Ministry of Higher Education and Scientific Research

University of Mosul

College of Petroleum and Mining Engineering

Courses Description

Mining Engineering Department

Level Three / Semester One / Bologna Process

2025-2026

MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	Applied Rock Mechanics			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒ **Seminar**	
Module Code	DME311				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGIII	**Semester of Delivery**		5
Administering Department		Mining Engineering	**College**	Petroleum & Mining Engineering	
Module Leader	Azealdeen Al-Jawadi		**e-mail**	azealdeenaljawadi@uomosul.edu.iq	
Module Leader's Acad. Title		Asst. Professor	**Module Leader's Qualification**		Ph.D.
Module Tutor			**e-mail**		
Peer Reviewer Name		Hudhaifa Raad Hamzah	**e-mail**	hudhaifahamzah@uomosul.edu.iq	
Scientific Committee Approval Date		15/09/2025	**Version Number**		1

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	1. To develop problem-solving skills and understanding of rock mechanics theory through the application of techniques. 2. To understand stress, strain, and deformation of rock and rock masses. 3. This course deals with the basic concepts of rock mechanics. 4. This is the basic subject for all mechanics and stability of engineering structures. 5. To understand the problems of engineering structures in rocks.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, preferably equal to the number of study weeks. 1. Recognize how rocks behave in the field of construction. 2. Summarize what is meant by basic rock mechanics. 3. Discuss the reaction and involvement of geological conditions on engineering projects. 4. Describe intact rocks and rock masses. 5. Define terms of rock mechanics. 6. Identify the basics of rock mechanics and their applications. 7. Discuss the operations of engineering projects and the relation with rock mechanics. 8. Discuss the various properties of intact rocks, discontinuities, and rock masses. 9. Explain the stability analysis of foundations, tunnels, and slopes. 10. Identify the evaluation of sites of engineering projects in rocks.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. <u>Part A – rock descriptions</u> Outcrop description for engineering purposes [15 hrs] Sampling and sample preparation [15 hrs] Laboratory tests for physical properties [10 hrs] Laboratory tests of mechanical properties. [15 hrs] Revision problem classes [6 hrs] <u>Part B - Evaluation</u> Rock sites evaluation. [15 hrs] Analysis of stability. [15 hrs]

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
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 and by considering types 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	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	87	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	6
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation تقييم المادة الدراسية					
		Time/Number	**Weight (Marks)**	**Week Due**	**Relevant Learning Outcome**
Formative assessment	**Quizzes**	2	10% (10)	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 الاسبوعي النظري	
	Material Covered
Week 1	Structure of Rock, Intact Rock, Discontinuities, and Rock
Week 2	Description of Discontinuities and Structural Models
Week 3	Stress-Strain Behavior of Intact Rock
Week 4	Stress-Strain Behavior of Discontinuities
Week 5	Stress-Strain Behavior of Rock Mass
Week 6	Rock properties and laboratory testing
Week 7	Evaluation of Rock Mechanical Parameters
Week 8	Spherical presentation of geological data
Week 9	Site Investigation
Week 10	Pillars with joints
Week 11	Rock slope stability
Week 12	Foundations on rock
Week 13	Porous Rocks and Effective Stresses
Week 14	Stresses Around a Wellbore
Week 15	Wellbore Instability Analysis
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Rock description
Week 2	Lab 2: Physical properties
Week 3	Lab 3: Mechanical properties
Week 4	Lab 4: Non-destructive tests
Week 5	Lab 5: Creep
Week 6	Lab 6: Slope stability
Week 7	Lab 7: Engineering evaluation

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Hudson, J.A. and Harrison, J.P. 1997 Engineering Rock Mechanics, Part I, 530 P. Parts I and II	Yes
Recommended Texts	William, G. Pariseau, Design Analysis in Rock Mechanics (BookFi.org)	Yes
Websites	www.rocscince.org	

