

University of Mosul جامعة الموصل



First Cycle – Bachelor's Degree (B.Sc.) – Petroleum and Refining Engineering

بكالوريوس - هندسة نفط وتكرير



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1. Overview

This catalogue is about the courses (modules) given by the program of Petroleum and Refining Engineering to gain the Bachelor of Science degree. The program delivers (48) Modules with (6000) total student workload hours and 240 total ECTS. The module delivery is based on the Bologna Process.

نظرة عامة

يتناول هذا الدليل المواد الدراسية التي يقدمها برنامج هندسة النفط والتكرير للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (48) 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 |
|--|-----------------------|---------------|-------------|
| PRE101 | Mathematics I | 6 | 1 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 1 | 63 | 87 |
| Description | | | |
| <p>The science of structure, order, and relation that has evolved from elemental practices of counting, measuring, and describing the shapes of objects. It deals with logical reasoning and quantitative calculation, and its development has involved an increasing degree of idealization and abstraction of its subject matter.</p> <p>The objective of this course is to present straight line, derivative, Limit, the integral, application to definite integral, the matrix, application of matrix, grammer method to solving linear system, hyperbolic Functions and derivatives and Integrals of hyperbolic functions</p> | | | |

Module 2

| Code | Course/Module Title | ECTS | Semester |
|--|-------------------------|---------------|-------------|
| PRE102 | Engineering Mechanics I | 4 | 1 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 63 | 37 |
| Description | | | |
| <p>Engineering Mechanics is a course that focuses on understanding the behavior of physical systems under different loads and conditions. In the statics portion of the course, we explore how forces and moments affect the equilibrium of rigid bodies and structures. Topics covered include the analysis of trusses and frames, the calculation of reactions and internal forces, and the application of static equilibrium equations to solve engineering problems. This course is essential for any aspiring engineer as it provides a fundamental understanding of how structures and machines work and how to design them to withstand different loads and environments.</p> | | | |

Module 3

| Code | Course/Module Title | ECTS | Semester |
|--|------------------------|---------------|-------------|
| UOM1031 | Computer Programming I | 4 | 1 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 63 | 37 |
| Description | | | |
| <p>Microsoft Office is a suite of productivity software developed by Microsoft Corporation. It is widely used for various tasks in both personal and professional settings. Microsoft Office includes a collection of applications that offer a range of features to create, edit, and manage documents, spreadsheets, presentations, emails, and more. The main applications within the suite are:</p> <ul style="list-style-type: none"> ➤ Microsoft Word: A word processing program used for creating and editing text-based documents such as letters, reports, and essays. It provides a variety of formatting options and features for document layout and design. ➤ Microsoft Excel: A powerful spreadsheet application used for organizing, analyzing, and manipulating numerical data. Excel provides tools for creating formulas, charts, graphs, and performing complex calculations. ➤ Microsoft PowerPoint: A presentation software used to create slide-based presentations. It allows users to combine text, images, videos, and other multimedia elements to deliver visually engaging presentations. | | | |

Module 4

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| UOM1021 | English Language I | 4 | 1 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 0 | 33 | 67 |
| Description | | | |
| <p>English language courses are designed to help individuals improve their reading, writing, listening, and speaking skills in the English language. They are typically offered at various levels, from beginner to advanced, to cater to the needs of different learners. The courses usually cover grammar, vocabulary, pronunciation, and comprehension skills, which are essential to communicate effectively in English. They often use a variety of teaching methods, including lectures, discussions, group activities, and multimedia resources to make learning fun and engaging. Overall, taking an English language course can help you build confidence in communicating with English speakers, expand your career opportunities, and enhance your cultural awareness.</p> | | | |

Module 5

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE105 | Engineering Drawing I | 6 | 1 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1 | 3 | 63 | 87 |
| Description | | | |
| <p>The engineering drawing course is designed to teach students the fundamentals of creating and interpreting technical drawings. These drawings are used in fields such as engineering, architecture, and manufacturing to communicate ideas and specifications. During the course, you will learn about the various types of technical drawings, including orthographic, isometric, and perspective drawings. You will also learn about the different tools and techniques used to create these drawings, such as drafting software and traditional drafting tools like T-squares and compasses. Additionally, you will learn about the various standards and conventions used in technical drawing, such as dimensioning and tolerances. By the end of the course, you should have a strong understanding of how to create accurate and detailed technical drawings that can be used to communicate complex ideas and designs.</p> | | | |

Module 6

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE106 | General Geology I | 6 | 1 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 78 | 72 |
| Description | | | |
| <p>The general geology course is an introductory-level course that covers the fundamentals of Earth's structure, materials, and processes. Students will learn about the internal and external processes that shape our planet, including plate tectonics, rock formation, erosion, and mineral resources. The course may also include hands-on experiences, such as field trips or laboratory exercises, to help students better understand the concepts covered in class. Overall, a general geology course provides a broad understanding of the Earth and its geological systems.</p> | | | |

