University of Mosul

College of Petroleum and Mining Engineering

Department of Mining Engineering

Course Description

Fourth Stage/Annual System

Prof. Dr. Nabil Youssef Al-Banna

Head of the Scientific Committee

Asst. Prof. Dr. Azealdeen Salih Al-Jawadi

Head of Department

كلية هندسة النفط والتعدين
قسم هندسة التعدين

Course Description Form Computer Applications in Mining Engineering

1. Course Name:
Computer Applications in Mining Engineering
2. Course Code:
ME 411
3. Semester / Year:
2024-2025
4. Description Preparation Date:
1/10/2024
5. Available Attendance Forms:
Physical and online
6. Number of Credit Hours (Total) / Number of Units (Total)
150 hours / 6 units
7. Course administrator's name (mention all, if more than one name)
Name: Dr. Azealdeen Salih Hassan Al-Jawadi Email: ahmeddaboo@uomosul.edu.iq Name: Shahad Salim Email: shahadsibrahim88@uomosul.edu.iq
8. Course Objectives
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.
9. Teaching and Learning 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.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Knowledge Comprehension	Introduction to the course subjects and highlighting its important.	Theoretical practical	General Questions
2	4	Knowledge, Comprehension, Understanding	Basic of Finite Element Analysis.	Theoretical practical	General Questions and Discussion
3	4	Scientific and Prac Skills	Procedure followed using Ansys software and l to start.	Theoretical practical	General Questions
4	4	Knowledge, Comprehension, Understanding	Getting starting with Ansys	Theoretical practical	Homework
5	4	Scientific and Prac Skills	Introduction to the Workbench.	Theoretical practical	General Questions
6	4	Scientific and Prac Skills	Using the Ansys to design, draw and model sin and basic models.	Theoretical practical	General Questions and Discussion
7	4	Scientific and Prac Skills	Using the Ansys to design, draw and model sin and basic models.	Theoretical practical	General Questions
8	4	Scientific and Prac Skills	Exam	Theoretical practical	Monthly Exam
9	4	Scientific and Prac Skills	Capabilities and utilizing of Ansys software in Mining Engineering.	Theoretical practical	General Questions and Discussion
10	4	Scientific and Prac Skills	Modeling a 3D centrifugal pump starting with meanline design.	Theoretical practical	General Questions and Discussion
11	4	Scientific and Prac Skills	Modelling using static structural analysis.	Theoretical practical	General Questions
12	4	Scientific and Prac Skills	Modeling using static and thermal structural analysis.	Theoretical practical	General Questions and Discussion
13	4	Scientific and Prac Skills	Evaluating students by raising some relevant problems in turbomachinery.	Theoretical practical	General Questions
14	4	Scientific and Prac Skills	Exam	Theoretical practical	Monthly Exam
15	4	Scientific and Prac Skills	Getting start with Microsoft Excel with basic operations of Excel 2013 and printing data.	Theoretical practical	General Questions and Discussion
16	4	Knowledge, Comprehension, Understanding	Using functions (array formulas, matrix functic solving system of equations) and some exercise	Theoretical practical	Homework
17	4	Scientific and Prac Skills	Conditional Functions (Logical Comparison Operators, if function, array formulas and conditional formatting).	Theoretical practical	General Questions
18	4	Scientific and Prac Skills	Taking some tasks and engineering exercise i.e Data Mining (Importing TXT File, Counting ar Summing with Criteria and Frequency Distribution).	Theoretical practical	General Questions and Discussion
19	4	Scientific and Prac Skills	Charts & Regression Analysis	Theoretical practical	General Questions and Discussion
20	4	Scientific and Prac Skills	Exam	Theoretical practical	Daily Exam
21	4	Scientific and Prac Skills	Introduction to Micromine software.	Theoretical practical	General Questions
22	4	Scientific and Prac Skills	Getting start with the basic commands.	Theoretical practical	General Questions
23	4	Scientific and Prac Skills	Charts & Regression Analysis	Theoretical practical	Homework
24	4	Knowledge, Comprehension, Understanding	Design of the pit geometry, tools and the mach using the software.	Theoretical practical	General Questions and Discussion

25	4	Scientific and Prac Skills	Build a Basic Model of airway ducts & Regula	Theoretical practical	General Questions and Discussion
26	4	Scientific and Prac Skills	Introduction to Ventsim software.	Theoretical practical	General Questions
27	4	Scientific and Prac Skills	Basic Operations & Import Files to Ventsim	Theoretical practical	General Questions and Discussion
28	4	Scientific and Prac Skills	Underground Heat Simulation Modelling	Theoretical practical	General Questions
29	4	Scientific and Prac Skills	Fan Ventilation Modelling& Construct Ventila Ducts	Theoretical practical	Homework
30	4	Scientific and Prac Skills	Exam	Theoretical practical	Comprehensive Exam