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 with 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	Well Drilling Engineering			**Module Delivery**	
Module Type	Core			☒Theory ☒Lecture ☐ Lab ☐Tutorial ☐ Practical ☒ Seminar	
Module Code	DME312				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Mining Engineering		**College**	Petroleum and Mining Engineering	
Module Leader	Mohammed Ali Alrashedi		**e-mail**	dr.mohammed.ali@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Hudhaifa Raad Hamzah		**e-mail**	hudhaifahamzah@uomosul.edu.iq	
Scientific Committee Approval Date	15/09/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understanding the basics of drilling operations, including drilling fluids, drill bits, and drilling rig components. 2. Learning how to design and implement drilling programs for various types of wells, such as oil/gas wells. 3. Gaining knowledge on drilling safety practices and how to handle emergency situations during drilling operations. 4. Familiarizing with drilling optimization techniques, such as directional drilling, hydraulics optimization, and bit selection.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the basic concepts of drilling engineering, including drilling fluids, drill bits, and drilling operations. 2. Analyzing drilling problems and developing solutions to overcome them. 3. Understanding the principles of wellbore stability and its impact on drilling operations. 4. Analyzing the geological formations and selecting the appropriate drilling methods. 5. Evaluating drilling economics and the impact on drilling operations. 6. Developing an understanding of safety practices and environmental concerns in drilling operations.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Drilling Engineering 2. Well planning and design 3. Drilling fluids and their properties 4. Drill bits and drilling mechanics 5. Directional drilling 6. Casing and cementing 7. Well control and blowout prevention 8. Drilling problems and troubleshooting 9. Drilling rig components and systems 10. Health, safety, and environmental considerations in drilling operations These are just a few of the topics that may be covered in a Drilling Engineering course.

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 types 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	48	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	3
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	77	**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 #3, #4
	Assignments	2	10% (10)	2 and 12	LO #3, #4 and #5, #6
	Projects / Tutorial	1	10% (10)	Continuous	All
	Report				
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #6
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to drilling, Classification of drilling operations, well planning and design
Week 2	Properties and functions of drilling fluid, Types and properties of clay in water
Week 3	types of drilling fluids
Week 4	Drilling hazards dependent on mud control, drilling mud calculations
Week 5	Drilling methods (cable tool drilling, rotary drilling)
Week 6	Drilling rig components and systems, Basic component of rotary drilling equipment
Week 7	Drilling string and accessories
Week 8	Types of bits, drill bit design and selection
Week 9	Casing of oil wells, Functions of casing
Week 10	Types of casing. Casing Strings
Week 11	Parameters of casing design, Selection of casing and bit types
Week 12	Cementing of oil wells Classification and properties of cements
Week 13	Classification of cementing operations
Week 14	Cementing equipment
Week 15	Methods and calculations of cementing
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Oil well Drilling Engineering Principles And Practice. H. Rabia	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
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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
	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	Surface Mining Engineering			**Module Delivery**	
Module Type	C			☒Theory ☒Lecture ☐ Lab ☒ Tutorial ☐Practical ☐Seminar	
Module Code	DME313				
ECTS Credits	6				
SWL (hr/sem)	150				
Module Level		UGIII	**Semester of Delivery**		5
Administering Department		Mining Engineering	**College**	Petroleum and Mining Engineering	
Module Leader	Nihad Saoud ALjuboori		**e-mail**	nihadsaoud@uomosul.edu.iq	
Module Leader's Acad. Title		Lecturer	**Module Leader's Qualification**		Ph.D.
Module Tutor	Rahma Sail Al-Auqadi		**e-mail**	Rahma.saeel86@uomosul.edu.iq	
Peer Reviewer Name		Hudhaifa Raad Hamzah	**e-mail**	hudhaifahamzah@uomosul.edu.iq	
Scientific Committee Approval Date		15/09/2025	**Version Number**		1