Module 7

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE121 | Mathematics II | 6 | 2 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 1 | 63 | 87 |
| Description | | | |
| <p>The science of structure, order, and relation that has evolved from elemental practices of counting, measuring, and describing the shapes of objects. It deals with logical reasoning and quantitative calculation, and its development has involved an increasing degree of idealization and abstraction of its subject matter.</p> <p>The objective of this course is to present Transcendental function ,Application of exponential and logarithmic function ,Hyperbolic Trigonometric function and inverse Hyperbolic Trigonometric function, Methods of integral, Complex numbers and Differential equation.</p> | | | |

Module 8

| Code | Course/Module Title | ECTS | Semester |
|--|--------------------------|---------------|-------------|
| PRE122 | Engineering Mechanics II | 4 | 2 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 63 | 37 |
| Description | | | |
| <p>Engineering mechanics (dynamic) is a course that focuses on the study of moving bodies and the forces that act upon them. This field of study is essential in understanding how things move, how they react to forces, and how they can be controlled or manipulated. Through the study of dynamic engineering mechanics, you will learn about motion, forces, energy, and momentum, as well as how they relate to each other. You will also learn about the different types of forces, such as friction, gravity, and centripetal forces, and how they affect the motion of objects. Overall, the course aims to help you develop a deeper understanding of how the world around us works, and how we can use this knowledge to design and build better structures, machines, and systems.</p> | | | |

Module 9

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE123 | Analytical Chemistry | 6 | 2 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 63 | 37 |
| Description | | | |
| <p>Analytical chemistry is a course that focuses on the principles and techniques of chemical analysis. The course covers various topics such as quantitative analysis, chemical equilibrium, acid-base and redox titrations, spectroscopic methods, chromatography, and electrochemical methods. In addition, students will learn how to design experiments, collect and analyze data, and interpret results. The course is designed to provide students with a strong foundation in analytical chemistry, which is a fundamental area of chemistry that has applications in many fields such as environmental monitoring, petroleum engineering, and materials science.</p> | | | |

Module 10

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| UOM1040 | Right and Freedoms | 2 | 2 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 0 | 33 | 17 |
| Description | | | |
| This section includes a description of the module, 100-150 words | | | |

Module 11

| Code | Course/Module Title | ECTS | Semester |
|--|------------------------|---------------|-------------|
| PRE124 | Engineering Drawing II | 6 | 2 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1 | 3 | 63 | 87 |
| Description | | | |
| <p>The AutoCAD software course teaches you how to create and edit engineering drawings using the AutoCAD software. AutoCAD is a popular computer-aided design (CAD) program that is used by engineers, architects, and designers to create precise technical drawings and 3D models. In this course, you will learn how to use the various tools and features of AutoCAD to create accurate and detailed drawings, including creating lines, circles, arcs, and other geometric shapes, and adding text and dimensions. You will also learn how to customize your drawings using layers, blocks, and other tools, and how to output your drawings in various formats, such as PDF or DXF. Overall, this course will teach you the skills you need to create professional-quality engineering drawings using AutoCAD.</p> | | | |

Module 12

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE125 | General Geology II | 6 | 2 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 78 | 72 |
| Description | | | |
| <p>Sedimentology is the study of sedimentary rocks and the processes that form them. It involves examining the texture, composition, and fossils within the rocks to understand the environment in which they were created. This course will cover topics such as sediment transport, deposition, and diagenesis, as well as the interpretation of sedimentary structures. Structural geology, on the other hand, is the study of the deformation of rocks and the structures that result from it. This course will cover topics such as stress and strain, the mechanics of rock deformation, and the analysis of geological structures such as faults and folds. Students will also learn how to interpret geological maps and cross-sections to reconstruct the history of a region's deformation.</p> | | | |

Module 13

| Code | Course/Module Title | ECTS | Semester |
|--|---------------------------|---------------|-------------|
| PRE211 | Engineering Mathematics I | 5 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 1 | 59 | 66 |
| Description | | | |
| <p>The mathematics course typically covers a range of topics, depending on the level of the course. Some common topics in a mathematics course might include algebra, geometry, trigonometry, calculus, statistics, and probability. Students will learn about mathematical concepts and techniques, and they'll have the opportunity to apply these ideas to solve problems and complete assignments. Additionally, some mathematics courses may involve computer-based assignments or projects, which can help students develop their computational skills and gain experience with modern technology.</p> | | | |

Module 14

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE 212 | Fluid flow I | 5 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 59 | 66 |
| Description | | | |
| <p>This description of the academic program provides a brief summary of the most important characteristics of the program and the learning outcomes expected of the student to achieve, demonstrating whether he has made the most of the available opportunities. It is accompanied by a description of each course within the program. It aims to teach the student the properties of oil and natural gas and related knowledge of crude oil, how it is formed and classified, and the chemical and physical properties of crude oil. Introduce the student to the purpose of testing or measuring these properties. As well as teaching students about the types of crude oil and how to dry and remove salinity from it. Introducing students to the most important typical characteristics of crude oil and how to stabilize crude oil using multiple methods.</p> | | | |