11. Course Evaluation

Monthly Exam: 20
Midterm Exam: 20
Daily Exams: 5
Reports: 5
Final Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	
Main references (sources)	Matsson, John E. *An Introduction to ANSYS Fluent 2022*. Sdc Publications, 2022.
Recommended books and references (scientific journals, reports...)	*Lee, Huei-Huang. Finite Element Simulations with ANSYS Workbench 2023: Theory, Applications, Case Studies. SDC publications, 2023.* *VentSim DESIGN™ User Guide*
Electronic References, Websites	*https://www.youtube.com/watch?v=od0IfSCeo_0* *http://www.louisvillelectures.org/new-blog/2019/mechanical-vent-1/rodrigo-cavallazzi* *https://www.thoracic.org/professionals/clinical-resources/video-lecture-series/mechanical-ventilation/mechanical-ventilation-101-resistance-and-compliance.php*
Curriculum or description update rate	15%

Name and signature of the department head

Dr. Azealdeen Salih Hassan

Name and signature of the course lecturer

Dr. Ahmed Daabo
Mrs. Shahad Salim

Course Description Form Environment and Safety of Mines

1. Course Name:

Environment and Safety of Mines

2. Course Code:

ME412

3. Semester / Year:

2024-2025

4. Description Preparation Date:

1/10/2024

5. Available Attendance Forms:

Physical and online

6. Number of Credit Hours (Total) / Number of Units (Total)

90 hours / 3 units

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Azealdeen Salih Hassan Al-Jawadi
Email: ahmeddaboo@uomosul.edu.iq
Name: Asmaa Alhasany
Email: rosefirst78@uomosul.edu.iq

8. Course Objectives

The objectives of a mine safety and environment unit are typically to:
• Educate miners and employees about the various safety and environmental hazards associated with mining, and help them develop strategies and practices to reduce or mitigate these hazards.
• The unit may cover topics such as mine ventilation and air quality, water management, land reclamation, hazardous materials and waste management, mine emergency preparedness, and health and safety regulations and compliance.
• Ultimately, the goal of the unit is to provide miners with the knowledge and skills necessary to work safely and responsibly in the mining sector without causing harm to themselves, others, or the environment.

9. Teaching and Learning Strategies

Learning and teaching strategies in the Mine Environment and Safety module may include:
• Lectures and presentations: Lectures are used to provide theoretical information on environmental and safety regulations, best practices, and case studies of mine accidents.
• Case studies: Case studies are used to explore real-life mine accidents and consider what could have been done differently to prevent them.
• Practical exercises: Practical exercises are used to demonstrate how to conduct safety checks, assess risks, and use safety equipment.
• Group discussions: Group discussions facilitate the learning process by encouraging students to actively engage with the course material, share their knowledge and opinions, and learn from others.
• Field trips or site visits: Field trips or site visits allow students to gain practical experience in observing and enforcing safety rules and regulations in mining environments. • Online resources and self-learning: Online resources and self-learning can be used to complement classroom learning and provide students with access to additional information about mine safety and environmental regulations.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Knowledge Comprehension	Fundamental Concepts of Fluid Mechanics for Mine Ventilation.	Theoretical practical	General Questions

2	4	Knowledge, Comprehension, Understanding	Fundamental Concepts of Fluid Mechanics for Mine Ventilation.	Theoretical practical	General Questions and Discussion
3	4	Scientific and Prac Skills	Environmental Conditions in the Mine/ Safety Mathematics and Basics	Theoretical practical	General Questions
4	4	Knowledge, Comprehension, Understanding	Exam	Theoretical practical	Daily Exam
5	4	Scientific and Prac Skills	Flow Rates and Pressure Measurements	Theoretical practical	General Questions
6	4	Scientific and Prac Skills	Flow Rates and Pressure Measurements	Theoretical practical	General Questions and Discussion
7	4	Scientific and Prac Skills	Dusts and Other Mine Aerosols	Theoretical practical	General Questions
8	4	Scientific and Prac Skills	Dusts and Other Mine Aerosols	Theoretical practical	Homework
9	4	Scientific and Prac Skills	Exam	Theoretical practical	Monthly Exam
10	4	Scientific and Prac Skills	Mine Ventilation Networks	Theoretical practical	General Questions and Discussion
11	4	Scientific and Prac Skills	Main Ventilation/ Natural Ventilation	Theoretical practical	General Questions
12	4	Scientific and Prac Skills	Main Ventilation/ Natural Ventilation	Theoretical practical	General Questions and Discussion
13	4	Scientific and Prac Skills	Airflow through Mine Openings and Ducts	Theoretical practical	General Questions
14	4	Scientific and Prac Skills	Airflow through Mine Openings and Ducts	Theoretical practical	Homework
15	4	Scientific and Prac Skills	Main Ventilation/ Forced Ventilation	Theoretical practical	General Questions and Discussion
16	4	Knowledge, Comprehension, Understanding	Exam	Theoretical practical	Monthly Exam
17	4	Scientific and Prac Skills	Fans and Flow Control Devices	Theoretical practical	General Questions
18	4	Scientific and Prac Skills	Fans and Flow Control Devices	Theoretical practical	General Questions and Discussion
19	4	Scientific and Prac Skills	Energy Consumed in Ventilation	Theoretical practical	Daily Exam
20	4	Scientific and Prac Skills	Energy Consumed in Ventilation	Theoretical practical	General Questions and Discussion
21	4	Scientific and Prac Skills	Calculation by the Simplified Expression of the Regulator Area	Theoretical practical	General Questions
22	4	Scientific and Prac Skills	Calculation by the Simplified Expression of the Regulator Area	Theoretical practical	General Questions
23	4	Scientific and Prac Skills	The Role of Ventilation in Fires and Explosion	Theoretical practical	Homework
24	4	Knowledge, Comprehension, Understanding	Exam	Theoretical practical	Monthly Exam
25	4	Scientific and Prac Skills	Secondary Ventilation	Theoretical practical	General Questions and Discussion
26	4	Scientific and Prac Skills	Secondary Ventilation	Theoretical practical	General Questions
27	4	Scientific and Prac Skills	Control of Mine Fires and Explosions	Theoretical practical	General Questions and Discussion
28	4	Scientific and Prac Skills	Control of Mine Fires and Explosions	Theoretical practical	General Questions
29	4	Scientific and Prac Skills	Heat Sources and Effects in Mines	Theoretical practical	Homework

