Ministry of Higher Education and Scientific Research

University of Mosul

College of Petroleum and Mining Engineering

Courses Description

Mining Engineering Department

Level Four / Semester Two / Bologna Process

2025 – 2026

MODULE DESCRIPTION FORM
نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Mining Engineering Techniques**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DME421**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	Mining Engineering		**College**	Petroleum & Mining Engineering	
Module Leader	Zainab Hazim Hameed		**e-mail**	eng.zainab.alkhafaf@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecturer		**Module Leader's Qualification**	M.Sc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01 / 09 / 2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	The main goal is to provide an overview of mining engineering operations and technology, as well as the design of open-pit and underground mines, and to identify the problems that a mining engineer faces in design
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Understanding the fundamentals of open-pit and underground mine design. 2. Understanding the design principles of surface and subsurface mining operations. 3. Understanding the basic principles for designing mineral extraction and processing units. 4. Understanding the concepts of material and energy balances in mineral processing operations. 5. Learning about mineral extraction methods, including pyrometallurgical,

	hydrometallurgical, and electrometallurgical extraction.
Indicative Contents المحتويات الإرشادية	Open Pit Mine Design: Concept and fundamentals of open-pit mine design. Open-pit mine engineering and planning. Pit slope geometry. Basic terminology in open-pit mining. Bench design. Bench slope angle. Bank angle. Bench height. Slope stability in open-pit mines.Underground mining design concept. Subsurface mining operations design. Unit operations of mining. Underground mine planning and design. Comparison and selection of suitable extraction methods for mineral deposits. Mineral Processing Plant Design: Introduction to mineral processing plant design. Process flow diagram. Operations flow diagram. Material flow diagram. Operational circuit design. Material balance in mineral processing. Energy balance in mineral processing. Extractive Metallurgy / Metal Extraction: Concept of metal extraction. Pyrometallurgy (thermal extraction of metals). Hydrometallurgy (aqueous/chemical extraction). Electrometallurgy (electrochemical extraction).

Learning and Teaching Strategies
استراتيجيات التعلم والتعليم

Strategies	1. Knowledge and Understanding This course provides knowledge and expertise in applying engineering principles to explore Earth's resources and construct geo-systems within an engineering systems-oriented environment. Additionally, it covers student learning methods for designing surface and subsurface mining, as well as developing student skills in designing mineral extraction units. 2. Subject-Specific Skills Students acquire engineering design skills for surface and subsurface mining methods, the skill to determine the optimal extraction method for mineral deposits, and the skill to design mineral extraction units.

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	62	**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 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	Mine design (surface pit design / open-pit mines)
Week 2	Pit slopes geometry / surface pit slopes
Week 3	Surface mining benches (bench slope, bank angle, bench height)
Week 4	Continuation
Week 5	Stability of open-pit mines (surface pit)
Week 6	Research seminar / Workshop
Week 7	**Mid-term Exam**
Week 8	Introduction to mineral processing and beneficiation plant design
Week 9	Continuation
Week 10	Process flow diagram / Material flow diagram / Operational circuit design
Week 11	Material balance in mineral processing
Week 12	Energy balance in mineral processing
Week 13	Exercises and applications in mineral processing
Week 14	Extractive metallurgy by: pyrometallurgy, hydrometallurgy, and electrometallurgy
Week 15	Research seminar / Workshop
Week 16	**Final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1: Concept of grid sampling system and its types (square grid, rectangular, triangular, and random grid systems). Determining the range of influence for samples (with solving practical examples)
Week 2	Lab 2: Identification and characterization of mineral deposits
Week 3	Lab 3: Calculation of mineral deposit thickness in a mine or in a single well or group of wells, and calculating the recovery/extraction percentage
Week 4	Lab 4: Calculation of ore grade, calculation of ore concentration, and calculation of average ore concentration with evaluating the range of influence of the site
Week 5	Lab 5: For mineral layer evaluation, calculation of average thickness in core/pulp drill holes, calculation of average concentration in core/pulp drill holes for mineral layer evaluation

Week 6	Lab 6: Evaluation (average thickness and average concentration)
Week 7	Lab 7: Cut-off grade unit or concentration (Cut-off): Defining mineral deposit boundaries based on thickness or cut-off limit
Week 8	Lab 8: Mineral deposit reserves: Concept of mineral reserves, estimation of in-situ mineral reserves, mineral deposit density, and calculation of reserves
Week 9	Lab 9: Methods for estimating mineral deposit reserves
Week 10	Lab 10: Angle of Repose, natural angle of repose, mining extraction methods: Stripping Ratio (waste-to-ore ratio), and calculation of stripping ratio
Week 11	Lab 11: Planning underground and surface mines, and extracting mineral deposits using the benching/terracing mining method
Week 12	Lab 12: Calculation of extracted raw ore quantity and dilution amount with grade dilution (Dilution), mineral extraction, mining dilution
Week 13	Lab 13: Classification of raw materials according to concentration grade transported to the metal extraction plant: grade of concentration
Week 14	Lab 14: Research seminar / Workshop
Week 15	Lab 15: Final Exam