Module 15

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE213 | Thermodynamic I | 5 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 66 |
| Description | | | |
| <p>Thermodynamics studies the relationship between heat, work, and other forms of energy. It is particularly concerned with describing how thermal energy is converted from one form of energy to another. It also studies how thermal energy affects matter. It can be defined as the energy possessed by a substance or system due to temperature. It is the energy of the moving or vibrating molecules of the substance.</p> | | | |

Module 16

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| UOM2032 | Computer II | 3 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 3 | 35 | 40 |
| Description | | | |
| <p>Fluid Mechanics, the branch of science that deals with the study of fluids (liquids and gasses) in a state of rest or motion, is an important subject of Civil, Mechanical, and Chemical Engineering. Its various branches are fluid statics, fluid kinematics, and fluid dynamics.</p> <p>A substance that flows is called a fluid. All liquid and gaseous substances are considered to be fluids. Water, oil, and others are very important in our day-to-day life as they are used for various applications. For instance, water is used for the generation of electricity in hydroelectric power plants and thermal power plants, water is also used as the coolant in nuclear power plants, oil is used for the lubrication of automobiles etc.</p> <p>Fluid Mechanics is the branch of science that studies the behavior of fluids when they are in state of motion or rest. Whether the fluid is at rest or motion, it is subjected to different forces and different climatic conditions and it behaves in these conditions as per its physical properties. Fluid mechanics deals with three aspects of the fluid: static, kinematics, and dynamics aspects.</p> | | | |

Module 17

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE 215 | Petroleum chemistry | 6 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 78 | 72 |
| Description | | | |
| <p>Petroleum chemistry is the study of the origin, exploration, and production of hydrocarbons (oil and gas) from the earth's subsurface. The course covers a range of topics, including the formation and migration of petroleum, the structural and stratigraphic traps that can contain it, the tools and techniques used in exploring for oil and gas, and the methods used to extract and process hydrocarbons once they are discovered. Additionally, the course includes discussions on the environmental impact of petroleum exploration and production, as well as the future of the petroleum industry in light of changing energy needs and emerging technologies.</p> | | | |

Module 18

| Code | Course/Module Title | ECTS | Semester |
|---|------------------------------------|---------------|-------------|
| PRE 216 | Material engineering and Corrosion | 4 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 44 | 56 |
| Description | | | |
| <p>Materials and Corrosion Engineering is a specialized field concerned with the study of how the environment affects materials, specifically how materials interact with their surroundings to cause corrosion. The primary goal is to understand the causes of corrosion and develop solutions to prevent or reduce it. Corrosion is a specialized branch concerned with applying scientific knowledge, natural laws, and material resources to design and implement materials, structures, devices, systems, and procedures aimed at dealing with the natural phenomenon known as corrosion. Corrosion engineering is generally associated with mining, but it is also relevant to non-metals, including ceramics.</p> | | | |

Module 19

| Code | Course/Module Title | ECTS | Semester |
|--------------|-----------------------|---------------|-------------|
| UOM2022 | English Language II | 2 | 3 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |

| | | | |
|--|---|----|----|
| 2 | 0 | 23 | 27 |
| Description | | | |
| <p>English language courses are designed to help individuals improve their reading, writing, listening, and speaking skills in the English language. They are typically offered at various levels, from beginner to advanced, to cater to the needs of different learners. The courses usually cover grammar, vocabulary, pronunciation, and comprehension skills, which are essential to communicate effectively in English. They often use a variety of teaching methods, including lectures, discussions, group activities, and multimedia resources to make learning fun and engaging. Overall, taking an English language course can help you build confidence in communicating with English speakers, expand your career opportunities, and enhance your cultural awareness.</p> | | | |

Module 20

| Code | Course/Module Title | ECTS | Semester |
|--|----------------------------|---------------|-------------|
| PRE221 | Engineering mathematics II | 5 | 4 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 66 |
| Description | | | |
| <p>The mathematics course typically covers a range of topics, depending on the level of the course. Some common topics in a mathematics course might include algebra, geometry, trigonometry, calculus, statistics, and probability. Students will learn about mathematical concepts and techniques, and they'll have the opportunity to apply these ideas to solve problems and complete assignments. Additionally, some mathematics courses may involve computer-based assignments or projects, which can help students develop their computational skills and gain experience with modern technology.</p> | | | |

Module 21

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE 222 | Fluid flow II | 6 | 4 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 63 | 87 |
| Description | | | |
| <p>Fluid Mechanics, the branch of science that deals with the study of fluids (liquids and gasses) in a state of rest or motion, is an important subject of Civil, Mechanical, and Chemical Engineering. Its various branches are fluid statics, fluid kinematics, and fluid dynamics.</p> <p>A substance that flows is called a fluid. All liquid and gaseous substances are considered to be fluids. Water, oil, and others are very important in our day-to-day life as they are used for various</p> | | | |

applications. For instance, water is used for the generation of electricity in hydroelectric power plants and thermal power plants, water is also used as the coolant in nuclear power plants, oil is used for the lubrication of automobiles etc.