30	4	Scientific and Prac Skills	Exam	Theoretical practical	Comprehensive Exam

11. Course Evaluation

Monthly Exam: 20
Midterm Exam: 20
Daily Exams: 5
Reports: 5
Final Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Banerjee S.P. (2003); "Mine Ventilation"; Lovely Prakashan, Dhanbad, India. 2. Hartman, H. L., Mutmansky, J. M. & Wang, Y. J. (1982); "Mine Ventilation and Air Conditioning"; John Wiley & Sons, New York. 3. Deshmukh, D. J. (2008); "Elements of Mining Technology, Vol. – II"; Denett & Co., Nagpur, India.
Main references (sources)	1. McPherson, M. J. (1993); Subsurface Ventilation and Environmental Engineering"; Chapman & Hall, London. 2. Misra G.B. (1986); "Mine Environment and Ventilation"; Oxford University Press,
Recommended books and references (scientific journals, reports...)	Deshmukh, D. J. (2008); "Elements of Mining Technology, Vol. – II"; Denett& Co., Nagpur, India. Jensen, J. H. (1977); "The role of light and radiant energy in health and safety"; Professional Safety; April; pp. 12-16.
Electronic References, Websites	https://www.youtube.com/watch?v=od0IfSCeo_0 http://www.louisvillelectures.org/new-blog/2019/mechanical-vent-1/rodrigo-cavallazzi https://www.thoracic.org/professionals/clinical-resources/video-lecture-series/mechanical-ventilation/mechanical-ventilation-101-resistance-and-compliance.php
Curriculum or description update rate	15%

Name and signature of the department head

Name and signature of the course lecturer

Course Description Form

1. Course name and academic level:
Mining Economics, Fourth stage
2. Course code:
ME413
3.Semester/Year:
Annual / 2024 - 2025
4. Date this description was prepared:
2/9/2024
5. Available attendance forms:
in-person
6. Number of study hours / Number of units
(120) hours / (4 units)
7. Course Instructor Name
Name: Dr. Rahma Sael Abdul Email: Rahma.saeel86@uomosul.edu.iq Name: M.M. Ruba Rafeh Mohammed Al-Wazzan Email : ruba.rafee@uomosul.edu.iq
8. Course objectives

	•Understanding economic fundamentals: Identifying basic economic principles and how to apply them to the mining industry. •Market analysis: Studying the forces of supply and demand in the mineral and natural resource market. • Studying the environmental impact of mining activities and how to achieve a balance between the economy and the environment.
9. Teaching and Learning Strategies	
	First: Learning Outcomes By the end of this course, the student should be able to: 1. Understand the basic concepts of mining economics, such as the concept of demand, the concept of supply, mineral and petroleum commodities, and artificial intelligence in mining. 2. Evaluate the factors affecting production costs and returns in mining operations.

	3. Apply economic models to analyze mineral prices and fluctuations in global markets. 4. Employ financial analysis methods to make investment decisions in the mining sector. 5. Understand the environmental and social dimensions associated with mining activities from an economic perspective. Second: Teaching and Learning Methods 1. Theoretical lectures: To present economic concepts and models related to mining. 2. Case studies: To analyze real mining projects in terms of economic feasibility. 3. Practical workshops: Financial simulation tools to analyze economic data. 4. Group work and classroom discussions: To develop critical thinking and communication skills.

