where possible practical) examples. Allow students adequate time to practice the techniques using a large number of carefully selected tutorial problems

Student Workload (SWL) الحمل الدراسي للطالب			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	**48**	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	**3.2**
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	**27**	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	**1.8**
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**75**		

Module Evaluation تقييم المادة الدراسية					
		Time (hr)	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	3	5% (5)		
	Assignments	2	5 % (5)		
	Lab	6	20% (20)		
	Tut.	2	10% (10)		
Summative assessment	**Midterm Exam**	2	10% (10)		
	Final Exam	3	50% (50)	16	All

Total assessment	100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Computer
Week 2	Structure of the computer
Week 3	Hardware Components
Week 4	Software
Week 5	Definition of Operating System & Windows Operating System
Week 6	Windows Explorer, File and Folder Operations
Week 7	Midterm exam
Week 8	Definition of Computer Virus
Week 9	Use of Antivirus software
Week 10	Types of Viruses, Effects of Viruses
Week 11	Introduction to Application Communication Tools:
Week 12	MS-Word
Week 13	MS-Word continued

Week 14	MS-PowerPoint
Week 15	MS-PowerPoint continued
Week 16	**Final Exam**

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	✓ Abod, Ziad M, et al. Computer Fundamentals and Its Applications (Part 1). University House of Printing and Publishing, 2016. ✓ Abod, Ziad M, et al. Computer Fundamentals and Its Applications (Part 2). University House of Printing and Publishing, 2016 ✓ al-Khazali, Wissam. Comprehensive Learning Windows 10, al-kafīlu, 2020.	Yes
Recommended Texts		No
Websites	.	

وصف مادة

اللغة العربية

Module Information معلومات المادة الدراسية					
Module Title	**اللغة العربية**			**Module Delivery**	
Module Type	Basic			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	UNI-1106				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	1		**Semester of Delivery**	1	
Administering Department	**ied Geology**		**ege**	**M**	

Module Leader	**en Qusay Nouman**	**il**	**en.Q.Nouman@st.tu.edu.iq**
Module Leader's Acad. Title	**urer**	**ule Leader's Qualification**	**brate**
Module Tutor	None	**e-mail**	/
Peer Reviewer Name	No	**e-mail**	/
Scientific Committee Approval Date	8/6/2023	**Version Number**	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Aims أهداف المادة الدراسية	**1_ تقوية القدرة اللغوية لدى الطلاب .** **2_ اكتساب الطالب المعرفة الكاملة لأسس اللغة العربية وإكسابهم مهارة التعبير الصحيح.** **3_ توضيح اهمية الشعر العربي في بيان القواعد النحوية للغة** **4_ تقوية ملكة الطلاب الأدبية لتذوق أساليب اللغة وإدراك مواطن الجمال فيها.** **5_ معرفة القواعد الأساسية القدرة على استخدامها وتطبيقها.**
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	**1- تعريف الطالب بالمصطلحات ذات الصلة بمفهوم القواعد الإملائية والنحوية .** **2- تعريف الطالب على القواعد النحوية والقدرة على استخدامها.** **3- تعريف الطالب على أهمية الدقة في الملاحظة والتمييز بين الصواب والخطأ فيما يسمعون أو يقرؤون مما يساعدهم على فهم معاني الجمل والأساليب.** **4- تعريف الطالب بقواعد الإملاء والقدرة على كتابة الهمزات بأنواعها المختلفة بدون أخطاء.** **5_ تعريف الطالب بعلامات الترقيم وكيفية استخدامها جيدًا.**
Indicative Contents المحتويات الإرشادية	

Learning and Teaching Strategies استراتيجيات التعلم والتعليم

Strategies	وُضِعت استراتيجية التعلم والتعليم من أجل ان يحصل الطالب على معلومات كاملة تغطي المنهج الدراسي المعد للمادة ولكي تتحقق الغاية الاساسية للمنهج الذي ينصب نحو المام وادراك الطالب بالمفاهيم الاساسية لمادة اللغة العربية ,إذ يتميز هذا المساق بحقيقة أنه يحتاج إلى نهج خاص يعتمد بشكل أساسي على تنمية قدرات الطالب على فهم القواعد النحوية والإملائية وكيفية تطبيقها على النصوص القرآنية والنصوص الشعرية ، وعدم الوقوع في اللحن.

Student Workload (SWL)
الحمل الدراسي للطالب

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	32	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2.2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	18	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	1.1
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**	4	20% (20)	5, 10,12	LO #1-3 , LO# 9 - 11
	Assignments	6	15% (15)	2, 12	LO # 3, 4, LO#8 -10
	Projects / Lab.	7			
	Report	2	5% (5)	12	LO # 5, 9 and 11
Summative assessment	**Midterm Exam**	2 hr	10% (10)	7	LO # 1-8
	Final Exam	3	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	القراءة والتفسير واستخراج الصيغ النحوية
Week 2	قراءة الابيات وشرحها بصورة صحيحة وبيان معانيها
Week 3	تعريف همزة الوصل والقطع واماكن تواجدها في اللغة
Week 4	علامات الترقيم تعريفها وبيان انواعها واهميتها في كتابة البحوث مستقبلاً

Week 5	الاسم المنقوص والمقصور والممدود
Week 6	الفعل الصحيح والمعتل
Week 7	اسم الفاعل واسم المفعول
Week 8	امتحان نصف الفصل
Week 9	أنواع الجمل
Week 10	المبتدأ والخبر
Week 11	تذكير العدد وتأنيثه
Week 12	قصيدة ابو الطيب المتنبي
Week 13	قصيدة يا دجلة الخير قراءة الابيات وشرحها بصورة صحيحة وبيان معانيها
Week 14	معلقة عمرو بن كلثوم
Week 15	قصة ذي القرنين
Week 16	امتحان نهاية الفصل

Delivery Plan (Weekly Lab. Syllabus): There is no Lab activities المنهاج الاسبوعي للمختبر:	
	Material Covered
Week 1	
Week 2	
Week 3	
Week 4	
Week 5	
Week 6	
Week 7	

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

Required Texts	1 القرآن الكريم اللغة العربية العامة للأقسام غير الاختصاص / جمع واعداد ، د. صباح علي سليمان و د. حبيب احمد علي العزاوي جامعة تكريت كلية التربية 2012	No
Recommended Texts	شرح ابن عقيل ، و قطر الندى	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.