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The objectives of a Surface Mining Engineering module may vary depending on the specific course or program. However, here are some common objectives that are often covered in such modules: 1. Understanding surface mining methods: The module aims to provide students with a comprehensive understanding of different surface mining methods used in the industry. This includes open-pit mining, quarrying, strip mining, mountaintop removal, and placer mining, among others. 2. Mine planning and design: Students learn how to plan and design surface mines efficiently and effectively. This involves topics such as pit optimization, mine layout, equipment selection, waste management, and haul road design. 3. Geotechnical considerations: The module addresses the geotechnical aspects related to surface mining, including slope stability analysis, rock mechanics, and ground control. Students learn how to assess and mitigate risks associated with geotechnical hazards in surface mining operations. 4. Equipment and technology: Students gain knowledge about the various types of equipment and technology used in surface mining operations. This includes drilling and blasting techniques, earthmoving machinery, haulage systems, and automation technologies for improving productivity and safety. 5. Environmental and social considerations: The module covers the environmental and social impacts of surface mining. Students learn about regulatory requirements, environmental management practices, land reclamation, and community engagement strategies to minimize the negative effects of mining operations. 6. Safety and risk management: Safety is a crucial aspect of surface mining. The module emphasizes the importance of safety protocols, hazard identification, risk assessment, and emergency response planning in mining operations. Students learn how to develop and implement safety programs to ensure a safe working environment. 7. Economic and financial aspects: Surface mining operations involve significant investments, and it is important to understand the economic and financial considerations. Students learn about cost estimation, financial analysis, mine valuation, and project evaluation techniques to make informed decisions regarding mining investments. 8. Sustainable mining practices: The module highlights the importance of sustainable mining practices and responsible resource extraction. Students explore topics such as energy efficiency, water management, waste

	reduction, and reclamation strategies to promote sustainable development in surface mining.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	After completing the module, students may attain the following potential learning outcomes: 1. Knowledge of surface mining methods: Students should have a comprehensive understanding of various surface mining methods, including their advantages, limitations, and applicability to different geological and operational conditions. 2. Ability to plan and design surface mines: Students should be able to develop mine plans and designs considering factors such as pit optimization, equipment selection, waste management, and haul road design. They should be able to create feasible and efficient mining plans that maximize productivity while minimizing costs and environmental impacts. 3. Competence in geotechnical considerations: Students should be competent in evaluating geotechnical risks associated with surface mining operations. They should be able to analyze slope stability, assess rock mechanics, and develop appropriate ground control measures to ensure safe and stable mining operations. 4. Familiarity with mining equipment and technology: Students should be familiar with the types of equipment and technology used in surface mining, including their functions, capabilities, and maintenance requirements. They should understand how to select and utilize equipment effectively to optimize mining operations. 5. Understanding of environmental and social aspects: Students should have an understanding of the environmental and social impacts of surface mining and be able to apply mitigation strategies. They should be familiar with environmental regulations, reclamation techniques, and community engagement practices to promote sustainable mining operations. 6. Proficiency in safety and risk management: Students should possess the knowledge and skills to identify and assess safety hazards in surface mining operations. They should be able to develop and implement safety programs, conduct risk assessments, and respond effectively to emergencies, ensuring a safe working environment for all personnel. 7. Application of sustainable mining practices: Students should be able to apply sustainable mining practices in surface mining operations. They should have an understanding of energy-efficient practices, water management strategies, waste reduction techniques, and reclamation principles to minimize environmental impacts and promote responsible resource extraction.

Indicative Contents المحتويات الإرشادية	These indicative contents provide a general framework for a Surface Mining Engineering module. The specific topics covered and the depth of coverage may vary depending on the academic institution, course level, and duration of the module. Introduction to Surface Mining: Overview of the mining industry Types of mining operations (open-pit, quarrying, strip mining, etc.) Historical development of surface mining Surface Mining Methods: Open-pit mining: planning, design, and operations Quarrying techniques and considerations Strip mining and mountaintop removal Placer mining and dredging In-situ leaching and solution mining Mine Planning and Design: Geological exploration and resource estimation Pit optimization and ultimate pit design Mine layout and equipment selection Waste management and disposal techniques Haul road design and transportation systems Geotechnical Considerations: Rock mechanics and properties of rocks Slope stability analysis and monitoring Ground control methods and techniques Blasting principles and techniques Excavation and support systems Surface Mining Equipment and Technology: Types and selection of mining equipment Drilling and blasting techniques

	Earthmoving machinery and equipment Haulage and transport systems Automation and digital technologies in surface mining Environmental and Social Aspects of Surface Mining: Environmental impact assessment and management Reclamation and land rehabilitation Water management in mining operations Community engagement and social responsibility Sustainable Mining Practices: Energy efficiency and renewable energy sources Water conservation and management Waste reduction and recycling Biodiversity conservation and ecosystem restoration Corporate social responsibility and sustainable development

