University of Mosul
جامعة الموصل

First Cycle – Bachelor's Degree (B.Sc.) - Mining Engineering

بكالوريوس - هندسة تعدين

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of Mining Engineering to gain the Bachelor of Science degree. The program delivers (xx) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظره عامه

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج الهندسة الكهربائية للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (٤٠) مادة دراسية، على سبيل المثال، مع (٦٠٠٠) إجمالي ساعات حمل الطالب و ٢٤٠ إجمالي وحدات أوروبية. يعتمد تقديم المواد الدراسية على عملية بولونيا.

2. Undergraduate Courses 2023-2024

Module 1

Code	Course/Module Title	ECTS	Semester
DME111	Geology for Engineers	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	97
Description			
This section includes a description of the module, 100-150 words The module "Geology for Engineers" is designed to introduce engineering students to the fundamental principles of geology and its relevance to engineering projects. The module covers various topics including the composition and classification of rocks and minerals, geological processes such as weathering and erosion, and the formation of geological structures. Students learn about the properties of different rock types, their behavior under load, and how geological factors can impact engineering projects such as foundation design, slope stability, and tunneling. The module also explores geotechnical investigations, site characterization, and the use of geological maps and models for engineering purposes. Practical exercises and fieldwork provide students with hands-on experience in applying geology to engineering projects. By the end of the module, students gain a solid understanding of geology and its significance in engineering, enabling them to make informed decisions and mitigate geotechnical risks in their future careers.			

Module 2

Code	Course/Module Title	ECTS	Semester
DME112	Engineering Drawing and AutoCad	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	93	82

Description

This section includes a description of the module, 100-150 words

The module "Engineering Drawing and AutoCAD" aims to provide engineering students with the necessary skills to effectively communicate and document engineering designs using traditional engineering drawing techniques and computer-aided design software, specifically AutoCAD. The module covers both theoretical and practical aspects of engineering drawing.
In the theoretical component, students learn about the principles of orthographic projection, isometric drawing, dimensioning, and tolerancing. They also gain knowledge of standard engineering drawing conventions, symbols, and notation.
The practical component focuses on developing proficiency in using AutoCAD, a widely-used software for creating technical drawings. Students learn how to navigate the AutoCAD interface, create and modify geometric shapes, apply annotations and dimensions, and generate accurate 2D drawings.
Throughout the module, students work on hands-on assignments and projects to apply their knowledge and skills in real-world engineering design scenarios. They learn to interpret engineering drawings, create detailed technical drawings, and effectively communicate their design intent.

Module 3

Code	Course/Module Title	ECTS	Semester
DME113	Applied Mathematics	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72

Description

This section includes a description of the module, 100-150 words
The module "Applied Mathematics for Engineers" is designed to equip engineering students with the mathematical tools and techniques necessary for solving engineering problems. The module covers a wide range of mathematical topics and their applications in engineering. Students learn fundamental concepts in calculus, including differentiation, integration, and their applications in solving engineering problems such as optimization, rates of change, and curve sketching. They also study linear algebra, focusing on matrix operations, systems of linear equations, and vector spaces, which are essential in solving problems related to linear transformations, determinants, and eigenvalues. The module introduces differential equations and their applications in modeling and analyzing engineering systems. Students learn techniques to solve ordinary differential equations and gain an understanding of their

role in engineering .
Throughout the module, students engage in problem-solving exercises, mathematical modeling projects, and computer-based simulations to apply mathematical concepts in practical engineering scenarios. The module aims to develop students' critical thinking, problem-solving, and mathematical modeling skills, enabling them to effectively tackle engineering challenges using mathematical tools and techniques.

Module 4

Code	Course/Module Title	ECTS	Semester
DME114	Engineering Mechanics	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87

Description

This section includes a description of the module, 100-150 words

Engineering Mechanics is a fundamental module that explores the principles and applications of mechanics in engineering. It covers topics such as statics and dynamics, equilibrium of forces, analysis of structures, and motion of particles and rigid bodies. The module emphasizes problem-solving techniques and the understanding of forces, moments, and their effects on various engineering systems. Students learn to analyze and design structures and machines, applying concepts of mechanics to real-world scenarios. Through theoretical study, mathematical modeling, and practical experiments, students develop skills in analyzing and predicting the behavior of engineering systems, laying a strong foundation for further studies in engineering disciplines.

Module 5

Code	Course/Module Title	ECTS	Semester
DME115	English Language	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17

Description

This section includes a description of the module, 100-150 words

The English Language for Engineers module is designed to enhance language skills specific to engineering professionals. It focuses on technical vocabulary, effective communication, and writing skills necessary for successful collaboration and presentation of engineering concepts. The module covers topics such as scientific reports, technical documentation, and oral presentations, equipping students with the ability to articulate complex ideas clearly and concisely. Additionally, it provides practical exercises to develop reading comprehension, listening skills, and critical thinking in

engineering contexts. By the end of the module, students will have improved their linguistic proficiency and acquired the language tools required to excel in their engineering careers.