10. Course structure.

week	Hours	Required learning outcomes	Name of unit or topic	Learning method	Evaluation method
1	**3**	**Contributions of minerals to economic development**	**Understanding the role of minerals in the economy**	**Theoretical**	**General questions and discussion**
2	**3**	**Minerals and economic resources**	**Identify the types of minerals and their classifications according to economic use.**	**theoretical**	**General questions and discussion**
3	**3**	**Costs, income and break-even point in mining operations.**	**Cost classification in mining projects / Calculating total and average costs / Analyzing income sources / Applying the break-even point concept.**	**theoretical**	**General questions and discussion or exam**
4	**3**	**Classification of mineral resources and reserves**	**Explain the basic concepts of mineral resources/Distinguish international classifications/Interpret the criteria used to determine economic raw material reserves**	**theoretical**	**General questions and discussion**
5	**1**	**Analysis of production processes in the mining sector**	**Description of the basic stages of production processes in mining projects / Analysis of the costs associated**	**theoretical**	**eaxam**

			with each production stage.		
6	**3**	**Fundamentals of economics and its relationship to other sciences**	**Understanding the economic problem, the concept of demand and the factors determining demand, the concept of supply and the factors determining supply**	**theoretical**	**General questions and discussion**
7	**3**	**The mining sector and its role in the economy**	**The concept of minerals, the importance of minerals and their vital role in life, the role of the mining sector in the global economy, technology in the mining sector**	**theoretical**	**General questions and discussion**
8	**3**	**Mineral and petroleum commodities**	**The importance of commodities in the global economy, the best exchange for trading precious metals**	**theoretical**	**General questions and discussion**
9	**3**	**Mineral and oil commodity markets**	**Trading in mineral and oil commodities, pricing of mineral and oil commodities, factors affecting mineral and oil commodity markets**	**theoretical**	**General questions and discussion**
10	**3**	**Investing in precious metals**	**How to invest in gold, oil, how to invest in oil, other metals, how to invest in metals, is investing in metals good, risks of investing in precious metals.**	**theoretical**	**General questions and discussion**
11		**Artificial Intelligence in Mining**	**The concept of artificial intelligence in mining, examples of how artificial intelligence is used, cases of using artificial intelligence in mining**	**theoretical**	**General questions and discussion**
11	**3**	**Economic feasibility of mining projects**	**The concept of economic feasibility study, the importance of economic feasibility study in the mining sector, stages of economic feasibility study for mining projects,**	**theoretical**	**General questions and discussion**

			environmental and social study, factors affecting the economic feasibility of mining projects		
12	**3**	**Economic feasibility study for establishing a solid waste recycling project**	**The concept of economic feasibility studies, the concept of solid waste, sources of solid waste, obstacles to recycling solid waste**	**theoretical**	**General questions and discussion**
14	**3**	**Licensing rounds**	**Learn about licensing rounds, types of projects under service contracts, Iraqi labor, recovery of petroleum and additional costs, and profitability fees.**		**General questions and discussion**
15	**3**	**Oil and gas revenues**	**Elements involved in oil and gas revenues, characteristics of oil and gas revenues, importance of oil and gas revenues**	**theoretical**	**General questions and discussion**
16	**3**	**OPEC**	**Definition of OPEC, objectives of OPEC, reasons for the establishment of the Organization of the Petroleum Exporting Countries, membership requirements**	**theoretical**	**General questions and discussion**

11. Course Evaluation and Grade Divisions

The grade is distributed out of 100 based on the tasks assigned to the student, such as daily preparation, daily, oralmonthly and written exams, reports, etc.

12. Learning and teaching resources

Required textbooks (methodology if (any	طارق العكيلي ،موسوعة العمري في التعدين والطاقة.
(Main References (Sources	https://resourcecapitalfunds.com/insights/rcf-/partners-blog/mineral-resources-reserves

Recommended supporting books and references (scientific journals, ...reports)	(الانسانيات والعلوم الاجتماعية ، مجلة كلية الاداب جامعة الفيوم)
Electronic references, websites	Sustainability reporting in the mining sector current status and future trend ، https://b2broker.com/ja/news/what-are-metals-in-trading-and-how-it-works/
Curriculum or description update rate	% 8

Name and signature of the department head

Dr. Azealdeen Salih Hassan

Name and signature of the course lecturer

Dr. Rahma Sael

Ass. L Ruba Rafee mohamed

Course Description Form

1. Course Name:
Mining Engineering Techniques / Fourth Stage
2. Course Code:
ME 414
3. Semester / Year:
Annual /2024-2025
4. Description Preparation Date:
1/10/2024
5. Available Attendance Forms:
In-person attendance
6. Number of Credit Hours (Total) / Number of Units (Total)
150 Hours / 6 Units
7. Course administrator's name (mention all, if more than one name)
Name : Zainab Hazim Hameed Email:eng.zainab.alkhafaf@uomosul.edu.iq
8. Course Objectives