Fluid Mechanics is the branch of science that studies the behavior of fluids when they are in state of motion or rest. Whether the fluid is at rest or motion, it is subjected to different forces and different climatic conditions and it behaves in these conditions as per its physical properties. Fluid mechanics deals with three aspects of the fluid: static, kinematics, and dynamics aspects.

Module 22

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE223 | Thermodynamics II | 5 | 4 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 53 | 72 |
| Description | | | |
| <p>Heat is a form of energy that can be converted from one form to another or transferred between objects. For example, to operate electric motors, turbines convert heat into mechanical energy. The mechanical energy is then converted into electrical energy by the motor to light electric bulbs. The electric bulb then converts the electrical energy into light, which is absorbed by surfaces and ultimately converted back into heat.</p> <p>To study the relationship between heat and other forms of energy, physicists established the science of thermodynamics as a branch of physics. The goal is to understand how thermal energy is converted to and from other forms of energy and how these transformations affect matter. Thermal energy is defined as the energy possessed by a substance or system as a result of its temperature, and it expresses the energy of moving or vibrating particles.</p> | | | |

Module 23

| Code | Course/Module Title | ECTS | Semester |
|---|------------------------------------|---------------|-------------|
| PRE 224 | Properties of Petroleum & Products | 6 | 4 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 3 | 63 | 87 |
| Description | | | |
| <p>Petroleum properties is the branch of engineering that focuses on the exploration, production, and optimization of oil and gas resources. It involves a wide range of technical and scientific disciplines, including geology, geophysics, drilling engineering, reservoir engineering, production engineering, and petrophysics. The fundamental principles of petroleum engineering include understanding the geological structures and formations that contain oil and gas reserves, designing and drilling wells to extract the resources, and optimizing the production process to maximize the yield of the reservoir. This involves analyzing data from geological surveys and exploration, designing and implementing drilling</p> | | | |

programs, and developing strategies to manage the reservoir and production facilities. Petroleum engineers also work on projects related to oil and gas transportation, storage, and refining, as well as environmental and safety issues related to the petroleum industry.

Module 24

| Code | Course/Module Title | ECTS | Semester |
|--------------|-----------------------|---------------|-------------|
| UOM2012 | Arabic language II | 2 | 4 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | | 22 | 28 |
| Description | | | |
| | | | |

Module 25

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE 225 | Electrical Technology | 4 | 4 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 40 | 60 |
| Description | | | |
| Electrical Engineering Technology is the field of engineering technology that applies and utilizes the principles of electrical engineering. Like electrical engineering, it deals with the design, implementation, installation, manufacture, operation, and/or maintenance of electrical/electronic systems. However, EET is a specialized discipline with a greater emphasis on application, theory, applied design, and implementation, whereas electrical engineering may place a more general focus on theory and conceptual design. Electrical/Electronic Engineering Technology is the largest branch of engineering technology and encompasses a variety of subdisciplines, such as applied design, electronics, embedded systems, control systems, instrumentation, communications, and power systems. | | | |

Module 25

| Code | Course/Module Title | ECTS | Semester |
|--------|------------------------|------|----------|
| PRE311 | Engineering Analysis I | 4 | 5 |

| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
|--|-----------------------|---------------|-------------|
| 3 | 2 | 45 | 55 |
| Description | | | |
| <p>Petroleum reservoir engineering is a branch of petroleum engineering that focuses on the characterization, modeling, and management of subsurface reservoirs containing hydrocarbons. It involves studying various properties of reservoirs, such as porosity, permeability, fluid flow, and pressure, to determine how best to extract oil or natural gas from them. Reservoir engineers use a variety of tools and techniques, such as well testing, numerical modeling, and simulation, to optimize the production of hydrocarbons from reservoirs while minimizing costs and maximizing profits. The ultimate goal of petroleum reservoir engineering is to ensure the safe and efficient extraction of valuable hydrocarbons from the earth.</p> | | | |

Module 26

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE302 | Mass transfer I | 5 | 5 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 66 |
| Description | | | |
| <p>Drilling engineering is a course that focuses on the design, planning, and execution of drilling operations. It covers the principles of drilling fluid systems, drilling mechanics, bit design, drill string design, wellbore stability, and casing and cementing programs. Students in this course will learn how to select the appropriate drilling equipment, how to analyze drilling data in real-time, and how to optimize drilling processes to enhance efficiency and safety. Additionally, the course also covers the regulatory and environmental considerations that come with drilling operations. Overall, drilling engineering is a highly specialized field that requires a deep understanding of geology, physics, and engineering principles, and this course provides the foundation for a career in this exciting field.</p> | | | |