Module 6

Code	Course/Module Title	ECTS	Semester
DME116	Human rights and democracy	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		31	19

Description

This section includes a description of the module, 100-150 words

The Human Rights and Democracy module provides an in-depth exploration of the principles, theories, and practices surrounding human rights and democratic governance. It examines the historical development of human rights and their universal application in contemporary societies. The module explores topics such as civil and political rights, economic and social rights, gender equality, minority rights, and the right to development. It also delves into the foundations of democracy, including rule of law, transparency, accountability, and citizen participation. Through case studies, debates, and interactive discussions, students analyze the challenges and dilemmas faced in promoting and protecting human rights within democratic frameworks. The module encourages critical thinking, ethical reasoning, and understanding of the complexities involved in balancing rights and responsibilities. By the end of the module, students will have gained a comprehensive understanding of human rights and democracy and their significance in fostering inclusive, just, and participatory societies. They will be equipped to engage in informed discussions and contribute to the advancement of human rights and democratic values.

Module 7

Code	Course/Module Title	ECTS	Semester
DME116	Engineering Physics	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72

Description

This section includes a description of the module, 100-150 words

In this subject, the student studies the nature of solids by knowing the atomic structure of solids and how to distribute electrons at nuclear levels, due to their importance in understanding the type of matter, and also studying the crystalline structure of solids and the way distribution of atoms align with each other to form solids, especially semiconductors because of their importance in the photomask industry. The student studies the devices and how to connect them, the electrical circuits and how they

work, and from them he gets to know the logic circuits that are of great importance in many control and control devices that the student will deal with in his life.

Module 8

Code	Course/Module Title	ECTS	Semester
DME122	Petroleum Geology	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
This section includes a description of the module, 100-150 words The Petroleum Geology module focuses on the study of hydrocarbon exploration and production. It covers topics such as sedimentary basins, petroleum systems, reservoir characterization, and petroleum geophysics. Students learn about the formation, migration, and accumulation of hydrocarbons, as well as the techniques used to locate and extract them. The module emphasizes the integration of geological, geophysical, and engineering data to assess the potential of petroleum reservoirs. Through case studies and practical exercises, students gain knowledge of exploration methods, drilling operations, and reservoir management. By the end of the module, students will have acquired a solid foundation in petroleum geology and the skills necessary for a career in the oil and gas industry.			

Module 9

Code	Course/Module Title	ECTS	Semester
DME123	Numerical and Engineering Analyses	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
This section includes a description of the module, 100-150 words The Numerical and Engineering Analyses module in mining engineering focuses on applying numerical methods and engineering analysis techniques to solve complex problems in the field. Students learn about computational modeling, simulation, and data analysis methods relevant to mining engineering. This module covers topics such as finite element analysis, computational fluid dynamics, optimization techniques, and statistical analysis. Students gain practical skills in using software tools and programming languages to perform engineering analyses and interpret results. The module equips students with the ability to analyze and optimize mining engineering systems and processes, enhancing efficiency and safety in mining operations.			

Module 10

Code	Course/Module Title	ECTS	Semester
DME124	MS Office and Internet	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	62

Description

This section includes a description of the module, 100-150 words

The Microsoft and Internet course aims to teach the student to define the basic rules of handling and managing a computer to help him complete projects, print things, prepare statistics and graphs, create presentations, design engineering drawings, etc.

With the emergence of the Internet as a means of communication available to all, it has become very necessary for the student to learn to use the computer, given the role of the Internet in many areas, including education, scientific research, trade, online marketing, correspondence, web pages, and electronic speech.

Among the cognitive objectives that the student will obtain after completing the course are:

A student's understanding of the material is measured by their ability to analyse and apply what they have learned practically on a computer. And that the assessment is done by presenting the material to the students in the laboratory and then applying what they learned from them, in addition to programming knowledge, knowledge of presentation creation programmes, PowerPoint, knowledge of applied programmes, knowledge of the Internet, how it is used in the field of scientific research, how to operate a computer, and dealing with the computer.

Module 11

Code	Course/Module Title	ECTS	Semester
DME125	Engineering Chemistry	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62

Description
This section includes a description of the module, 100-150 words The Engineering Chemistry module provides an understanding of the fundamental principles and applications of chemistry in engineering disciplines. It covers topics such as chemical bonding, stoichiometry, thermodynamics, kinetics, and electrochemistry. Students learn how chemical concepts are applied in engineering processes, materials science, and environmental sustainability. The module emphasizes the practical aspects of chemistry, including laboratory experiments and analysis techniques. Through hands-on exercises and problem-solving, students develop skills in chemical analysis, material synthesis, and understanding chemical reactions in engineering contexts. By the end of the module, students will have gained a solid foundation in engineering chemistry, enabling them to apply chemical principles to solve engineering challenges and make informed decisions in their future careers.