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	- Hartman, H.L., and Mutmansky , J.M. 2002. Introductory Mining Engineering. John Wiley & Sons Inc, New Jersey, U.S.A.	NO
Recommended Texts	Barry A. Wills and Tim Napier-Munn. Mineral Processing Technology, Seventh Edition: An Introduction to the Practical Aspects of Ore Treatment and Mineral Recovery. 2005 Elsevier	No
Websites	https://www.azomining.com/Article.aspx?ArticleID=1837	

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	**Computer Applications in Mining and Metallurgy**		**Module Delivery**	
Module Type	**C**		☐ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☒**Seminar**	
Module Code	**DME414**			
ECTS Credits	6			
SWL (hr/sem)	**125**			
Module Level	4	**Semester of Delivery**	1	
Administering Department	Type Dept. Code	**College**	Petroleum and Mining Engineering	
Module Leader	Ahmed Mahmood Abdullah Daabo	**e-mail**	ahmeddaboo@uomosul.edu.iq	
Module Leader's Acad. Title	Lecturer	**Module Leader's Qualification**	Ph.D.	
Module Tutor	Shahad Salim Ibrahim	**e-mail**	E-mail	
Peer Reviewer Name	Name	**e-mail**	E-mail	
Scientific Committee Approval Date	01 / 09 / 2026	**Version Number**	1.0	

Relation with other Modules
العلاقة مع المواد الدراسية الأخرى

Prerequisite module	Application to previous modules	**Semester**	
Co-requisites module	Fluid Mechanics, Design, Heat Transfer Tunnels Engineering and Mining Environment and safety	**Semester**	

Module Aims, Learning Outcomes and Indicative Contents
أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية

Module Objectives أهداف المادة الدراسية	The objectives of computer applications in mining and metallurgy module may vary, but some common objectives are: **1.** To equip students with knowledge of computer applications in the fields of mining and metallurgy, which can enable them to solve complex problems related to the industry.

	2. To impart skills related to the use of various computer software packages, tools, and techniques that are used in mining and metallurgical engineering. **3.** To provide an understanding of the application of data science, machine learning, and artificial intelligence in the mining and metallurgical industry. **4.** To enhance students' analytical and computational skills, which are critical for effective decision-making in the mining and metallurgical industry. Overall, the module aims to prepare students for a career in the mining and metallurgical industries, where computer applications are becoming increasingly important.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	The learning outcomes of computer applications in mining and metallurgy can include: 1. Proficiency in using software tools for geological modelling, mine planning, and mineral processing simulations. 2. Understanding of the role of computer applications in optimizing mining and metallurgy operations. 3. Knowledge of the latest trends in mining and metallurgy technologies, such as artificial intelligence, machine learning, and automation. 4. Familiarization with various computer software and tools used for data analysis, tracking, and visualization related to mining engineering and metallurgy. 5. Development of critical thinking, problem solving, and decision-making skills related to mining and metallurgy.
Indicative Contents المحتويات الإرشادية	**The indicative list of computer applications in mining and metallurgy module might include:** **1.** Mine planning and design software like Ventsime, Surpac, MineSight, and Vulcan **2.** Mining simulation software like Arena and PROMETHEE **3.** Mining data analysis and visualization software like Microsoft Excell, Tableau and JMP. **4.** 3D modeling software like AutoCAD and Ansys for mining infrastructure design and visualization **5.** Mine ventilation software like Ventsime software. **6.** Metallurgical process control and optimization software like Ansys/ Optimization tool and VisioFroth.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	There are various learning and teaching strategies for computer applications in mining and metallurgy, including: 1. Simulation-based learning: This approach involves using computer simulations to simulate real-world situations and scenarios. With simulation-based learning, students can practice using various computer applications in a safe and controlled environment. 2. Project-based learning: In this approach, students work on projects that require the use of specific computer applications related to mining and metallurgy. This helps students develop practical skills in using these applications and reinforces their knowledge of the subject matter. 3. Collaborative learning: Students work together in groups to solve problems and complete tasks related to mining and metallurgy using computer applications. This approach encourages teamwork and communication skills while reinforcing knowledge of the subject matter. 4. Online learning: Online courses, tutorials and webinars can be used to teach computer applications in mining and metallurgy. These can be self-paced or instructor-led and can be accessed from anywhere in the world.