Module 27

| Code | Course/Module Title | ECTS | Semester |
|---|------------------------------|---------------|-------------|
| PRE313 | Petroleum refining process I | 6 | 5 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 73 | 77 |
| Description | | | |
| <p>Petroleum production engineering is a course that focuses on the exploration and extraction of oil and gas resources from the earth. The course covers a wide range of topics including drilling engineering, reservoir engineering, production engineering, formation evaluation and well completion techniques. Students will learn about the various methods used to extract oil and gas from the subsurface, as well</p> | | | |

as the different types of equipment and machinery used in the process. The course also delves into the economic and environmental aspects of the petroleum industry. Graduates of petroleum production engineering can pursue careers in oil and gas companies, energy consulting firms, government agencies and research institutions.

Module 28

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE314 | Reactor design | 5 | 5 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 66 |
| Description | | | |
| <p>The well logging course teaches participants how to acquire, process, and interpret data from a well log. Well logs are records of subsurface formations that are created by measuring the properties of the rocks and fluids surrounding a wellbore. These logs can provide valuable information about the geology, hydrology, and potential resources of a given area. During a well logging course, participants can expect to learn about different types of well logs, how to measure and interpret the data, and how to use that information to make informed decisions about resource exploration and production. The course may also cover topics such as wellsite operations, safety procedures, and regulatory compliance. Overall, a well logging course is a great way to gain the skills and knowledge needed to work in the oil and gas industry, geology, or other related fields.</p> | | | |

Module 29

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE315 | Heat transfer I | 4 | 5 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 41 |
| Description | | | |
| <p>Geophysics is a multidisciplinary field of study that combines principles from physics, geology, and mathematics to understand the Earth and its environment. Geophysics courses typically cover a range of topics, including the study of earthquakes, volcanoes, and other natural phenomena, as well as exploration for natural resources such as oil and gas. Students in geophysics courses may also learn about the Earth's magnetic and gravitational fields, as well as how to use various instruments and techniques to measure and analyze these phenomena. This field of study is important for understanding the Earth's past, present, and future, and it has many practical applications in industries such as energy, mining, and environmental consulting.</p> | | | |

Module 30

| Code | Course/Module Title | ECTS | Semester |
|---|---------------------------|---------------|-------------|
| PRE316 | Petrochemical engineering | 6 | 5 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 91 |
| Description | | | |
| <p>Petroleum pollution refers to the accidental release of crude oil or refined petroleum products into the environment, which can have detrimental effects on ecosystems, wildlife, and human health. This type of pollution can occur during oil drilling, transportation, storage, and refining. An occupational safety course, on the other hand, is a training program designed to educate workers about potential hazards in the workplace and how to prevent them. This type of course typically covers topics such as workplace safety regulations, emergency procedures, hazard communication, personal protective equipment, and safe work practices. The specific content of a petroleum pollution and occupational safety course could include information on preventing spills and leaks, responding to emergencies, handling hazardous materials safely, and maintaining equipment and facilities to prevent accidents. The goal is to ensure that workers who are involved in the production, transportation, and refining of petroleum products are able to perform their jobs safely and efficiently, while also protecting the environment and public health.</p> | | | |

Module 31

| Code | Course/Module Title | ECTS | Semester |
|---|-------------------------|---------------|-------------|
| PRE321 | Engineering Analysis II | 4 | 6 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 59 | 41 |
| Description | | | |
| <p>Petroleum reservoir engineering is a branch of petroleum engineering that focuses on the study of subsurface reservoirs that contain oil and gas. A course in petroleum reservoir engineering would typically cover topics such as fluid properties, rock properties, reservoir simulation, well testing, production forecasting, and more. Students in this course will learn about the different types of reservoirs, how to model reservoir behavior, how to optimize production, and how to design and manage well systems, among other things. The course will also cover the latest technologies and techniques used in the field of petroleum reservoir engineering. Overall, a course in petroleum reservoir engineering is a challenging and rewarding program that equips students with the knowledge and skills they need to become successful professionals in the oil and gas industry.</p> | | | |

Module 32

| Code | Course/Module Title | ECTS | Semester |
|--------------|-----------------------|---------------|-------------|
| PRE322 | Mass transfer II | 5 | 6 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |

| | | | |
|--|---|----|----|
| 2 | 2 | 59 | 66 |
| Description | | | |
| <p>Drilling engineering is a course that focuses on the design, planning, and execution of drilling operations. It covers the principles of drilling fluid systems, drilling mechanics, bit design, drill string design, wellbore stability, and casing and cementing programs. Students in this course will learn how to select the appropriate drilling equipment, how to analyze drilling data in real-time, and how to optimize drilling processes to enhance efficiency and safety. Additionally, the course also covers the regulatory and environmental considerations that come with drilling operations. Overall, drilling engineering is a highly specialized field that requires a deep understanding of geology, physics, and engineering principles, and this course provides the foundation for a career in this exciting field.</p> | | | |