Module 12

Code	Course/Module Title	ECTS	Semester
DME126	Scientific English Language	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2		33	17
Description			
This section includes a description of the module, 100-150 words The Scientific English Language module focuses on developing English language skills specifically tailored for scientific communication. It covers essential aspects such as technical vocabulary, writing research papers, presenting scientific findings, and effective scientific communication. Students learn to effectively convey complex scientific concepts, structure and organize scientific reports, and use appropriate scientific language. The module also emphasizes reading and comprehension of scientific literature, enhancing critical thinking and analytical skills. Through practical exercises and feedback, students improve their ability to write and speak in English within scientific contexts. By the end of the module, students will have acquired the language proficiency and confidence needed to excel in scientific research, academia, and professional settings.			

Module 13

Code	Course/Module Title	ECTS	Semester
DME211	Geochemistry of ores	6	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
3	2	93	57

Description
This section includes a description of the module, 100-150 words The Geochemistry of Ores module in mining engineering focuses on the study of the chemical composition and characteristics of mineral ores. It explores the processes that govern the formation and concentration of economically valuable elements in ore deposits. This module covers topics such as ore mineralogy, geochemical analysis techniques, and the interpretation of geochemical data to assess the quality and potential value of mineral deposits. Students gain insights into the geochemical aspects of ore exploration, extraction, and processing, enabling them to make informed decisions in mining operations.

Module 14

Code	Course/Module Title	ECTS	Semester
DME212	Soil Mechanics	6	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	72

Description
This section includes a description of the module, 100-150 words The Soil Mechanics module in mining engineering focuses on the study of soil properties and behavior in relation to mining operations. It covers topics such as soil classification, compaction, permeability, shear strength, and settlement analysis. Students learn how to assess and predict the stability of soil masses and slopes, design appropriate foundations for mining structures, and mitigate soil-related risks. This module equips students with the knowledge and skills to analyze and manage soil mechanics aspects in mining projects effectively.

Module 15

Code	Course/Module Title	ECTS	Semester
DME213	Engineering Surveying	5	1

Class (hr/w)	Lect/Lab./Prac./Tutor	SSWL (hr/sem)	USWL (hr/w)
2	3	78	47

Description

This section includes a description of the module, 100-150 words

The Engineering Surveying module focuses on the principles and techniques of surveying in engineering projects. Students learn how to measure, record, and analyze spatial data to support various engineering disciplines. This module covers topics such as land surveying, topographic mapping, construction surveying, and geodetic surveying. Students gain practical skills in using surveying instruments and software for precise measurements, control point establishment, and data analysis. The Engineering Surveying module equips students with the knowledge and tools to ensure accurate and reliable spatial information, essential for engineering design, construction, and maintenance projects.

Module 16

Code	Course/Module Title	ECTS	Semester
DME214	Static Fluid Mechanics	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37

Description

This section includes a description of the module, 100-150 words

Fluid mechanic is a since that study fluids (liquids and gases) either at rest fluid statics or in motion fluid dynamics. And their effects on other fluid or solids bodies. Moreover, it helps engineers to understand the behavior of fluid under various forces and at different atmospheric conditions, and to select the proper fluid for various applications. In fluid static the students studies the effect of fluid on the plan surface and curve surface and how much forces generates on the surfaces.
In petroleum engineers this subject provides the knowledge necessary for to develop design methods for drilling, production, transport of oil and gas. Basic mechanical laws are applied for perfect fluid flow, Newtonian fluid, non-Newtonian fluid, and multiple phase flows. And it is important and useful to know properties of fluid like, density, viscosity, pressure, specific volume, specific weight, specific gravity.

Module 17

Code	Course/Module Title	ECTS	Semester
DME215	Hydrogeology	5	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
This section includes a description of the module, 100-150 words The Hydrogeology module in mining engineering focuses on the study of groundwater systems and their interactions with mining operations. Students learn about the properties and behavior of subsurface water, aquifer characterization, groundwater flow, and contaminant transport. This module covers topics such as well drilling and construction, groundwater monitoring, and the design of dewatering systems. Students gain an understanding of how hydrogeological processes influence mine planning, slope stability, and water management strategies. The Hydrogeology module equips students with the knowledge and skills to assess and mitigate potential water-related challenges in mining projects.			

Module 18

Code	Course/Module Title	ECTS	Semester
DME216	Transportation and circulation of raw materials	4	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
This section includes a description of the module, 100-150 words The Transportation and Circulation of Raw Materials module in mining engineering focuses on the efficient movement of raw materials within mining operations. Students learn about various transportation methods, including conveyor systems, trucks, railroads, and pipelines, and their application in the mining industry. This module covers topics such as material handling, logistics management, and transportation network design. Students gain an understanding of the challenges associated with transporting bulk materials and develop strategies to optimize the flow of raw materials from extraction points to processing facilities. The module equips students with the			

knowledge and skills to ensure smooth and cost-effective transportation of raw materials in mining operations.