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	
Strategies	A combination of various learning and teaching strategies can be employed to effectively deliver a Surface Mining Engineering module. Here are some strategies that can be used to enhance student engagement and promote effective learning: 1. Lectures: Lectures provide a structured overview of the key concepts and theories related to surface mining engineering. Instructors can present theoretical knowledge, case studies, and industry examples to introduce students to the subject matter. 2. Field Trips: Organizing field trips to active mining sites or mine museums gives students the opportunity to witness surface mining operations firsthand. It allows them to observe mining practices, interact with industry professionals, and gain a practical understanding of the challenges and considerations in the field. 3. Group Discussions: Group discussions promote student engagement and encourage peer-to-peer learning. Students can analyze and discuss various surface

	mining engineering topics, share their perspectives, debate different approaches, and develop their communication and critical thinking skills. 4. Case Studies and Projects: Assigning case studies and projects related to surface mining engineering allows students to delve deeper into specific topics or real-world challenges. They can conduct research, analyze data, and develop solutions, fostering independent learning and problem-solving skills. 5. Guest Lectures and Industry Experts: Industry experts can share their experiences, discuss current industry practices, and address emerging trends and challenges. 6. Multimedia Resources: Utilizing multimedia resources such as videos, documentaries, and online tutorials can enhance student engagement and facilitate visual and auditory learning. These resources can be used to supplement lectures, provide visual demonstrations, or showcase industry best practices. 7. Assessments and Feedback: Regular assessments, such as quizzes, tests, and assignments, help students evaluate their understanding and progress. Providing timely feedback on their performance enables students to identify areas of improvement and reinforce their learning. It is important to use a combination of these strategies to cater to different learning styles and promote active participation from students. Additionally, incorporating real-world applications, industry examples, and current research advancements can help students connect theoretical concepts to practical applications in the field of surface mining engineering.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	57	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	4
Total SWL (h/sem) الحمل الدراسي الكلي للطالب خلال الفصل	**150**		

Module Evaluation

تقييم المادة الدراسية

		Time/Number	Weight (Marks)	Week Due	Relevant Learning Outcome
Formative assessment	Quizzes	2	10% (10)	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 الاسبوعي النظري

	Material Covered
Week 1	Introduction to Surface Mining Engineering Overview of the mining industry and its significance Types of surface mining operations Historical development of surface mining
Week 2	Surface Mining Methods: Open-pit Mining Planning and design considerations Pit optimization techniques Equipment selection and productivity analysis
Week 3	Surface Mining Methods: Quarrying and Strip Mining Quarrying techniques and considerations Stripping ratio and economics of strip mining

	Environmental and social implications of strip mining
Week 4	Surface Mining Methods: Placer Mining and In-situ Leaching Principles and techniques of placer mining
Week 5	In-situ leaching and solution mining processes Environmental considerations in placer mining
Week 6	Surface Mining Equipment and Technology: Drilling and Blasting Types of drilling equipment and techniques
Week 7	Mid-term Exam + Blasting patterns and practices in surface mining
Week 8	Surface Mining Equipment and Technology: Earthmoving Machinery and Haulage Systems Earthmoving equipment used in surface mining operations Haulage systems and truck fleet optimization
Week 9	Mining and Sustainable Development Energy efficiency and renewable energy sources Water conservation and management Waste reduction and recycling Biodiversity conservation and ecosystem restoration
Week 10	Mine Design (Design of open-pit)
Week 11	Pit slopes geometry, Geomtrical considerations
Week 12	Open pit Stability
Week 13	Mining Software Introduction Types of Mining Software RockWorks
Week 14	Mining Software Borehole Manager Datamine
Week 15	**Group Projects and Presentations**
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Revuelta, Manuel Bustillo. *Mineral resources: from exploration to sustainability assessment*. Springer, 2017.	Yes
Required Texts	Singhal, R. K. (2014). Surface and underground excavations–methods, techniques and equipment.	Yes
Recommended Texts	Elbeblawi, Mostafa Mohamed Ali, et al. *Surface Mining Technology*. Springer, 2022.	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	Geophysics			**Module Delivery**	
Module Type	C			☒Theory ☒ Lecture ☐ Lab ☒ Tutorial ☐Practical ☐Seminar	
Module Code	DME314				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Mining Engineering		**College**	Petroleum & Mining Engineering	
Module Leader	Rahma Sail Al-Auqadi		**e-mail**	Rahma.saeel86@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Hudhaifa Raad Hamzah		**e-mail**	hudhaifahamzah@uomosul.edu.iq	
Scientific Committee Approval Date	15/09/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents

أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	• To introduce the basic principles of applied geophysics. • To understand seismic, magnetic, gravity, electrical and EM methods. • To explain data acquisition, processing and interpretation in exploration. • To know the role of geophysics in mineral, groundwater and hydrocarbon exploration. • To integrate geophysical data with geology for resource evaluation.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion students should be able to: • Explain principles of geophysical methods. • Apply seismic, gravity, magnetic, electrical and EM methods. • Interpret anomalies and subsurface structures. • Evaluate advantages & limitations of methods. • Integrate multi-method data for exploration.