Course Objectives	**The main objective of this course is to provide an overview of the business and technology of mining engineering and engineering design of open-pit mines, underground mines, drilling machinery, and equipment, and to identify the problems facing the mining engineer in the design.**
9. Teaching and Learning Strategies	
Strategy	**Learning outcomes and methods of teaching, learning and assessment:** **1. Knowledge and understanding** **This course provides knowledge and experience in the applications of engineering principles to explore Earth resources and construct Earth systems in an engineering system orientation setting. In addition to the methods of students learning to design surface mines and methods of**

	designing subsurface mining, in addition to the students learning the skill of designing a mineral extraction plant. **2) Subject-specific skills** **The student acquires the engineering design skill for surface and subsurface mining methods, Acquire the skill of determining the best method for extracting mineral deposits, Acquiring the skill of designing a mineral extraction unit**

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	1	Mine Design (Design of open pit)	Theory	discussion
2	=	=	Continue	=	Quize1
3	=	=	Pit slopes geometry,	=	Quize1
4	=	=	Terms in open pit Benches(Bench Slope, Bank Angle, Bench height	=	exercise
5	=	=	Continue	=	exercise
6	=	=	Open pit Stability	=	exercise
7	=	=	**Exam 1**	=	exercise
8	=	=	Underground mining design, Unit operations of mining.	=	exercise
9	=	=	Continue	=	exercise
10	=	=	Continue	=	Reports
11	=	=	**Exam 2**	=	Reports
12	=	=	Drilling Technology drilling system basics of drilling, Types of drill bits	=	Reports
13	=	=	Continue	=	Reports
14	=	=	**seminar**	=	Reports
15	=	=	**Final Term1 Exam**	=	Reports
16	=	=	Introduction to Mineral Processing Plant Design	=	Reports
17	=	=	Continue	=	Reports
18	=	=	Process flow diagram/flow sheet/ Material flow	=	Reports

			diagram/ circuit design		
19	=	=	Continue	=	**Reports**
20	=	=	Continue	=	**Reports**
21	=	=	**Exam1**	=	
22	=	=	Materials Balance in mineral processing	=	**exercise**
23	=	=	Continue	=	**exercise**
24	=	=	Energy Balance in Mineral Processing	=	**exercise**
25	=	=	Continue	=	**exercise**
26	=	=	**Exam2**	=	**exercise**
27		=	Exercise 0n Mineral Processing	=	**exercise**
28	=	=	Extraction metallurgy by: Pyrometallurgy, Hydrometallurgy, and Electrometallurgy.	=	**exercise**
29	=	=	**seminar**	=	
30		=	**Final Term2 Exam**	=	
Week	**Hours Practical**	**Required Learning Outcomes**	**Unit or subject name**	**Learning method**	**Evaluation method**
1	**3**	3	The Concept of Grid Sampling System and Types Square, Rectangular, Triangular, Random Grid System. Determination of the Range of sites to the Sampling (with examples solved).	**Theory**	**Reporting**
2	=	=	Continue	=	**Reporting**
3	=	=	Determination of Mineral Deposits.	=	**Reporting**
4	=	=	Continue	=	**Reporting**
5	=	=	Calculation of the Thickness of the Mineral Deposits in a mine or a single well or a group of Recovery .wells Rate Calculation	=	**Reporting**
6	=	=	Continue	=	**Exam**

7	=	=	Calculate the Concentration Degree of Ore. Calculation of Ore Concentration. Calculate the rate of Concentration of crude with the extent of the impact of the site.	=	**Reporting**
8	=	=	Continue	=	**Homework, Reporting**
9	=	=	Calculate the Rate of Concentration in the pulp wells to Evaluate the metal layer. Calculate the Thickness Rate in the pulp wells to evaluate the metal layer.	=	**Homework, Reporting**
10	=	=	Continue	=	**Reporting**
11	=	=	Evaluation (Thickness Rate and Rate of Concentration) in a cauliflower	=	**Homework, Reporting**
12	=	=	Continue	=	**Homework, Reporting**
13	=	=	Determination of the limits of the Mineral Deposits by Thickness of the Cut and the Cutting unit of the Concentration.	=	**Homework, Reporting**
14	=	=	Continue	=	**Homework, Reporting**
15	=	=	Mineral Deposits Reserve. The Concept of Mineral Reserve,Estimation of the on-site Reserve of Mineral Deposits,Density Mineral Deposits, Reserves Account.	=	**Homework, Reporting**
16	=	=	Continue	=	**Exam**
17	=	=	Methods of Estimation of	=	**Reporting**