Module 19

Code	Course/Module Title	ECTS	Semester
DME221	Strength of Materials	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
This section includes a description of the module, 100-150 words The Strength of Materials module in mining engineering focuses on the mechanical behavior and properties of materials used in mining operations. Students learn about the concepts of stress, strain, and deformation, as well as the principles of elasticity, plasticity, and fracture mechanics. This module covers topics such as material testing, analysis of structural components, and the design of mine support systems. Students gain practical skills in evaluating the strength and stability of mining structures and equipment. The Strength of Materials module equips students with the knowledge to ensure the safe and reliable performance of materials in mining engineering applications.			

Module 20

Code	Course/Module Title	ECTS	Semester
DME222	Ore and Oil Exploration by Remote Sensing	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
This section includes a description of the module, 100-150 words The Ore and Oil Exploration by Remote Sensing module in mining engineering focuses on the application of remote sensing technologies for identifying and assessing mineral and oil deposits. Students learn about the principles and techniques of remote sensing, including aerial and satellite imagery, hyperspectral imaging, and thermal imaging. This module covers topics such as image interpretation,			

spectral analysis, and data processing algorithms specific to ore and oil exploration. Students gain practical skills in using remote sensing data to identify potential resource targets, map geological features, and support decision-making in exploration projects. The module equips students with the knowledge to enhance the efficiency and accuracy of ore and oil exploration in mining engineering.

Module 21

Code	Course/Module Title	ECTS	Semester
DME223	Mines management	5	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	62
Description			

Project management is the process by which a team of people successfully guide a project using the elements of planning, analyzing, directing, monitoring, problem solving, and communicating. They take an idea from the opportunity stage through development to the achievement of specific, established corporate objectives within set cost, schedule, and quality constraints.

Project management is not a complex process. There are four basic steps to a successful project outcome:

1. Develop a definitive project scope and a project-specific execution plan.

2. Use qualified management personnel.

3. Create the project control mechanisms up-front (documents, tools, and procedures).

4. Control engineering, construction, and start-up activities during project execution.

Module 22

Code	Course/Module Title	ECTS	Semester
DME224	Dynamic Fluid Mechanics	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			

The Dynamic Fluid Mechanics module in mining engineering focuses on the study of fluid behavior in motion, particularly in the context of mining operations. Students learn about the principles and

equations governing fluid flow, including the conservation of mass, momentum, and energy. This module covers topics such as flow in pipes and channels, flow measurement techniques, and the analysis of pressure losses and hydraulic systems. Students gain an understanding of how dynamic fluid mechanics principles apply to mining applications, such as pumping systems, slurry transport, and ventilation networks. The module equips students with the knowledge to analyze and optimize fluid flow in mining engineering projects.

Module 23

Code	Course/Module Title	ECTS	Semester
DME225	Thermodynamics	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
The module on thermodynamics provides students with a fundamental understanding of the principles and concepts governing the behavior of energy and its transformations in various systems. The module explores the relationships between heat, work, and energy, and their applications in engineering and science. Students will delve into the laws of thermodynamics, starting with the first law, which states that energy is conserved and can be neither created nor destroyed. They will learn about heat transfer mechanisms, including conduction, convection, and radiation, and how these processes affect energy transfer in different systems. The module also covers the second law of thermodynamics, which introduces concepts such as entropy, irreversibility, and the directionality of processes. Students will explore the Carnot cycle and other thermodynamic cycles, as well as the principles behind refrigeration and heat pump systems. Additionally, the module addresses the properties of pure substances and their behavior under different thermodynamic processes, such as compression, expansion, and phase changes. Students will learn about equations of state, ideal gases, and the concept of thermodynamic equilibrium. Throughout the module, students will engage in problem-solving exercises and practical applications to reinforce their understanding of thermodynamics. They will analyze thermodynamic systems, calculate heat and work transfers, and evaluate system efficiencies. The module aims to equip students with the necessary knowledge and skills to analyze and design energy systems, such as power plants, engines, and refrigeration systems while considering energy efficiency and sustainability.			

Module 24

Code	Course/Module Title	ECTS	Semester
DME226	Numerical Analysis Programming	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72

Description
The Engineering Analysis Programming course aims to prepare students to understand and develop MATLAB programming skills and the ability to implement various engineering applications in the MATLAB programming language. Work to provide students with sufficient information related to the MATLAB programme and how to programme issues related to numerical analysis and develop their awareness regarding the subject of numerical analysis and how to apply the MATLAB programme on the computer. In addition to getting acquainted with the famous engineering and mathematical analysis programme (MATLAB) and obtaining sufficient information about using the programme in mathematical analysis and programming, the use of matrices, solving and drawing complex mathematical equations, and two- and three-dimensional drawing using MATLAB programme commands. Learn about MATLAB windows, how to enter variables and write numerical constants, as well as ways to solve algebraic equations. This course also aims to provide students with information on how to use MATLAB software to solve numerical analysis problems. This programme contains a huge library of functions for solving a variety of mathematical problems. This course introduces a combination of these functions, including solving a nonlinear equation in one variable, finding the maximum and minimum of a function, solving integrals numerically, and solving differential equations of the first degree.