	5. Flipped classroom: In a flipped classroom, students are required to watch instructional videos or complete readings outside of class time. The in-class time is then primarily used to apply the concepts using computer applications, work on projects, or collaborate with other students.

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	72	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	5
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**	1	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.	2	10% (10)	Continuous	All
	Report	1	10% (10)	13	LO #5, #8 and #10
Summative assessment	**Midterm Exam**	3hr	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 course subjects and highlighting its important.
Week 2	Basic of Finite Element Analysis.
Week 3	Capabilities and utilizing of Ansys software in Mining Engineering.
Week 4	Procedure followed using Ansys software and how to start.
Week 5	Getting start with Microsoft Excel with basic operations of Excel 2013 and printing data.
Week 6	Introduction to Micromine software.
Week 7	Getting start with the basic commands.
Week 8	Introduction to Ventsim software.
Week 9	Basic Operations & Import Files to Ventsim

Delivery Plan (Weekly Lab. Syllabus)

المنهاج الاسبوعي للمختبر

	Material Covered
Week 1	Getting starting with Ansys and introduction to the Workbench.
Week 2	Using the Ansys to design, draw and model simple and basic models.
Week 3	Modelling a 3D centrifugal pump starting with meanline design.
Week 4	Modelling using static structural analysis.
Week 5	Evaluating students by raising some relevant problems in turbomachinery.
Week 6	Using functions (array formulas, matrix function, solving system of equations) and some exercises.
Week 7	Conditional Functions (Logical Comparison Operators, if function, array formulas and conditional formatting).
Week 8	Taking some tasks and engineering exercise i.e Data Mining (Importing TXT File, Counting and Summing with Criteria and Frequency Distribution).
Week 9	Charts & Regression Analysis
Week 10	Getting starting with Micromine and introduction to its capabilities.
Week 11	Design of the pit geometry, tools and the machines using the software.
Week 12	Lunching with the Micromine company for proposed workshops.
Week 13	Build a Basic Model of airway ducts & Regulator.
Week 14	Underground Heat Simulation Modelling
Week 15	Fan Ventilation Modelling& Construct Ventilation Ducts

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Matsson, John E. *An Introduction to ANSYS Fluent 2022*. Sdc Publications, 2022.	No
Recommended Texts	Lee, Huei-Huang. *Finite Element Simulations with ANSYS Workbench 2023: Theory, Applications, Case Studies*. SDC publications, 2023. VentSim DESIGN™ User Guide	No
Websites	https://books.google.iq/books?hl=en&lr=&id=HaK_EAAAQBAJ&oi=fnd&pg=PA1&dq=ansys+theory+guide&ots=8tXTuRtj92&sig=Uk5VLkqc6DDKZrvWzF9XzN2iy0k&redir_esc=y#v=onepage&q=ansys%20theory%20guide&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
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MODULE DESCRIPTION FORM

نموذج وصف المادة الدراسية

Module Information معلومات المادة الدراسية					
Module Title	**Applied Raw Materials Processing**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☒ **Lecture** ☒ **Lab** ☐ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	**DME423**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	UGIV		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**		
Module Leader	Eman Kassim Yahya		**e-mail**	Eman.q@uomosul.edu.iq	
Module Leader's Acad. Title	Assistant Lecture		**Module Leader's Qualification**	MSc.	
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	1/09/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Mineral Resources Evaluation, Geochemistry of ores	**Semester**	8, 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	1. finished products perform one or both of two major functions: first, they form the material into the desired shape, and, second, they alter or improve the properties of the material. 2. study the five important factors in the selection of raw material Qualities to consider when ordering raw materials that is include: Purity, Potency, Shelf life, Composition, Value. 3. explain the step of processing of material from mine to product. 4. Study the equipment that used and system of processing material in plants. 5. Study the chemical and physical properties of raw material to choose the type of processing.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 2. Properties of minerals and raw materials 3. IMPORTANT TERMINOLOGY in minerals processing. 4. MINERAL BENEFICIATION OPERATIONS 5. Sampling process 6. SIEVE ANALYSIS 7. Liberation 8. TYPES OF COMMINUTION OPERATIONS 9. Crushing and Grinding 10. Physical separation: CLASSIFIERS types: sizing classifier, Sorting classifiers, Centrifugal classifiers 11. Chemical separation: flotation method, leaching method 12. Magnetic separation 13. Electrical separation
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. Part A - Theoretical Introduction – properties of minerals and raw material and IMPORTANT TERMINOLOGY in mineral processing Delineation, analysis, and evaluation of separation, Analysis and assessment of separation process, feed processing upgrading curves, Upgradeability (9hrs) Sampling processing, SIEVE ANALYSIS, Screening, TYPES OF SCREENS, Mechanics of screening, Probability of screening, Kinetics of screening, . Analysis and evaluation of screening Grinding, type of milling, comminution process (9hrs) Physical separation: CLASSIFIERS types: sizing classifier, Sorting classifiers, Centrifugal classifiers Hydraulic and air separation, Principles, Classification by sedimentation, Fluidizing classification, Hydrocyclones, operation and design methods, Thin stream separation, Introduction, Stream separators, Reichert cones, Humphrey spiral concentrator, Concentrating tables (12hrs)