Module 33

| Code | Course/Module Title | ECTS | Semester |
|---|-------------------------------|---------------|-------------|
| PRE323 | Petroleum refining process II | 6 | 6 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 73 | 77 |
| Description | | | |
| <p>A drilling engineering course typically covers the fundamental principles and practices of drilling operations in the oil and gas industry. This includes topics such as drilling rig components, drilling fluid types and properties, wellbore hydraulics, drill bit selection and design, and well control procedures. Students may also learn about drilling optimization, including the use of advanced technologies like Measurement While Drilling (MWD) and Logging While Drilling (LWD). The course may also include lectures on drilling safety, environmental considerations, and regulatory compliance. Overall, the aim of the course is to equip students with the knowledge and skills necessary to design, plan and execute drilling operations safely and efficiently.</p> | | | |

Module 34

| Code | Course/Module Title | ECTS | Semester |
|---|---------------------------------|---------------|-------------|
| PRE324 | Catalysts in petroleum refinery | 5 | 6 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 66 |
| Description | | | |
| <p>Petroleum production engineering is a course that focuses on the exploration and extraction of oil and gas resources from the earth. The course covers a wide range of topics including drilling engineering, reservoir engineering, production engineering, formation evaluation and well completion techniques. Students will learn about the various methods used to extract oil and gas from the subsurface, as well as the different types of equipment and machinery used in the process. The course also delves into the economic and environmental aspects of the petroleum industry. Graduates of petroleum production engineering can pursue careers in oil and gas companies, energy consulting firms, government agencies and research institutions.</p> | | | |

Module 35

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE325 | Heat transfer II | 6 | 6 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 6 | 87 | 63 |
| Description | | | |
| <p>The well logging course is a comprehensive training program that covers the principles and applications of well logging. Well logging is an essential technique used by geologists and petroleum engineers to evaluate the properties of geological formations and to locate and assess hydrocarbon reserves. The course will cover a range of topics related to well logging, including the different types of logs, their applications, and interpretation techniques. You will learn about the physical principles that underlie well logging, the tools used to collect data, and the methods used to analyze and interpret the data. During the course, you will also gain practical experience in well logging through hands-on training exercises and simulations. This will help you develop the skills and knowledge you need to work effectively as a geologist or petroleum engineer in the field of well logging. Overall, the well logging course is an excellent opportunity to learn about one of the most important techniques used in the oil and gas industry, and to gain the skills and knowledge you need to succeed in this exciting field.</p> | | | |

Module 36

| Code | Course/Module Title | ECTS | Semester |
|--|------------------------------------|---------------|-------------|
| PRE326 | Numerical methods and optimization | 4 | 6 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 2 | 59 | 41 |
| Description | | | |
| <p>Various aspects of rock mechanics such as compressive, tensile and shear strength of intact rocks, as well as their deformation parameters were identified. Furthermore, their classification according to various systems were categorized. However, the same scenario is repeated for study of discontinuity surfaces, with their classification systems.</p> <p>Linear elasticity handled throughout Stress – strain aspects, elastic moduli, Hooke's law, bulk modulus, compressibility. Then non-linear elasticity was stated. Poroelasticity is characterized with two material phases (solid & fluid), thus two stresses involved: external and internal (pore pressure) stresses, and hence two strains involved. These couples of stresses and strains are regulated by Biot-Hooke's law, Biot-Gassmann equation and effective stress concept by (Terzaghi, 1923).</p> <p>Failure mechanics includes: Strength and related concepts, shear failure, tensile failure and Pore collapse. In this respect failure envelope, Tresca, Mohr–Coulomb, Griffith, Modified Griffith criterion and Compaction failure were elucidated. Moreover, Fracturing and Extended Leak off Test were considered as well.</p> <p>Stresses in the Earth before and after drilling boreholes were realized with their controlling factors. Wellbore Stresses were identified as well. Geometry of Borehole failures were illustrated. Finally,</p> | | | |

Reservoir Geomechanic and Mechanical Earth Model were explained as well.

Module 37

| Code | Course/Module Title | ECTS | Semester |
|---|---------------------------|---------------|-------------|
| PRE411 | Special petroleum process | 5 | 7 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 4 | -- | 59 | 66 |
| Description | | | |
| <p>Petroleum economics is a course that explores the economic principles and practices of the global oil and gas industry. Students will learn about the market structure, supply and demand dynamics, price formation, investment appraisal, risk assessment, and financial management in the petroleum sector. The course may cover various topics, including oil and gas exploration, production, transportation, and marketing, as well as the impact of government policies, regulations, and environmental factors on the industry. Students will gain a solid understanding of the economics of petroleum production and consumption, and how it affects the global economy.</p> | | | |