Module 25

Code	Course/Module Title	ECTS	Semester
DME311	Applied Rock Mechanics	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
The module "Applied Rock Mechanics in Mining Engineering" focuses on the application of rock mechanics principles and techniques specifically in the context of mining operations. It explores the behavior of rocks under various mining conditions and emphasizes the design and stability analysis of mining excavations. Students learn about key concepts such as rock mass classification, stress distribution, and failure mechanisms in underground mining environments. The module covers topics such as ground support systems, rock reinforcement, mine design optimization, and ground control plans. Students gain practical skills in conducting rock mechanics testing, interpreting data, and using numerical modeling software to simulate and analyze rock behavior in mining scenarios. Additionally, the module addresses safety considerations and risk management in mining operations, including the assessment and mitigation of geotechnical hazards. By the end of the module, students are equipped with the knowledge and skills required to address the unique challenges and complexities of rock mechanics in the field of mining engineering.			

Module 26

Code	Course/Module Title	ECTS	Semester

DME312	Well Drilling Engineering I	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	48	77
Description			
The Well Drilling Engineering I module in mining engineering focuses on the principles and techniques of drilling wells in the context of mining operations. Students learn about various aspects of well drilling, including drilling methods, drilling equipment, and drilling fluids. This module covers topics such as drilling rig components, drilling bit selection, wellbore stability, and well control techniques. Students gain practical skills in planning and executing well drilling operations, ensuring efficient and safe extraction of resources from subsurface formations. The Well Drilling Engineering I module equips students with the knowledge and tools to successfully drill wells in mining engineering projects.			

Module 27

Code	Course/Module Title	ECTS	Semester
DME313	Well Logging	6	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
The Well Logging module in mining engineering focuses on the techniques and interpretation of well logging data in subsurface formations. Students learn about the various tools and methods used to measure and record data related to geological, hydrological, and petrophysical properties of wellbore formations. This module covers topics such as logging tool types, log interpretation principles, lithology identification, fluid saturation analysis, and formation evaluation. Students gain practical skills in analyzing well logging data to assess reservoir characteristics, identify potential mineral or hydrocarbon deposits, and make informed decisions in mining and energy exploration projects. The Well Logging module equips students with the knowledge and tools to effectively evaluate subsurface formations using well logging techniques.			

Module 28

Code	Course/Module Title	ECTS	Semester
DME314	Petroleum Production Engineering I	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The petroleum production engineering is that part of Petroleum Engineering which attempts to			

maximize production (or injection) in a cost manner. The appreciation of production engineering and methods of application are related directly and interpedently with other major areas of petroleum engineering. In this class term many paragraphs are illustrated as follows:
• Determine the well head pressure, down-hole pressure and operating oil/ gas flow rates of the reservoir.
• Identify formation damage and find remedial methods to bring the well back into production.
• Screen, design and operate artificial lifts on reservoir pressure depletions.
• Handle in case of any crisis at drilling/production installations.
• Process oil and gas before supply to refinery/consumers.
• Contribute to reservoir management as production engineers to prolong the reservoir life with optimum production.

Module 29

Code	Course/Module Title	ECTS	Semester
DME315	Rock blasting Engineering	4	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	48	52
Description			
The module "Rock Blasting Engineering in Mining Engineering" focuses on the principles, techniques, and applications of rock blasting in mining operations. This module covers the entire process of rock blasting, starting from blast design and planning to the safe execution of blasts. Students learn about the properties of explosive materials, blast initiation systems, and the effects of blasting on rock mass behavior. They gain an understanding of the factors influencing blast design, including rock properties, geology, and environmental considerations. The module also explores vibration and air overpressure control, fragmentation analysis, and blast optimization techniques. Students acquire practical skills in blast design, blast monitoring, and the use of specialized software for blast simulations. Safety aspects of rock blasting, including hazard identification, risk assessment, and blast management practices, are also emphasized. By the end of the module, students are equipped with the knowledge and skills to design and execute efficient and safe rock blasting operations in the mining industry.			