			Mineral Deposits Reserves.		
18	=	=	Continue	=	**Reporting**
19	=	=	Practical Issues on the metal reserve account.	=	
20	=	=	Continue	=	**Reporting**
21	=	=	Mining extraction methods. Stripping Ratio,The Angle of Repose,Calculation of Stripping Ratio	=	**Reporting**
22	=	=	Continue	=	**Quize**
23	=	=	Underground Mine, Surface Mine Planning. Extraction of Mineral Deposits in Bench Mining	=	**Reporting**
24	=	=	Continue	=	**Quize**
25	=	=	Stability of Rocky Slopes. Factors Affecting the Stability of Rocky Slopes.	=	**Homework, Reporting**
26	=	=	Continue	=	**Reporting**
27			Mineral Extraction, Dillution Mining,Calculate the Amount of Ore extracted and the Amount of dilution with the Concentration degree.		**Homework, Reporting**
28	=	=	Continue	=	**Reporting**
29	=	=	Classification of Ore materials according to the grade of Concentration transferred to the Mineral Extraction Plant: Heag Grade, Recoverable Grade,Cut-off Grade.	=	**Homework, Reporting**
30			**Exam**		

11. Course Evaluation	
The grade is distributed out of 100 based on the tasks assigned to the student, such as daily preparation and daily exams (5%), monthly exams (40%), written work (40%), and reports.(%5)	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	unavailable
Main references (sources)	- Hartman, H.L., and Mutmansky , J.M. 2002. Introductory Mining Engineering. John Wiley & Sons Inc, New Jersey, U.S.A. -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
Recommended books and references (scientific journals, reports).	Juan Herrera Herbert (2024), Planning and design of underground mining operation
Electronic References, Websites	https://www.azomining.com/Article.aspx?ArticleID=1837

Dr. Azealdeen Salih Hassan
Head of Department

A.L. Zainab Hazim Hameed
Lecturer

1. Course Name:	
Design of mine machinery/ Fourth stage	
2. Course Code:	
ME 415	
3. Semester / Year:	
Second Semester /2024-2025	
4. Description Preparation Date:	
October 1, 2024	
5. Available Attendance Forms:	
In-person (On-campus)	
6. Number of Credit Hours (Total) / Number of Units (Total)	
60 hours / 3 unit	
7. Course administrator's name (mention all, if more than one name)	
Name: **Dr. Hudhaifa Raad Hamzah** **Email:** hudhaifahamzah@uomousl.edu.iq	
8. Course Objectives	
Course Objectives	**1.** To introduce students to the principles and practices of design in the context of petroleum and mining equipment. **2.** To provide students with an understanding of the engineering design process, including conceptual design, detailed design, and design for manufacturing. **3.** To teach students how to analyze and evaluate the performance of petroleum and mining equipment. **4.** To enable students to design and optimize petroleum and mining equipment components and systems for maximum efficiency and safety. **5.** To introduce students to the relevant safety regulations, standards, and codes applicable to the design of petroleum and mining equipment.
9. Teaching and Learning Strategies	
Strategy	1- Theoretical Lectures: Fundamental principles and concepts are introduced through structured classroom. 2- Interactive Discussions: Class sessions include discussions to encourage student participation and critical thinking around mining machinery topics. 3- Case-Based Learning: Real-world equipment scenarios and handling systems are examined to apply theoretical knowledge practically. 4- Homework and Written Exercises: Assignments and written tasks are used to reinforce understanding and assess students' analytical skills. 5- Quizzes and Exams: Periodic quizzes, midterm, and final exams are employed to evaluate students' retention.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
The first	**1**	Understand the basics of mechanical design	**Introduction to Mechanical Engineering Design**	Theoretical +discussion	Explanation and discussion
The second	**2**	Select materials and determine geometric dimensions	**Keystones of Design: Materials Selection and Geometry Determination + H.W. #1**	Theoretical +discussion	Explanation, discussion, and written exercise
The third	**2**	Design efficient pipeline systems	**Pipeline Mechanical Design**	Theoretical +discussion	Explanation and discussion
Fourth	**2**	Analyze pressurized cylinders and interference fits	**Pressurized Cylinders; Interference Fits + Quiz #1**	Theoretical +discussion	Explanation, discussion and exam
Fifth	**2**	Evaluate deflection and stiffness	**Deflection and Stiffness**	Theoretical +discussion	Explanation and discussion
Sixth	**2**	Identify causes of static loading failure	**Failures Resulting from Static Loading**	Theoretical +discussion	Explanation and discussion
Seventh	**2**	Integrate concepts in the midterm exam	**Mid exam**	Theoretical	Exam
The eighth	**2**	Analyze fatigue failure under variable loading	**Fatigue Failure Resulting from Variable Loading**	Theoretical +discussion	Explanation and discussion
Ninth	**2**	Design shafts and related components	**Shafts and Shaft Components + H.W. #2**	Theoretical +discussion	Explanation, discussion, and written exercise
tenth	**2**	Design permanent joints (welding and bonding)	**Welding, Bonding, and the Design of Permanent Joints**	Theoretical +discussion	Explanation and discussion
eleventh	**1**	Understand the principles of gears	**Gears—General**	Theoretical +discussion	Explanation and discussion
twelfth	**2**	Analyze brakes, couplings, and flywheels	**Brakes, Couplings and Flywheels + Quiz # 2**	Theoretical +discussion	Explanation, discussion and exam
thirteenth	**2**	Study flexible mechanical elements	**Flexible Mechanical Elements**	Theoretical +discussion	Explanation and discussion
fourteenth	**2**	Analyze power transmission case studies	**Power Transmission Case Study**	Theoretical +discussion	Explanation and discussion
fifteenth	**2**	Consolidate knowledge in the final exam	**Final exam**	Theoretical	Exam