Indicative Contents

المحتويات الإرشادية

Introduction to Exploration Geophysics	5 hrs	
Gravity Method	10 hrs	
Magnetic Method	10 hrs	
Seismic Method (Refraction & Reflection)	20 hrs	
Electrical Methods (Resistivity, SP, IP, EM)	15 hrs	
Well Logging	10 hrs	
Integration & Case Studies	10 hrs	

Learning and Teaching Strategies

استراتيجيات التعلم والتعليم

Strategies	This course relies on a blended approach that combines theoretical lectures supported by educational tools (presentations, figures, and instructional videos) with practical exercises that enhance students' understanding of geophysical principles. Students are encouraged to actively participate through class discussions and problem-solving activities related to geophysical surveys. In addition, real case studies from mineral and petroleum exploration in Iraq and worldwide are emphasized to link theory with practice. Students are trained to analyze and interpret geophysical data and integrate it with geological information. Short projects and written reports are assigned to strengthen research skills, teamwork, and the ability to use modern resources (books, scientific articles, and online databases).

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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)	2 and 8	LO #3, #4 and #8, #9
	Assignments	2	10% (10)	2 and 12	LO #3, #5 and #6, #7
	Projects / Lab.	1	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #3, #8 and #7
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	LO #1 - #8
	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 Exploration Geophysics
Week 2	Physical properties of rocks and minerals
Week 3	Gravity Method – Principles
Week 4	Gravity Method – Interpretation
Week 5	Magnetic Method – Principles
Week 6	Magnetic Method – Exploration applications
Week 7	Seismic Refraction Method
Week 8	Seismic Reflection Method
Week 9	Seismic Data Processing & Interpretation
Week 10	Electrical Resistivity Method
Week 11	Induced Polarization & Self Potential
Week 12	Electromagnetic Methods
Week 13	Well Logging Techniques
Week 14	Integrated Geophysical Interpretation
Week 15	Case Studies (Petroleum & Mineral Exploration in Iraq)
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Introduction to geophysical instruments – principles of operation and safety rules.
Week 2	Measurement of gravity using gravimeter – field procedure and data correction.
Week 3	Interpretation of gravity anomalies – simple models.
Week 4	Magnetic field measurement using proton magnetometer – survey design.
Week 5	Processing and interpretation of magnetic anomalies (mineral exploration examples).
Week 6	Seismic refraction method – field setup and data acquisition.
Week 7	Seismic refraction data interpretation – time-distance curves.
Week8	Seismic reflection method – survey layout and shot records.
Week9	Seismic reflection data interpretation – travel-time curves and simple sections.
Week10	Electrical resistivity method – Schlumberger and Wenner configurations.
Week11	Resistivity data interpretation – depth estimation and subsurface layers.
Week12	Self-potential (SP) and Induced Polarization (IP) field practice.
Week13	Electromagnetic (EM) methods – field demonstration and anomaly recognition.
Week14	Well logging principles – interpretation of resistivity, gamma ray and sonic logs.
Week15	Integrated interpretation project – combining gravity, magnetic, seismic and electrical data for exploration case study.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	• Telford, W.M., Geldart, L.P. & Sheriff, R.E. (1990). Applied Geophysics. Cambridge University Press.	Yes
Recommended Texts	• Reynolds, J.M. (2011). An Introduction to Applied and Environmental Geophysics. Wiley-Blackwell.	yes
	• Parasnis, D.S. (1997). Principles of Applied Geophysics. Chapman & Hall.	yes