Module 38

| Code | Course/Module Title | ECTS | Semester |
|---|----------------------------|---------------|-------------|
| PRE412 | Plant design and utilities | 6 | 7 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 73 | 77 |
| Description | | | |
| <p>Petroleum reservoir engineering is a branch of petroleum engineering that focuses on the study of subsurface reservoirs that contain oil and gas. A course in petroleum reservoir engineering would typically cover topics such as fluid properties, rock properties, reservoir simulation, well testing, production forecasting, and more. Students in this course will learn about the different types of reservoirs, how to model reservoir behavior, how to optimize production, and how to design and manage well systems, among other things. The course will also cover the latest technologies and techniques used in the field of petroleum reservoir engineering. Overall, a course in petroleum reservoir engineering is a challenging and rewarding program that equips students with the knowledge and skills they need to become successful professionals in the oil and gas industry.</p> | | | |

Module 38

| Code | Course/Module Title | ECTS | Semester |
|--------------|-----------------------|---------------|-------------|
| PRE413 | Process dynamic | 5 | 7 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |

| | | | |
|--|---|----|----|
| 2 | 3 | 73 | 52 |
| Description | | | |
| <p>Drilling engineering is a course that focuses on the design, planning, and execution of drilling operations. It covers the principles of drilling fluid systems, drilling mechanics, bit design, drill string design, wellbore stability, and casing and cementing programs. Students in this course will learn how to select the appropriate drilling equipment, how to analyze drilling data in real-time, and how to optimize drilling processes to enhance efficiency and safety. Additionally, the course also covers the regulatory and environmental considerations that come with drilling operations. Overall, drilling engineering is a highly specialized field that requires a deep understanding of geology, physics, and engineering principles, and this course provides the foundation for a career in this exciting field.</p> | | | |

Module 39

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE414 | Unit operation I | 6 | 7 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 4 | 87 | 63 |
| Description | | | |
| <p>Petroleum Production Engineering is a course that focuses on the exploration, production, and transportation of hydrocarbons. The course covers a wide range of topics, including reservoir engineering, drilling engineering, production engineering, and well completion design. It also covers the basics of geology, geophysics, and reservoir rock properties. Students of petroleum production engineering learn how to optimize oil and gas well performance, design and implement well completions, perform reservoir simulations and modeling, and analyze reservoir data to make informed decisions. They also learn about the latest technologies and techniques used in the industry, such as hydraulic fracturing, directional drilling, and artificial lift. Overall, the course prepares students for careers in the oil and gas industry, with a focus on maximizing production efficiency and minimizing environmental impact.</p> | | | |

Module 40

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE415 | Petroleum pollution | 5 | 7 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 1 | 59 | 66 |
| Description | | | |
| <p>Numerical analyses are techniques used to solve complex problems and evaluate the performance of systems and structures in various fields of engineering. These analyses involve the use of mathematical models, computational algorithms, and numerical methods to simulate and predict the behavior of physical systems.</p> | | | |

Engineering analysis involves applying numerical methods and computational tools to analyze and evaluate the performance of engineering systems. Engineering analysis aims to assess the behavior, strength, stability, and efficiency of structures, machines, processes, and devices.

In numerical analyses, mathematical models are developed based on fundamental principles and physical laws governing the system under study. These models incorporate various factors such as geometry, material properties. By solving the mathematical equations derived from these models, engineers can obtain insights into system behavior, make predictions, and optimize designs, explore "what-if" scenarios, and conduct parametric studies to understand the effects of different variables on system performance.

Module 41

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE416 | Project I | 3 | 7 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1 | 2 | 45 | 30 |
| Description | | | |
| <p>Secondary oil recovery is a stage in the process of extracting crude oil from underground reservoirs. It follows the primary oil recovery phase. This technique typically involves injecting water or other fluids into the reservoir to maintain reservoir pressure, sweep the oil towards production wells, and improve oil recovery efficiency. Some common secondary recovery methods include water flooding, gas injection. Water Flooding method involves injecting water into the reservoir through injection wells to displace the remaining oil towards production wells. Water flooding can help maintain reservoir pressure, sweep the oil trapped in the rock pores, and increase the recovery factor. In Gas Injection technique, gases such as natural gas or carbon dioxide (CO₂) are injected into the reservoir. Gas injection methods include gas flooding. Gas flooding involves injecting gas into the reservoir to sweep and displace the oil towards production wells.</p> | | | |

Module 42

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE421 | Gas technology | 5 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 4 | -- | 59 | 66 |
| Description | | | |
| <p>The engineering project course is a challenging and rewarding educational opportunity for students to apply their knowledge and skills in engineering to solve real-world problems. This course typically involves working in teams to design, build, test, and refine a project that meets a specific set of requirements. Projects can range from developing a new product, to improving an existing system, to</p> | | | |

conducting research in a particular field of engineering. Throughout the course, students will have the opportunity to work closely with faculty and industry professionals to gain valuable insights and feedback. The engineering project course is a great way for students to develop their problem-solving, teamwork, and communication skills, while also gaining practical experience in their chosen field of engineering.