	Beneficiation operation, Gravity separation, The basis of gravity separation in water and heavy liquid, Densimetric analysis, Gravity separation in magnetic liquids, Electrical separation, Magnetic properties of materials, Diamagnetics, . Paramagnetics, Ferrimagnetics, Separation, low intensity magnetic separator LIMS, • high intensity magnetic HIMS, Chemical separation: 1- flotation method, Theoretical basis, Hydrophobicity of materials, contact angle, theories binding hydrophobicity, Hydrophobicity modification, Flotation reagents. Collectors, Frothers. Activators, Dewatering, THICKENING, FILTRATION, Types of filters, handling and storage of materials (12hrs) Part B – practical introduction to ore process, mining methods underground mining, open pit mining. Calculation of the concentration factors and polt the concentration. (9 hrs) Calculation of the volume of the crust that yield Cu and calculation of the concentration using solubility product. Determination the concentrations of the chalcophile elements and calculation of the concentration in Mol/l^{-1} , Calculation of the tonnages of ore and elemental copper in a hypothetical copper. (9hrs) Finding the temperature of formation of minerals. Determination of the Origin of the mineralization fluid. Determination of source of materials necessary in the ore deposits, Calculation of the Oxygen isotopic composition of the fluid at the above temperature. Calculation the temperature of formation of the Aberfeldy ore deposits using the given Sulfur isotope fractionation equations of mineral pairs. (15hrs) Calculation the sulfur Isotopic composition of the sulfate and sulfide minerals, Calculation of the overall shape of ore body and the volume of ore. Cement process. Phosphate process. (12hrs)

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, scientific trips to the plants, and prepare reports about raw materials and processing specially that riches in country.

Student Workload (SWL) الحمل الدراسي للطالب محسوب لـ ١٥ اسبوعا			
Structured SWL (h/sem)	93	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	6

الحمل الدراسي المنتظم للطالب خلال الفصل			
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 – properties of minerals and raw material and IMPORTANT TERMINOLOGY in mineral processing
Week 2	Delineation, analysis, and evaluation of separation, Analysis and assessment of separation process, feed processing
Week 3	upgrading curves, Upgradeability
Week 4	Sampling processing, SIEVE ANALYSIS, Screening, TYPES OF SCREENS
Week 5	Mechanics of screening, Probability of screening, Kinetics of screening, . Analysis and evaluation of screening
Week 6	Grinding, type of milling, comminution process
Week 7	Mid-term Exam
Week 8	Physical separation: CLASSIFIERS types: sizing classifier, Sorting classifiers, Centrifugal classifiers
Week 9	Hydraulic and air separation, Principles, Classification by sedimentation,
Week 10	Fluidizing classification, Hydrocyclones, operation and design methods
Week 11	Thin stream separation, Introduction, Stream separators, Reichert cones, Humphrey spiral concentrator, Concentrating tables
Week 12	Beneficiation operation, Gravity separation, The basis of gravity separation in water and heavy liquid, Densimetric analysis, Gravity separation in magnetic liquids

Week 13	Electrical separation, Magnetic properties of materials, Diamagnetics, Paramagnetics, Ferrimagnetics, Separation, low intensity magnetic separator LIMS, high intensity magnetic HIMS,
Week 14	Chemical separation: 1- flotation method, Theoretical basis, Hydrophobicity of materials, contact angle, theories binding hydrophobicity, Hydrophobicity modification, Flotation reagents, Collectors, Frothers, Activators,
Week 15	Dewatering, THICKENING, FILTRATION,Types of filters, handling and storage of materials
Week 16	**Preparatory week before the final Exam**