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	Sulfur Operations			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DME315				
ECTS Credits	5				
SWL (hr/sem)	125				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Mining Engineering		**College**	Petroleum & Mining Engineering	
Module Leader	Islam Kamal Saeed Al-Tayi		**e-mail**	islam.kamal1158@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor	None		**e-mail**		
Peer Reviewer Name	Hudhaifa Raad Hamzah		**e-mail**	hudhaifahamzah@uomosul.edu.iq	
Scientific Committee Approval Date	15/09/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	This study aims to provide a comprehensive study of sulfur, its formation, sources, extraction methods, the presence of raw sulfur in Iraq, and the contribution of sulfur ore obtained from the consumption of Mishraq and Kamel. It also aims to provide an understanding of industrial sulfur applications, their effects on the environment and humans, and ways to mitigate these effects.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon successful completion of this module, students will be able to: 1. Describe the occurrence, allotropes, properties, and natural and industrial sources of sulfur. 2. Explain the major sulfur extraction and production methods, including the Frasch and Claus processes. 3. Analyze the geological and industrial significance of sulfur deposits, with particular emphasis on the Al-Mishraq sulfur fields in Iraq. 4. Evaluate sulfur handling, solidification, storage, and transportation systems used in sulfur industries. 5. Apply laboratory and analytical techniques for sulfur characterization, purification, and quality assessment. 6. Interpret the chemical and physical properties of sulfur and their influence on industrial applications. 7. Explain the production processes of sulfuric acid, alum, and sulfur-based industrial products. 8. Assess the environmental and health impacts associated with sulfur, sulfur dioxide emissions, and sulfur-related industrial activities. 9. Propose suitable pollution prevention and control measures for sulfur-processing operations. 10. Conduct laboratory experiments, analyze results, and prepare technical reports related to sulfur extraction, processing, and applications.
Indicative Contents المحتويات الإرشادية	1. Introduction to sulfur, its occurrence, allotropes, and physical and chemical properties. 2. Natural and industrial sources of sulfur. 3. Sulfur extraction and production methods, including Frasch and Claus processes. 4. Sulfur handling, storage, solidification, and transportation systems. 5. Al-Mishraq sulfur deposits and sulfur production operations in Iraq. 6. Industrial applications of sulfur and sulfur-based products. 7. Production of sulfuric acid, alum, and fertilizers. 8. Environmental and health impacts of sulfur and sulfur dioxide emissions. 9. Laboratory techniques for sulfur analysis, purification, and characterization. 10. Pollution control and safety measures in sulfur operations.

Learning and Teaching Strategies استراتيجيات التعلم و التعليم	

Strategies	**1. Interactive Lectures**
	• Explaining the fundamental concepts of sulfur production and recovery processes.
	• Using presentations and process flow diagrams to illustrate operating units.
	• Encouraging students to ask questions and participate in discussions during lectures.
	2. Problem-Based Learning (PBL)
	• Presenting real engineering problems related to sulfur recovery units.
	• Assigning students tasks involving calculations of process efficiency, conversion rates, and energy consumption.
	• Developing analytical and engineering decision-making skills.
	3. Case Study
	• Analyzing operational cases from oil refineries and gas processing plants.
	• Investigating the causes of operational failures and methods for troubleshooting.
	• Linking theoretical knowledge with industrial applications.
	4. Project-Based Learning
	• Designing a sulfur recovery unit or one of its components.
	• Preparing a group project that includes material and energy balances as well as equipment design.
	• Enhancing teamwork and project management skills.
	5. Laboratory and Practical Experiments
	• Conducting experiments related to sulfur properties, combustion, and oxidation processes.
	• Using measurement instruments and chemical analysis equipment.
	• Interpreting experimental results and relating them to engineering theories.
	6. Simulation-Based Learning
	• Using software such as:
	  ○ Aspen HYSYS
	  ○ Aspen Plus
	• Simulating Claus units and acid gas treatment units.

- Studying the effects of operating variables on process performance.

7. Cooperative Learning

- Dividing students into groups to discuss engineering problems.
- Sharing ideas and experiences to reach appropriate solutions.

8. Inquiry- and Research-Based Learning

- Assigning students to review recent research papers on sulfur recovery technologies.
- Delivering presentations and discussing findings from published studies.

9. Field Visits

- Visiting oil refineries or natural gas processing plants.
- Observing sulfur recovery units and their operational components.
- Learning about safety and environmental protection practices.

10. Flipped Classroom

- Providing students with learning materials before class.
- Using class time for discussions, problem-solving, and practical applications.