Module 30

Code	Course/Module Title	ECTS	Semester
DME316	Heat Transfer	5	5
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	47
Description			
Heat transfer refers to the process by which thermal energy is transferred from one object or system to another due to a temperature difference. It occurs through three primary mechanisms: conduction, convection, and radiation. These mechanisms are governed by the laws of thermodynamics and play			

crucial roles in various natural and engineered systems. Heat transfer by conduction occurs through direct contact between objects or substances, transferring energy from higher to lower temperatures. Heat transfer by convection occurs when heat is transferred through the movement of fluid or gas particles.
Overall, heat exchangers and fins play crucial roles in enhancing heat transfer efficiency by maximizing the surface area available for heat exchange and improving the conduction of heat between fluids.
And heat transfer by radiation involves the emission and absorption of electromagnetic waves without the need for a medium. Understanding heat transfer mechanisms is crucial in various fields, including engineering, physics, meteorology, and environmental science, as it impacts the design and operation of systems involving temperature control, energy transfer, and thermal management.

Module 31

Code	Course/Module Title	ECTS	Semester
DME321	Design of Petroleum and Mining Equipment	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72
Description			
Design of Petroleum and Mining Equipment explain: 1. Understanding of the principles and practices of designing petroleum and mining equipment. 2. Ability to identify and apply appropriate design methods and techniques for different equipment types. 3. Knowledge of safety and environmental regulations related to the design of petroleum and mining equipment. 4. Analytical skills in evaluating the performance and efficiency of equipment designs. 5. Ability to use relevant software and tools for designing and analyzing equipment. 6. Effective communication skills to present and explain equipment designs to different stakeholders in the industry. 7. Ability to work in a team to develop effective solutions to complex equipment design problems.			

Module 32

Code	Course/Module Title	ECTS	Semester
DME322	Well Drilling Engineering II	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	48	77
Description			
The Well Drilling Engineering II module in mining engineering builds upon the foundational knowledge acquired in Well Drilling Engineering I. It delves deeper into advanced techniques and practices related to drilling wells in mining operations. Students learn about topics such as directional drilling, well			

completion and production, well control and safety systems, and wellbore geomechanics. This module emphasizes the application of advanced drilling technologies and methodologies to optimize drilling efficiency, well productivity, and resource recovery. Students gain practical skills in planning, designing, and managing complex drilling operations. The Well Drilling Engineering II module equips students with the expertise to handle challenging drilling scenarios in mining engineering projects.

Module 33

Code	Course/Module Title	ECTS	Semester
DME323	Environment and Safety of Mines	6	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72

Description

The description of this module include:
1- Developing an understanding of environmental hazards and their potential effects on human health and the environment.
2- Identifying various types of risks and hazards associated with mining operations, understanding the safety protocols, regulations, and best practices in the industry.
3- Developing skills in identifying, assessing, and managing risks associated with mining activities.
4- The ability to evaluate environmental impacts of mining, design effective mitigation strategies, and develop plans for emergency response and disaster management in mining operations.
The environment and safety of mines module may include topics such as mine safety legislation, safety hazards and risks in mining, mine ventilation and lighting, emergency preparedness and response, environmental management in mining, occupational health and hygiene, water management in mining, and community relations and social responsibility.

Module 34

Code	Course/Module Title	ECTS	Semester
DME324	Petroleum Production Engineering II	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52

Description

In this module, the main information can learn student are:

- Fundamental production engineering design, evaluation and optimization for oil and gas producing well; well deliverability; formation damage and skin analysis; well completion selection; technologies that improve oil and gas well performance including artificial lift and well stimulation.
- Acquiring scientific concepts and foundations that can distinguish the student as an oil engineer

supervising and following up the oil production processes.

- Identifying the factors affecting oil production and causing a reduction in the oil field depletion rate, as well as on-site devices and equipment for isolating impurities, solutions and gases accompanying oil production so that the oil engineer can identify the optimal and economical ways to drain the oil field.

Module 35

Code	Course/Module Title	ECTS	Semester
DME325	Petroleum and Gas Transport and Exchange	4	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
The Petroleum and Gas Transport and Exchange module is designed to provide a comprehensive understanding of the processes and systems involved in the transportation and exchange of petroleum and gas resources. This module explores the critical aspects of logistics, infrastructure, and trading mechanisms in the petroleum and gas industry. Students will delve into the intricacies of pipeline transportation, maritime shipping, and road transport, along with the associated safety measures and environmental considerations. They will gain insights into the design, construction, and maintenance of pipelines and storage facilities, as well as the regulatory frameworks governing the transportation sector. Furthermore, the module covers the fundamentals of gas and petroleum trading, including market dynamics, pricing mechanisms, and contractual arrangements. Students will examine the role of intermediaries, such as brokers and exchanges, in facilitating efficient trading operations. By the end of this module, students will have a solid grasp of the logistical challenges and commercial aspects involved in the transport and exchange of petroleum and gas, enabling them to make informed decisions and contribute effectively to the energy industry.			