Delivery Plan (Weekly Lab. Syllabus) المنهاج الاسبوعي للمختبر	
	Material Covered
Week 1	Lab 1:introduction to ore process
Week 2	Lab 2: Mining methods underground mining, open pit mining.
Week 3	Lab 3: Calculation of the concentration factors and polt the the concentration.
Week 4	Lab 4: Calculation of the volume of the crust that yield Cu and calculation of the concentration using solubility product.
Week 5	Lab 5: Determination the concentrations of the chalcophile elements and calculation of the concentration in Mol/l^{-1}
Week 6	Lab 6: Calculation of the tonnages of ore and elemental copper in a hypothetical copper.
Week 7	Lab 7: Finding the temperature of formation of minerals.
Week 8	Lab 8: Determination of the Origin of the mineralization fluid.
Week 9	Lab 9: Determination of source of materials necessary in the ore deposits
Week 10	Lab 10: Calculation of the Oxygen isotopic composition of the fluid at the above temperature.
Week 11	Lab 11: Calculation the temperature of formation of the Aberfeldy ore deposits using the given Sulfur isotope fractionation equations of mineral pairs.
Week 12	Lab 12 : Calculation the sulfur Isotopic composition of the sulfate and sulfide minerals
Week 13	Lab 13: Calculation of the overall shape of ore body and the volume of ore.
Week 14	Lab 14: Cement process.
Week 15	Lab 15: Phosphate process.

Learning and Teaching Resources مصادر التعلم والتدريس		
	Text	**Available in the Library?**
Required Texts	JAN DRZYMALA, 2007, Mineral Processing Foundations of theory and practice of minerallurgy, 1st ed, Wroclaw University of Technology, 508p. D.V. SUBBA RAO, 2011, MINERAL BENEFICIATION A CONCISE BASIC COURSE, CRC Press is an imprint of Taylor & Francis Group, an Informa business, 167p	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	**Engineering Statistics**			**Module Delivery**	
Module Type	C			☒ **Theory** ☒ **Lecture** ☐ **Lab** ☒ **Tutorial** ☐ **Practical** ☐ **Seminar**	
Module Code	DME424				
ECTS Credits	4				
SWL (hr/sem)	100				
Module Level		UGIV	**Semester of Delivery**		2
Administering Department		Mining Engineering	**College**	College of Petroleum and Mining Engineering	
Module Leader	Dr. Ibrahim Adil Ibrahim		**e-mail**	iibrahim@uomosul.edu.iq	
Module Leader's Acad. Title			**Module Leader's Qualification**		Ph.D.
Module Tutor	Name (if available)		**e-mail**		
Peer Reviewer Name		Name	**e-mail**	E-mail	
Scientific Committee Approval Date		1/09/2026	**Version Number**		1.0

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Introduce students to the fundamental concepts of descriptive statistics and methods for organizing and presenting engineering data. 2. Build a solid understanding of probability theory as a foundation for engineering statistical analysis. 3. Enable students to work with common probability distributions and apply them to real mining data. 4. Develop skills in statistical estimation and hypothesis testing to support data-driven engineering decisions. 5. Introduce students to linear regression and analysis of variance and their application in interpreting relationships between engineering variables.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Upon completion of this course, students will be able to: 1- Organize and summarize engineering data using descriptive statistics methods and graphical techniques. (SO1, SO6) 2- Apply fundamental probability concepts (sample space, events, conditional probability, Bayes' theorem) to mining engineering problems. (SO1) 3- Use discrete and continuous probability distributions (Binomial, Poisson, Normal) to model mining-related data (ore grade, rock quality, equipment failures). (SO1, SO6) 4- Construct confidence intervals and perform hypothesis tests to support engineering decisions based on field and laboratory data. (SO1, SO6) 5- Apply simple linear regression, correlation, and introductory analysis of variance to exploration and mining data, and interpret results in an engineering context. (SO1, SO6, SO2).
Indicative Contents المحتويات الإرشادية	1. Descriptive statistics: data organization, tabulation, and graphical presentation. 2. Probability theory: sample space, events, conditional probability, and Bayes' theorem. 3. Discrete and continuous probability distributions (Binomial, Poisson, Uniform, Exponential, Normal). 4. Sampling distributions and the Central Limit Theorem. 5. Statistical estimation: point estimation and confidence intervals. 6. Hypothesis testing for one and two populations. 7. Simple linear regression, correlation, and introductory analysis of variance. 8. Applications to mining engineering data: ore grade, rock quality, equipment reliability, and exploration data.

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	a. Lectures introducing theoretical concepts, supported by real mining engineering examples and datasets. b. Tutorial sessions for solving problems and statistical exercises. c. In-class discussions and short quizzes to reinforce key concepts. d. An applied project requiring statistical analysis of real or simulated mining data using software (Excel, Minitab, or MATLAB). e. Guided self-study sessions and assigned homework to build problem-solving proficiency.