11. E-Learning

- Utilizing learning management systems to upload lectures and assignments.
- Conducting online quizzes and providing immediate feedback.

Appropriate Assessment Methods

- Written examinations.
- Laboratory reports.
- Engineering projects.
- Oral presentations.
- Assignments and problem-solving exercises.
- Participation in classroom discussions.

Evaluation of simulation-based activities and performance.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	78	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	5
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	47	**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 and #10
	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 الاسبوعي النظري	
	Material Covered
Week 1	Introduction, Allotropes of Sulfur.
Week 2	Source of Sulfur, Natural Sources of Sulfur.
Week 3	Man-Made Sources of Sulfur (Natural Gas, Petroleum, Oil Sands, Sulfide Smelting, and Coal), Claus process.
Week 4	Create of Sulfur.
Week 5	Frasch mines processing method.
Week 6	The algorithm of functioning of well sensors.
Week 7	Properties of Sulfur (Melting/Freezing Point, Viscosity, Density, Color, Thermal Conductivity).
Week 8	Sulfur solidification and handling systems.
Week 9	The Sandvik Rotoform process, Process description – pastillation with the Rotoformer.
Week 10	Types of Rotoformer, Advantages of pastillation.
Week 11	Environmental aspects, Handling of solid sulfur.
Week 12	Al-Mishraq raw elemental sulfur, methods to sulfur purification. Sulfur Production Process Stages in Mishraq Sulfur Mine.
Week 13	Production of Sulfuric Acid: The lead chamber process. Production of Sulfuric Acid: The Contact process.
Week 14	Wet Contact Process, Pressure Process, Process Control Optimization. Alum production, Detection of alum, Uses of Alum. Fertilizers.
Week 15	Environment and sulfur. Hazard rating of sulfur. Health hazards of sulfur. Health hazards of sulfur dioxide. Acid rain.
Week 16	Preparatory week before the final Exam

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	General information, Safety in the laboratory.
Week 2	Introduction of the Sulfur element, Physical properties, Melting point of Sulfur. Chemical properties of sulfur.
Week 3	Analytical Methods for Sulfur Determination in Glasses, Rocks and Minerals, Infrared absorption technology.
Week 4	Isotope effects Mass spectrometer technology.
Week 5	X-ray fluorescence.
Week 6	Separation Processes: Distillation.
Week 7	Crystallization.
Week 8	Adsorption process. Absorption and Stripping.
Week 9	Manifestation of sulfur, Frasch process. Production of sulfur from hydrogen sulfide: Chemically, Biologically.
Week 10	Purification of Al-Mishraq raw elemental sulfur. Extraction of sulfur from the raw sulfur in the laboratory.
Week 11	Sulfur-modified asphalt, Rheological properties of asphalt.
Week 12	Rheological properties of asphalt, Procedure of sulfur addition on the rheological properties of virgin asphalt.
Week 13	The preparation of the Sulfuric acid in lab, The °Baume scale.
Week 14	Introduction of alum, Alum preparation. The procedure of Alum (aluminum sulfate) in laboratory.
Week 15	Calculation of theoretical and Experimental yield of alum, Some examples.