Module 36

Code	Course/Module Title	ECTS	Semester
DME326	Building Stones and Sustainability	5	6
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	63	62
Description			
Building stones, also known as natural stones are solid rocks that are used in construction for their durability, aesthetic appeal, and architectural value. Sustainability in the context of building stones refers to the environmental, social, and economic considerations associated with their extraction, production, use, and disposal. Here's a description of building stones and their sustainability aspects:			

1- Types of Building Stones: Building stones come in various types, including granite, marble, limestone, sandstone, slate, and travertine.
2- Environmental Sustainability: Building stones can have both positive and negative environmental impacts. On the positive side, they are natural and abundant resources, reducing the need for energy-intensive manufacturing processes.
3- Resource Efficiency: Building stones have a long lifespan and can be reused or repurposed in construction, reducing the demand for new materials.
4- Energy Efficiency: While the extraction and processing of building stones require energy, the durability and thermal properties of stones can contribute to energy efficiency in buildings.

Module 37

Code	Course/Module Title	ECTS	Semester
DME411	Geographical Information System GIS	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
The Geographical Information System (GIS) module in mining engineering focuses on utilizing GIS technology to address the unique challenges and requirements of the mining industry. This module combines the principles of GIS with mining-specific data to provide a comprehensive understanding of the spatial aspects of mining operations. In the context of mining engineering, the GIS module facilitates the integration and analysis of geological data, mine planning and design, environmental assessments, and resource management. It enables the creation of detailed maps and visualizations that depict the distribution of mineral deposits, geological structures, and topographical features within a mining site. With GIS, mining engineers can analyze and interpret spatial data to optimize mine planning, identify potential hazards, and evaluate the impact of mining activities on the environment. It assists in decision-making processes related to site selection, infrastructure design, and resource allocation. Furthermore, the GIS module enables efficient data management, allowing mining engineers to store and organize large volumes of spatial data, including exploration data, drill hole data, and survey data. It also supports the integration of data from various sources, such as remote sensing and geophysical surveys, to enhance the accuracy and reliability of geological models and mining plans.			

Module 38

Code	Course/Module Title	ECTS	Semester
DME412	Surface Mines Engineering	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	57
Description			

The Surface Mines Engineering module provides a comprehensive understanding of the principles, methodologies, and technologies involved in surface mining operations. It covers topics such as mine planning, design, equipment selection, drilling and blasting, excavation, and mine reclamation. Students learn about geological exploration, resource estimation, and mine feasibility studies. The module also explores safety regulations, environmental considerations, and sustainable mining practices. Through case studies and practical exercises, students gain hands-on experience in mine design, production scheduling, and optimization. They also learn about the integration of mining software and geospatial technologies in mine planning and monitoring. By the end of the module, students will have acquired the technical knowledge and skills necessary to plan and manage surface mining operations efficiently and responsibly, taking into account economic, environmental, and safety factors.

Module 39

Code	Course/Module Title	ECTS	Semester
DME413	Mechanical Excavation of Rock	5	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	62
Description			
Mechanical excavation of rock is a method used to remove or break apart solid rocks using machines. It is commonly done in construction, mining, and tunneling projects. The process involves several steps: Equipment selection, Preparatory work, Drilling, Blasting (optional), Excavation, Hauling and disposal. Safety is crucial during mechanical rock excavation. Workers must receive proper training and wear protective gear. Following safety regulations and guidelines is essential to ensure the well-being of everyone involved. mechanical excavation of rock is an important process used to clear the way for construction and mining projects. It requires specialized machinery and careful planning to safely and efficiently remove rock from the ground.			

Module 40

Code	Course/Module Title	ECTS	Semester
DME414	Computer Applications in Mining and Metallurgy	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
Computer applications in mining and metallurgy include: Proficiency in using software tools for geological modelling, mine planning, and mineral processing simulations. Understanding of the role of computer applications in optimizing mining and metallurgy operations. Knowledge of the latest trends in mining and metallurgy technologies, such as artificial			

intelligence, machine learning, and automation. Familiarization with various computer software and tools used for data analysis, tracking, and visualization related to mining engineering and metallurgy. Development of critical thinking, problem solving, and decision-making skills related to mining and metallurgy.
The main programs importance in this module are:
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. Metallurgical process control and optimization software like Ansys/ Optimization tool and VisioFroth.

Module 41

Code	Course/Module Title	ECTS	Semester
DME415	Well Testing	6	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	72
Description			
Well testing is a process of determining the properties of a reservoir that contains hydrocarbons. The technique provides detailed information about the condition of the well. The primary objective of well testing is to understand the reservoir capacity to produce hydrocarbons, including natural gas and crude oil. The technique determines reservoir pressure, fluid properties, drawdown pressure, productivity index, permeability, formation damage, and a lot of other information. It allows the company to draw some fluid samples from the reservoir to determine the properties of hydrocarbons. The properties of fluids present in the reservoir are useful during the well completion stage. Well testing requires high-end technology, planning, and execution to rightly gather data for appropriate calculations and estimations.			