11. Course Evaluation

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

12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	Not available
Main references (sources)	Pipeline design & construction: a practical approach.
Recommended books and references (scientific journals, reports…)	Mechanical Engineering Design
Electronic References, Websites	Articles from the Internet

Name and signature of the department head lecturer

Dr. Azealdeen Salih Hassan

Name and signature of the course

Dr. Hudhaifa R. Hamzah

Course Description Form Rock Blasting Engineering

1. Course Name:

Rock Blasting Engineering

2. Course Code:

ME416

3. Semester / Year:

first/ 2024-2025

4. Description Preparation Date:

1/10/2024

5. Available Attendance Forms:

Physical and online

6. Number of Credit Hours (Total) / Number of Units (Total)

30 hours / 2 units

7. Course administrator's name (mention all, if more than one name)

Name: Dr. Azealdeen Salih Hassan Al-Jawadi
Email: azealdeenaljawadi@uomosul.edu.iq
Name: Asmaa Alhasany
Email: rosefirst78@uomosul.edu.iq

8. Course Objectives

- Study rock mechanics and its role in engineering applications.
- Prepare students to understand the subjects of tunneling and mining engineering they will receive in the fourth year.
- Enabling students to calculate and analyze laboratory and field results and apply them to engineering and design projects.
- Prepare students practically and scientifically to solve problems they will encounter in their practical life after graduation.
- Apply the basic principles of mechanics and geology to evaluate the response of rocks when affected by environmental forces, changes in the original forces surrounding the rocks and their impact on factors resulting from engineering projects.

9. Teaching and Learning Strategies

This science is concerned with applying the basic principles of rock blasting and geological effects to evaluate the response of rock during blasting operations when engineering projects are being carried out in, on, and with it, and the change in stresses and their concentration, as well as any change in the original forces surrounding and on the rocks due to the influence of factors resulting from blasting to carry out engineering projects.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	2	Knowledge Comprehension	Introduction to Rocks Blast Engineering	Theory	General Questions
2	2	Knowledge, Comprehension, Understanding	Definitions	Theory	General Questions and Discussion

3	2	Scientific Practical Skills	Types of Explosives	Theory	General Questions
4	2	Scientific Practical Skills	Chemistry of Explosives I	Theory	Daily Exam
5	2	Scientific Practical Skills	Chemistry of Explosives II	Theory	General Questions
6	2	Scientific Practical Skills	Rock Blasting Basics	Theory	General Questions and Discussion
7	2	Scientific Practical Skills	Rules of Blasting	Theory	General Questions
8	2	Scientific Practical Skills	The Physics of Energy Release and Rock Breakage	Theory	Homework
9	2	Scientific Practical Skills	Exam	Theory	Monthly Exam
10	2	Scientific Practical Skills	Blasting Engineering	Theory	General Questions and Discussion
11	2	Scientific Practical Skills	Drilling, Spacing, and Timing	Theory	General Questions
12	2	Scientific Practical Skills	Presplitting, Smoothing and Trimming	Theory	General Questions and Discussion
13	2	Scientific Practical Skills	Air Blast, Fly Rock, and Ground Vibration	Theory	General Questions
14	2	Scientific Practical Skills	Environmental Impact from Blasting	Theory	Homework
15	2	Scientific Practical Skills	Exam	Theory	Comprehensive Exam

11. Course Evaluation

Monthly Exam: 20
Midterm Exam: 20
Daily Exams: 5
Reports: 5
Final Exam: 50

12. Learning and Teaching Resources

Required textbooks (curricular books, if any)	1. Calvin J. Konya, and Edward J. Walter, 1991. Rock Blasting and Overbreak Control 2. Liu, J. 2015. Liquid Explosives
Main references (sources)	3. Stig, O. Olofsson, 1990. Applied Explosives Technology for Construction and Mining
Recommended books and references (scientific journals, reports...)	4. R. Meyer, J. Köhler, A. Homburg, 2007. Explosives
Electronic References, Websites	1. www.rocscince.org
Curriculum or description update rate	15%

Lecturer

Head of Department

Course Description Form

1. Course Name:

Tunnel Engineering / Fourth stage

2. Course Code:

ME417

3. Semester / Year:

Annual /2024-2025

4. Description Preparation Date:

15/9/2024

5. Available Attendance Forms:

Physical and online

6. Number of Credit Hours (Total) / Number of Units (Total)

90 hours / 4 units

7. Course administrator's name (mention all, if more than one name)

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Email: azealdeenaljawadi@uomosul.edu.iq
Name: Dr. Hamed Jassim Mohammed
Name: Sarah Mwafaq Abdulaziz
Email: saraaltaie87@uomosul.edu.iq

8. Course Objectives

- Applying what has been eliminated in Black Mechanics to its applications in tunneling engineering.
- Preparing the student to understand tunneling methods.
- Enabling the student to calculate field stress analysis and employ it in engineering projects and tunnel design.
- Introducing the student to practical terrain and understanding the problems he faces in real life after hard work.