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Sulfur. History, Technology, Applications & Industry. Gerald Kutney, 2013	Yes
Recommended Texts	Sulphur Dioxide: Environmental Effects, Fate and Behaviour. WBK & Associates Inc. 2003.	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	Numerical and Engineering Analyses			**Module Delivery**	
Module Type	Basic			☒ Theory ☐ Lecture ☐ Lab ☒ Tutorial ☐ Practical ☐ Seminar	
Module Code	DME316				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level	UGIII		**Semester of Delivery**	5	
Administering Department	Mining Engineering		**College**	Petroleum and Mining Engineering	
Module Leader	Ibrahim Adil Ibrahim Al-Hafidh		**e-mail**	iibrahim@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer		**Module Leader's Qualification**	Ph.D.	
Module Tutor			**e-mail**		
Peer Reviewer Name	Hudhaifa Raad Hamzah		**e-mail**	hudhaifahamzah@uomosul.edu.iq	
Scientific Committee Approval Date	15/09/2025		**Version Number**	1	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The module objectives for teaching Numerical and Engineering Analyses can include the following: 1- Develop a thorough understanding of the fundamental principles and concepts of numerical methods and their applications in engineering. 2- Gain knowledge of various numerical techniques used for solving engineering problems, such as root finding, interpolation, differentiation, integration, and differential equations. 3- Understand the sources of errors in numerical computations and how to analyze and minimize them. 4- Comprehend the principles and techniques of optimization, statistical analysis, and uncertainty quantification in engineering. 5- Apply numerical methods to solve engineering problems, including root finding, interpolation, curve fitting, differentiation, integration, and differential equations. 6- Analyze the accuracy, efficiency, and stability of different numerical methods for various engineering applications. 7- Identify appropriate numerical techniques for specific engineering problems and evaluate their suitability. 8- Develop skills in modeling engineering problems and formulating them into mathematical equations suitable for numerical analysis.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The module on Numerical and Engineering Analyses aims to achieve the following learning outcomes for students: 1- Develop a comprehensive understanding of various numerical methods and techniques used in engineering analysis. 2- Acquire knowledge of mathematical concepts and principles underlying numerical analysis. 3- Understand the application of numerical methods to solve engineering problems and interpret the results. 4- Apply numerical methods to analyze and solve engineering problems accurately and efficiently. 5- Evaluate the appropriateness of different numerical techniques for specific engineering applications. 6- Critically assess the accuracy, stability, and limitations of numerical solutions.
Indicative Contents المحتويات الإرشادية	The indicative contents for a module on Numerical and Engineering Analyses could include the following topics: 1- <u>Introduction to Numerical Analysis:</u>

	- Overview of numerical methods and their applications in engineering - Sources of errors in numerical computations and error analysis 2- Root Finding Methods: - Bisection method - Newton-Raphson method - Secant method - Fixed-point iteration method 3- Interpolation and Curve Fitting: - Polynomial interpolation (Lagrange, Newton) - Splines and piecewise interpolation - Least squares approximation 4- Numerical Differentiation and Integration: - Finite difference approximations - Numerical differentiation methods (forward, backward, central differences) - Trapezoidal rule - Simpson's rule - Romberg integration 5- Ordinary Differential Equations (ODEs): - Initial value problems (IVPs) and boundary value problems (BVPs) - Euler's method - Runge-Kutta methods 6- Systems of ODEs and Higher-Order ODEs: - Numerical methods for systems of ODEs - Higher-order ODEs and reduction to systems of first-order ODEs

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	The main approach employed in this module will be to foster active student engagement in resolving analytical and numerical challenges, aiming to enhance their proficiency in mathematical reasoning. This will be facilitated through in-class exercises and assignments.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	63	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	4
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	37	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	3
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**	8	15% (15)	4,7,10,14	LO #1,5,2,6
	Assignments	5	10% (10)		LO # 1,5,6,
	Projects / Lab.		0% (0)		
	Report		0% (0)		
Summative assessment	**Midterm Exam**	1hr	15% (15)	8	LO # 1,5,2,6
	Final Exam	3hr	60% (60)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Numerical and Engineering Analyses. Overview of numerical methods and their applications in engineering.
Week 2	Error analysis and propagation.
Week 3	Round-off and truncation errors
Week 4	Root finding methods (e.g., Bisection method, Newton-Raphson method)
Week 5	Solving nonlinear equations
Week 6	Interpolation and curve fitting
Week 7	Least squares approximation
Week 8	Numerical differentiation
Week 9	Numerical integration (e.g., Trapezoidal rule, Simpson's rule)
Week 10	Ordinary differential equations (ODEs)
Week 11	Initial value problems and numerical solutions (e.g., Euler's method, Runge-Kutta methods)
Week 12	Systems of ODEs Numerical methods for solving systems of ODEs
Week 13	Statistical analysis and data processing
Week 14	Sensitivity analysis and uncertainty quantification
Week 15	Case studies and applications in engineering Real-world examples showcasing the use of numerical and engineering analyses in various fields
Week 16	Preparatory week before the final Exam

Learning and Teaching Resources

مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Chapra, S. C. (2010). *Numerical methods for engineers*. Mcgraw-hill. Chapra, S. (2011). *EBOOK: Applied Numerical Methods with MATLAB for Engineers and Scientists*. McGraw Hill.	yes
Recommended Texts	Epperson, J. F. (2021). *An introduction to numerical methods and analysis*. John Wiley & Sons.	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
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	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.