Module 42

Code	Course/Module Title	ECTS	Semester
DME416	Graduate Project I	2	7
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			

Module 43

Code	Course/Module Title	ECTS	Semester

DME421	Clay Minerals Technology	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
The Clay Minerals Technology module provides a comprehensive understanding of the properties, characterization, and applications of clay minerals. It covers topics such as clay mineralogy, clay structure, clay chemistry, and clay mineral processing techniques. Students learn about the formation and classification of clay minerals, as well as their role in various industries, including catalytic application in oil and gas industry, ceramics, construction, agriculture, and environmental engineering. The module explores the characterization methods for clay minerals, such as X-ray diffraction, scanning electron microscopy, and thermal analysis. It also delves into the modification and functionalization of clay minerals for specific applications. Through laboratory experiments and practical exercises, students gain hands-on experience in clay mineral identification, characterization, and testing. By the end of the module, students will have acquired the knowledge and skills necessary to utilize clay minerals effectively in different engineering and industrial contexts, contributing to the development of sustainable and innovative solutions.			

Module 44

Code	**Course/Module Title**	**ECTS**	**Semester**
DME422	Underground Mines Engineering	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72
Description			
Underground Mines Engineering is an advanced module that focuses on the principles and practices of engineering in the context of underground mining operations. This module provides a comprehensive understanding of the design, construction, and operation of underground mines. Students learn about various mining methods, including room and pillar, cut and fill, and longwall mining, as well as the associated equipment and infrastructure. The module covers topics such as mine ventilation, ground control, mine planning, and safety considerations specific to underground environments. Students develop skills in designing support systems, analyzing rock mechanics, and managing mine hazards. Additionally, they explore mine economics, environmental impacts, and sustainable mining practices. Through practical exercises and case studies, students gain hands-on experience in solving real-world challenges faced by underground mining engineers. This module equips students with the knowledge and skills to contribute to the efficient and safe extraction of mineral resources from underground mines.			

Module 45

Code	**Course/Module Title**	**ECTS**	**Semester**

DME423	Applied Raw Materials Processing	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	3	93	57
Description			
Mineral processing is based on separation processes and is involved in performing and description of separations, as well as their analysis, evaluation, and comparison. Various terms are used in different countries for mineral processing. The goal of this curriculum is to present the bases of mineral processing with emphasis on treating all operations as separation processes having similar structure, which can be subjected to the same procedure of delineation, analysis, and evaluation. The present, most common treatment of mineral processing operations is by many stage like Comminution Classification Upgrading - flotation - gravity - magnetic - etc. Final treatment - drying - sampling - portioning - etc.			

Module 46

Code	Course/Module Title	ECTS	Semester
DME424	Mineral Resources Evaluation	4	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
Mineral resources evaluation is a systematic and comprehensive process used to assess the quantity, quality, and economic viability of mineral deposits. It involves the examination and analysis of geological, geochemical, and geophysical data to estimate the potential mineral resources within a given area Mineral resources refer to naturally occurring substances found in the Earth's crust that have economic value and are extracted for various purposes. These resources are typically formed over millions of years through geological processes such as deposition, heat, pressure, and chemical reactions. They can be classified into metallic minerals and non-metallic minerals. The evaluation process typically consists of the following steps:-Data Integration and Interpretation: The collected geological, geophysical, and geochemical data are integrated and interpreted to understand the subsurface geology and identify potential mineral resources. Mineral resources are extracted through mining techniques, which can vary depending on the type of deposit and its depth. Common methods include open-pit mining, underground mining, and placer mining.			

Module 47

Code	Course/Module Title	ECTS	Semester
DME425	Tunnels engineering	6	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87

Description
The Tunnels Engineering module in mining engineering focuses on the design, construction, and management of underground tunnels and excavations in the mining industry. It equips students with the necessary knowledge and skills to plan, engineer, and maintain tunnels in various mining applications. This module covers a range of topics, including tunnel design principles, excavation methods, ground support systems, ventilation, and safety considerations specific to underground mining environments. It explores the geological and geotechnical factors influencing tunnel stability and durability, and the techniques for assessing and mitigating risks associated with tunneling. Students will learn about different tunneling methods, such as drill and blast, tunnel boring machines, and cut-and-cover techniques, and understand their suitability for different geological conditions and project requirements. They will also study the selection and installation of appropriate ground support systems, including bolts, rock anchors, and shotcrete.

Module 48

Code	Course/Module Title	ECTS	Semester
DME426	Graduate Project II	2	8
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	17	50
Description			
This section includes a description of the module, 100-150 words			

Contact

Program Manager:
Azealdeen Salih Hassan Ali Al-Jawadi | Ph.D. in Geo-technique | Assistant Professor
Email: azealdeenaljawadi@uomosul.edu.iq
Mobile no.: 07740868719

Liqaa Idrees Saeed Milco Majdal | PhD in Chemistry | Lecturer
Email: l.idrees.saeed@uomsul.edu.iq
Mobile no.: 009647719826503