9. Teaching and Learning Strategies

This science applies the basic principles of tunneling engineering and geological influences to assess the response of rocks when tunnels are excavated, the stresses and stress concentrations change, and any changes in the original forces surrounding and upon the rocks due to the influence of factors resulting from engineering projects.

10. Course Structure

Week	Hours	Required Learning Outcomes	Unit or subject name	Learning method	Evaluation method
1	4	Knowledge Comprehension	Introduction to Tunnels Engineering	Theoretical practical	General Questions
2	4	Knowledge, Comprehension, Understanding	Types and Constructions of Tunnels	Theoretical practical	General Questions and Discussion
3	4	Scientific Practical Skills	Single tunnels	Theoretical practical	General Questions

4	4	Scientific Practical Skills	Single Tunnel Joints	Theoretical practical	Daily Exam
5	4	Scientific Practical Skills	Multiple Tunnels	Theoretical practical	General Questions
6	4	Scientific Practical Skills	Classification of Tunnels	Theoretical practical	General Questions and Discussion
7	4	Scientific Practical Skills	Tunnel Construction	Theoretical practical	General Questions
8	4	Scientific Practical Skills	Shallow Tunnels and Weak Rock Tunnels	Theoretical practical	Homework
9	4	Scientific Practical Skills	Exam	Theoretical practical	Monthly Exam
10	4	Scientific Practical Skills	Conventional Bottom-Up Construction	Theoretical practical	General Questions and Discussion
11	4	Scientific Practical Skills	Top-Down Construction	Theoretical practical	General Questions
12	4	Scientific Practical Skills	Pipe jacking Method	Theoretical practical	General Questions and Discussion
13	4	Scientific Practical Skills	New Austrian Tunneling Method	Theoretical practical	General Questions
14	4	Scientific Practical Skills	Drill and Blast Tunneling	Theoretical practical	Homework
15	4	Scientific Practical Skills	Exam	Theoretical practical	Monthly Exam
16	4	Knowledge, Comprehension, Understanding	Typical Cross Section Elements	Theoretical practical	General Questions and Discussion
17	4	Scientific Practical Skills	Rock Bolts	Theoretical practical	General Questions
18	4	Scientific Practical Skills	Groundwater Control	Theoretical practical	General Questions and Discussion
19	4	Scientific Practical Skills	Temporary Support of Tunnels	Theoretical practical	Daily Exam
20	4	Scientific Practical Skills	Permanent Support of Tunnels	Theoretical practical	General Questions and Discussion
21	4	Scientific Practical Skills	Shotcrete	Theoretical practical	General Questions
22	4	Scientific Practical Skills	Exam	Theoretical practical	Monthly Exam
23	4	Scientific Practical Skills	Tunnel Drainage Requirements	Theoretical practical	Homework
24	4	Knowledge, Comprehension, Understanding	Ventilation Requirements	Theoretical practical	General Questions
25	4	Scientific Practical Skills	Lighting Requirements	Theoretical practical	General Questions and Discussion
26	4	Scientific Practical Skills	Traffic Control Requirements	Theoretical practical	General Questions
27	4	Scientific Practical Skills	Safety of Tunnels I	Theoretical practical	General Questions and Discussion
28	4	Scientific Practical Skills	Safety of Tunnels II	Theoretical practical	General Questions
29	4	Scientific Practical Skills	Environmental Issues	Theoretical practical	Homework
30	4	Scientific Practical Skills	Exam	Theoretical practical	Monthly Comprehensive Exam

11. Course Evaluation

Midterm Exam: 20
Midterm Exam: 20
Daily Exams: 5

Reports: 5 Final Exam: 50	
12. Learning and Teaching Resources	
Required textbooks (curricular books, if any)	1. Obert and Duvall, 1968. Rock mechanics and the design of structures in rocks
Main references (sources)	2. Singh, B. and Goel, R.K. 2006. Tunnelling in Weak Rocks 3. Pariseau, W.G., 2007. Design analysis in rock mechanics
Recommended books and references (scientific journals, reports...)	4. C. Jeremy Hung, PE, James Monsees, PhD, PE, Nasri Munfah, PE, and John Wisniewski, PE, 2009. Technical Manual for Design and Construction of Road Tunnels – Civil Elements
Electronic References, Websites	5. www.rocscince.org
Curriculum or description update rate	15%

Name and signature of the department head

Dr. Azealdeen Salih Hassan

Name and signature of the course lecturer

Dr. Azealdeen Salih Hassan