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	52	**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**	4	20% (20)	2 and 12	
	Classwork	2	5% (5)	2 and 12	
	Lab / Report	4	10% (15)	Continuous	
	Study Sessions	1	5% (5)	13	
Summative assessment	**Midterm Exam**	2hr	10% (10)	7	
	Final Exam	3hr	50% (50)	16	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus) المنهاج الاسبوعي النظري	
	Material Covered
Week 1	Introduction to Engineering Statistics: importance of statistics in mining engineering, types of data (quantitative/qualitative), sources of field and laboratory data.

Week 2	Descriptive Statistics: frequency tables, histograms, frequency polygons; application to ore-grade data.
Week 3	Measures of Central Tendency (mean, median, mode) and Measures of Dispersion (range, variance, standard deviation, coefficient of variation).
Week 4	Fundamentals of Probability: random experiments, sample space, events, addition and multiplication rules of probability.
Week 5	Conditional Probability and Statistical Independence; Bayes' Theorem and its applications in mining risk assessment and quality control.
Week 6	Discrete Random Variables: Binomial and Poisson distributions, with applications to equipment failures and safety incidents.
Week 7	Continuous Random Variables: Uniform and Exponential distributions, with applications to downtime and reliability of mining equipment.
Week 8	The Normal Distribution: properties, standard normal table, applications to the distribution of ore grades and rock quality.
Week 9	Midterm Examination and comprehensive review of probability concepts.
Week 10	Sampling Distributions and the Central Limit Theorem, and their importance in field sampling design.
Week 11	Statistical Estimation: point estimation, confidence intervals for the mean and proportion, determining required sample size for exploration studies.
Week 12	Hypothesis Testing: basic concepts, Type I and Type II errors, hypothesis test for a single population mean.
Week 13	Hypothesis Testing for comparing two means (two samples) and two proportions, with applications comparing ore batches or different mining sites.
Week 14	Simple Linear Regression and Correlation: building a predictive model between two engineering variables (e.g., drilling depth and ore grade).
Week 15	Introduction to One-Way Analysis of Variance (ANOVA); comprehensive course review and preparation for the final examination.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Montgomery, D. C., & Runger, G. C. *Applied Statistics and Probability for Engineers*. Wiley (latest edition).	Yes
Recommended Texts	Walpole, R. E., Myers, R. H., Myers, S. L., & Ye, K. *Probability and Statistics for Engineers and Scientists*. Pearson (latest edition).	Yes
Websites	None	

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	**Tunnels engineering**			**Module Delivery**	
Module Type	**Core**			☒ **Theory** ☐ **Lecture** ☐ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**DME425**				
ECTS Credits	**6**				
SWL (hr/sem)	**150**				
Module Level	4		**Semester of Delivery**	8	
Administering Department	Type Dept. Code		**College**	Type College Code	
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	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/09/2026		**Version Number**	1.0	

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

Module Aims, Learning Outcomes and Indicative Contents أهداف المادة الدراسية ونتائج التعلم والمحتويات الإرشادية	
Module Objectives أهداف المادة الدراسية	1. Understand the principles of tunnel engineering: Gain a comprehensive understanding of the fundamental principles and theories related to tunnel engineering, including design, construction, and maintenance. 2. Study geotechnical aspects: Explore the geotechnical considerations involved in tunnel engineering, including site investigation, soil and rock mechanics, ground stability, and excavation techniques. 3. Analyze tunnel design and construction methods: Learn about various tunnel design and construction methods, such as cut-and-cover, bored tunnels, immersed tunnels, and tunneling with tunnel boring machines (TBMs).

	4. Assess tunnel structural analysis: Acquire knowledge of structural analysis techniques for tunnels, including load analysis, stress analysis, and the evaluation of tunnel stability under different loading conditions. 5. Evaluate tunnel ventilation and fire safety: Understand the principles of tunnel ventilation and fire safety systems, including ventilation design, smoke management, fire suppression, and emergency evacuation procedures. 6. Explore tunnel lining and waterproofing: Study different types of tunnel linings and their applications, as well as waterproofing systems to prevent water ingress and protect tunnel structures. 7. Consider environmental and sustainability aspects: Recognize the environmental impact of tunnels and explore sustainable tunnel engineering practices, such as energy-efficient lighting, ventilation, and water management. 8. Learn about tunnel monitoring and maintenance: Understand the importance of tunnel monitoring systems, including instrumentation, data collection, and maintenance strategies to ensure the safety and integrity of tunnels over their lifespan.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	Important: Write at least 6 Learning Outcomes, better to be equal to the number of study weeks. 1. Demonstrate a comprehensive understanding of the principles and theories related to tunnel engineering, including design, construction, and maintenance. 2. Apply geotechnical knowledge to assess site conditions, evaluate ground stability, and select appropriate excavation techniques for tunnel projects. 3. Analyze and compare different tunnel design and construction methods, considering their advantages, limitations, and applicability to specific project requirements. 4. Conduct structural analysis of tunnels, including load analysis and stress analysis, and evaluate the stability and safety of tunnel structures. 5. Design tunnel ventilation and fire safety systems, considering factors such as airflow requirements, smoke management, fire suppression, and emergency evacuation procedures. 6. Select appropriate tunnel lining materials and systems, and apply knowledge of waterproofing techniques to prevent water ingress and ensure the durability of tunnel structures. 7. Recognize the environmental impact of tunnels and identify sustainable engineering practices to minimize the environmental footprint of tunnel projects. 8. Develop proficiency in using tunnel monitoring systems, including data collection and interpretation, and implement maintenance strategies to ensure the long-term safety and performance of tunnels.
Indicative Contents المحتويات الإرشادية	Indicative content includes the following. 1. Introduction to Tunnels • Definition and types of tunnels • Historical perspective and major tunnel projects 2. Geotechnical Considerations • Site investigation techniques • Soil and rock mechanics • Ground stability and tunneling-induced ground movements • Excavation methods and ground support systems 3. Tunnel Design and Construction Methods • Cut-and-cover tunnels • Bored tunnels (conventional and mechanized)