Module 43

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE422 | Equipment design | 6 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 3 | 2 | 73 | 77 |
| Description | | | |
| <p>The engineering design course is a comprehensive study of the principles and practices involved in designing and developing engineering products. The course covers a wide range of topics, including engineering graphics, computer-aided drafting and design (CADD), materials science, product development, and manufacturing processes. Students will learn how to identify and analyze problems, design solutions, and create detailed plans and specifications for engineering projects. They will also learn how to use a variety of tools and technologies to bring their designs to life, including 3D printing, CNC machining, and computer simulation software. Throughout the course, students will work on a variety of real-world design challenges, putting their skills into practice and developing a portfolio of engineering projects that demonstrate their abilities.</p> | | | |

Module 44

| Code | Course/Module Title | ECTS | Semester |
|--|-----------------------|---------------|-------------|
| PRE423 | Process control | 6 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 3 | 73 | 52 |
| Description | | | |
| <p>This description of the academic program provides a brief summary of the most important characteristics of the program and the learning outcomes expected of the student to achieve, demonstrating whether he has made the most of the available opportunities. It is accompanied by a description of each course within the program.</p> <p>It aims to teach the student the properties of natural gas and what is related to it in terms of knowledge of natural gas, how it is formed and classified, and gas specifications. Introducing students to the chemical and physical properties and basic concepts of natural gas processing. As well as teaching students how to treat gas field and how to choose the desalination process.</p> | | | |

Module 45

| Code | Course/Module Title | ECTS | Semester |
|--|--|---------------|-------------|
| PRE424 | Management and economics of petroleum projects | 5 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 4 | -- | 59 | 66 |
| Description | | | |
| <p>The petroleum production engineering course is designed to provide students with an understanding of the various aspects of petroleum production, including reservoir engineering, drilling operations, well completion and stimulation, and surface facilities. Students will learn about the various techniques used in oil and gas production, such as secondary and tertiary recovery methods, and will gain hands-on experience through laboratory exercises and field trips. The course will also cover the economic and environmental considerations involved in petroleum production, such as risk management, sustainability, and regulatory compliance. Overall, this course is ideal for students who wish to pursue a career in the oil and gas industry or related fields.</p> | | | |

Module 46

| Code | Course/Module Title | ECTS | Semester |
|---|-----------------------|---------------|-------------|
| PRE425 | Unit operation II | 6 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 2 | 4 | 87 | 63 |
| Description | | | |
| <p>The reservoir simulation course is designed to provide an in-depth understanding of the principles and applications of reservoir simulation for the development and management of oil and gas reservoirs. It covers the fundamentals of fluid flow, rock properties, well performance, and reservoir characterization. The course also includes the modeling and simulation techniques used in the industry, such as numerical methods, grid generation, and history matching. Participants will learn to use software tools commonly used in the industry, as well as industry best practices in simulation modeling, interpretation, and analysis of simulation results. By the end of the course, participants will be able to apply reservoir simulation techniques to optimize field development plans, improve production performance, and make informed reservoir management decisions.</p> | | | |

Module 47

| Code | Course/Module Title | ECTS | Semester |
|--------------|-----------------------|---------------|-------------|
| PRE426 | Project II | 3 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1 | 2 | 45 | 30 |

| Description |
|---|
| Enhanced Oil Recovery (EOR) refers to a set of techniques and methods used to extract additional crude oil from reservoirs after the primary and secondary recovery methods have been exhausted. These techniques involve injecting various substances into the reservoir to alter the properties of the oil or reservoir rock, allowing for improved oil displacement and recovery. The three primary methods of EOR are thermal, chemical, and miscible gas injection. Thermal method involves injecting heat into the reservoir to reduce the viscosity of the oil, making it easier to flow and recover. In Chemical methods, Chemicals are injected into the reservoir to alter the properties of the oil or rock and improve oil recovery. In Miscible Gas Injection gases such as carbon dioxide (CO ₂) or natural gas are injected into the reservoir to mix with the oil, reducing its viscosity and improving its flow characteristics. |

Module 48

| Code | Course/Module Title | ECTS | Semester |
|--|------------------------|---------------|-------------|
| PRE412 | Engineering Project II | 6 | 8 |
| Class (hr/w) | Lect/Lab./Prac./Tutor | SSWL (hr/sem) | USWL (hr/w) |
| 1 | 1 | 32 | 18 |
| Description | | | |
| The engineering project course is a challenging and rewarding educational opportunity for students to apply their knowledge and skills in engineering to solve real-world problems. This course typically involves working in teams to design, build, test, and refine a project that meets a specific set of requirements. Projects can range from developing a new product, to improving an existing system, to conducting research in a particular field of engineering. Throughout the course, students will have the opportunity to work closely with faculty and industry professionals to gain valuable insights and feedback. The engineering project course is a great way for students to develop their problem-solving, teamwork, and communication skills, while also gaining practical experience in their chosen field of engineering. | | | |

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