	• Immersed tunnels • Tunnels using tunnel boring machines (TBMs) 4. Structural Analysis and Design of Tunnels • Load analysis and structural requirements • Tunnel lining design and materials • Stability analysis and reinforcement measures • Structural behavior under different loading conditions 5. Tunnel Ventilation and Fire Safety • Principles of tunnel ventilation • Ventilation system design and airflow calculations • Smoke management and fire suppression systems • Emergency evacuation procedures 6. Waterproofing and Drainage • Water ingress and its effects on tunnel structures • Waterproofing techniques and materials • Drainage systems for tunnel seepage and groundwater control 7. Tunnel Monitoring and Maintenance • Instrumentation and monitoring systems • Maintenance strategies and repair techniques

Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	Lectures: Traditional lectures can be used to deliver theoretical concepts, fundamental principles, and case studies related to tunnel engineering. It is essential to ensure clear explanations, visual aids, and real-world examples to enhance understanding. Practical Exercises and Workshops: Engage students in hands-on exercises and workshops to apply theoretical knowledge in practical scenarios. This can include activities such as tunnel design exercises, analysis of structural components, or working with geotechnical software. Field Visits and Site Tours: Whenever possible, organize field visits to active tunnel construction sites or completed tunnel projects. This provides students with a practical understanding of the construction processes, safety considerations, and real-world challenges in tunnel engineering. Computer Simulations and Modeling: Utilize computer simulations and modeling tools to demonstrate complex tunneling processes, structural analysis, and ventilation systems. This interactive approach allows students to visualize and understand the behavior of tunnels under different conditions. Multimedia Resources: Utilize multimedia resources such as videos, animations, and interactive online platforms to supplement lectures and provide visual representations of tunneling techniques, construction processes, and safety measures. Assessments: Use a variety of assessment methods, including written exams, project reports, presentations, and practical demonstrations, to evaluate students' understanding of tunnel engineering concepts and their ability to apply them in real-world scenarios.

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	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	Introduction to Tunnels engineering
Week 2	Site Investigations for Tunnels Planning and Design
Week 3	Tunnel Design Principles
Week 4	Single Tunnels
Week 5	Tunnel Excavation Methods
Week 6	New Austrian Tunneling Method
Week 7	Pipe jacking Method
Week 8	Submerged Tunnel Method
Week 9	Shallow Tunnels
Week 10	Tunnel Supports
Week 11	Rock Bolting and Anchoring
Week 12	Shotcrete and Sprayed Concrete
Week 13	Steel Ribs and Sets
Week 14	Tunnel Lining Systems
Week 15	Effect the groundwater on the tunnel support
Week 16	**Preparatory week before the final Exam**

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	William G. Pariseau, (2017), Design Analysis in Rock Mechanics 3rd Edition	No
Recommended Texts	Bai Yun, (2019), Underground Engineering Planning, Design, Construction and Operation of the Underground Space	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
	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	**Graduation Project**			**Module Delivery**	
Module Type	**B**			☒ **Theory** ☐ **Lecture** ☒ **Lab** ☐ **Tutorial** ☒ **Practical** ☒ **Seminar**	
Module Code	**DME426**				
ECTS Credits	**2**				
SWL (hr/sem)	**50**				
Module Level	UGIV		**Semester of Delivery**		8
Administering Department			**College**	Type College Code	
Module Leader			**e-mail**		
Module Leader's Acad. Title			**Module Leader's Qualification**		Ph.D., MSc.
Module Tutor	Name (if available)		**e-mail**	E-mail	
Peer Reviewer Name	Name		**e-mail**	E-mail	
Scientific Committee Approval Date	01/09/2026		**Version Number**	1.0	

Relation with other Modules العلاقة مع المواد الدراسية الأخرى			
Prerequisite module	Successful completion of all core courses through the 7th semester of the Mining Engineering program (per department regulations) — Semester: 7	**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. Enable students to apply the engineering knowledge and skills acquired throughout the program to an independent, real or realistic mining engineering problem. 2. Develop students' ability to plan, organize, and manage an engineering project within a defined timeframe and set of constraints. 3. Strengthen students' skills in engineering data collection, analysis, design, and evaluation of alternative solutions.

	4. Enhance students' ability to communicate technical work effectively through written reports and oral presentation. 5. Foster awareness of professional, ethical, safety, economic, and environmental considerations relevant to mining engineering practice.
Module Learning Outcomes مخرجات التعلم للمادة الدراسية	1. Identify and formulate a mining engineering problem and define its objectives and scope. (SO1, SO2) 2. Apply mathematics, science, and engineering knowledge to analyze and develop a solution to the project problem. (SO1, SO6) 3. Conduct engineering investigations — including data collection, analysis, and interpretation — to support project conclusions. (SO1, SO6) 4. Design a system, process, or approach that meets specified requirements within realistic economic, environmental, safety, and social constraints. (SO2) 5. Function effectively individually or as part of a team to accomplish the project's objectives. (SO5) 6. Communicate the project's methodology, results, and conclusions clearly in a written report and an oral presentation/defense. (SO3) 7. Recognize and apply professional and ethical responsibilities relevant to mining engineering practice. (SO4)
Indicative Contents المحتويات الإرشادية	1. Selection of the project topic and formulation of the problem statement, in coordination with the project supervisor. 2. Literature review and background study relevant to the project topic. 3. Preparation of the project proposal: objectives, scope, methodology, and work plan. 4. Data collection and/or experimental, field, or laboratory work as required by the project. 5. Engineering analysis, design, modelling, or simulation relevant to the project topic. 6. Evaluation and discussion of results, and comparison with relevant engineering/design standards. 7. Consideration of economic, safety, environmental, and ethical aspects of the proposed solution. 8. Preparation of the final project report following the department's technical writing guidelines. 9. Preparation and delivery of the final oral presentation and defense before an examination committee.
Learning and Teaching Strategies استراتيجيات التعلم والتعليم	
Strategies	1. Regular individual (or small-group) supervision meetings with the project advisor. 2. Independent research, data collection, and engineering analysis conducted by the student(s). 3. Periodic progress seminars/presentations to monitor progress and provide feedback. 4. Guided use of relevant software, laboratory, or field tools appropriate to the project topic.

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

Structured SWL (h/sem) الحمل الدراسي المنتظم للطالب خلال الفصل	33	**Structured SWL (h/w)** الحمل الدراسي المنتظم للطالب أسبوعيا	2
Unstructured SWL (h/sem) الحمل الدراسي غير المنتظم للطالب خلال الفصل	17	**Unstructured SWL (h/w)** الحمل الدراسي غير المنتظم للطالب أسبوعيا	
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	Progress Report / Proposal	1	10% (10)	5	CLO1, CLO2
	Progress Seminar	1	10% (10)	10	CLO3, CLO4
Summative assessment	Final Project Report	1	40% (40)	14	CLO2–CLO6
	Final Oral Presentation & Discussion	1	40% (40)	15	All
Total assessment			100% (100 Marks)		

Delivery Plan (Weekly Syllabus)
المنهاج الاسبوعي النظري

	Material Covered
Week 1	Introduction to graduation project requirements; allocation of supervisors and project topics.
Week 2-3	Literature review and background research; refinement of the problem statement.
Week 4	Submission and discussion of the project proposal (objectives, scope, methodology, work plan).
Week 5-6	Initial data collection and/or setup of experimental, field, or laboratory work.
Week 7-9	Continued data collection, engineering analysis, and design work under supervision.
Week 10	First progress seminar — presentation to the department supervising committee.
Week 11-12	Refinement of analysis/design based on feedback; continued engineering work.
Week 13	Preparation of the draft final report and supervisor review.
Week 14	Submission of the final project report.

Week 15	Final oral presentation and discussion (defense) before the examination committee.

Learning and Teaching Resources
مصادر التعلم والتدريس

	Text	Available in the Library?
Required Texts	Relevant technical references, standards, and literature specific to each student's project topic, as identified with the project supervisor.	
Recommended Texts	Reference textbooks and peer-reviewed journal articles related to the specific mining engineering sub-field addressed by the project.	
Websites		

Grading Scheme
مخطط الدرجات

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