Alayen Iraqi University
جامعة العين العراقية

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

بكالوريوس - هندسة نفط

Table of Contents

1. Overview

This catalogue is about the courses (modules) given by the program of petroleum Engineering to gain the Bachelor of Science degree. The program delivers (60) 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 النفط للحصول على درجة بكالوريوس العلوم. يقدم البرنامج (60) مادة دراسية، 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
PENG116	General Geology I	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	79	96
Description			
This course introduces students to the fundamentals of geology, focusing on the Earth's structure, composition, and dynamic processes. Topics include mineral and rock classification, plate tectonics, geological mapping, and the processes that shape the Earth's surface. Students learn to identify key geological materials and understand their significance in natural resource exploration and engineering applications. Practical sessions emphasize rock and mineral identification, interpretation of geological maps, and the study of soil properties. This foundational knowledge equips students to analyze geological factors affecting construction, mining, and environmental projects			

Module 2

Code	Course/Module Title	ECTS	Semester
PENG115	Engineering Mechanics	7	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	112
Description			
This module provides an in-depth study of forces, equilibrium, and the mechanics of rigid bodies. Core topics include the principles of statics, dynamics, kinematics, and energy conservation. Students gain analytical skills to solve real-world engineering problems, focusing on structural analysis and mechanical systems. Practical applications include truss analysis, friction, and motion in two and three dimensions. Problem-solving workshops and laboratory sessions enhance theoretical concepts, helping students develop a solid foundation in mechanical principles crucial for advanced engineering fields.			

Module 3

Code	Course/Module Title	ECTS	Semester
CENG114	Mathematics	6	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
This course builds a strong mathematical foundation for engineering and science students. It covers essential topics such as calculus, linear algebra, and differential equations. Students learn techniques for solving systems of equations, performing matrix operations, and applying derivatives and integrals in various contexts. The module emphasizes problem-solving and analytical skills, with practical applications in engineering mechanics, physics, and computer science. Through lectures, tutorials, and practice sessions, students gain a deeper understanding of mathematical concepts and their role in solving real-world engineering challenges.			

Module 4

Code	Course/Module Title	ECTS	Semester
CENG113	Workshop Technology	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
0	2	33	42
Description			
This module introduces students to essential workshop practices, tools, and manufacturing processes. It covers hand tools, power tools, welding, machining, and sheet metal work. Students gain hands-on experience in the safe use of equipment and the fabrication of components. The course emphasizes precision, material selection, and quality control techniques. By learning practical skills in manufacturing, students develop an appreciation for engineering craftsmanship and gain insights into the industrial production process. This course prepares students for advanced engineering design and manufacturing concepts.			

Module 5

Code	Course/Module Title	ECTS	Semester
CENG112	Computer Science I	3	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	48	27
Description			
This introductory module familiarizes students with the fundamentals of computer science, focusing on programming, algorithms, and data structures. Students learn to write and debug programs using languages like Python or C++, developing problem-solving and logical thinking skills. Topics include basic programming constructs, control statements, loops, and functions. Additionally, students explore the role of computing in engineering applications, data analysis, and system automation. The course combines theoretical lectures with practical programming assignments to build technical competence in modern computing tools.			

Module 6

Code	Course/Module Title	ECTS	Semester
GE111	English Language I	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**

2	0	33	17
Description			
This module enhances students' proficiency in English, focusing on grammar, vocabulary, and effective communication. It emphasizes writing skills for technical and academic purposes, including report writing and presentations. Students also practice reading comprehension and listening skills, enabling them to interpret and analyze complex texts. Oral communication exercises, such as discussions and public speaking, build confidence and fluency. The module equips students with the language skills necessary for professional and academic success in engineering and global contexts.			

Module 7

Code	Course/Module Title	ECTS	Semester
GE110	Democracy and Human Rights	2	1
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
This course explores the principles of democracy, governance, and human rights, fostering civic awareness and social responsibility. Students learn about the history, theories, and practices of democratic systems, including electoral processes and constitutional rights. Key topics include freedom of speech, equality, justice, and the rule of law. Discussions focus on the role of individuals and societies in upholding human rights and promoting sustainable development. By understanding these concepts, students are encouraged to become active, informed citizens who contribute positively to their communities and professions.			

Module 8

Code	Course/Module Title	ECTS	Semester
PENG126	General Geology II	7	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	79	3
Description			
This module builds on General Geology I, delving deeper into advanced geological concepts and processes. It covers structural geology, sedimentology, hydrogeology, and the study of geological formations in engineering contexts. Students learn to interpret stratigraphic sequences, analyze fault and fold structures, and understand groundwater systems. Practical			

components include geological field mapping, core logging, and lab analysis of rock and soil samples. By applying theoretical knowledge to real-world scenarios, students develop skills essential for addressing challenges in mining, construction, and environmental management.

Module 9

Code	Course/Module Title	ECTS	Semester
CENG125	Physics	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	37
Description			
This course introduces students to the principles of classical and modern physics, emphasizing their application in engineering and technology. Topics include mechanics, thermodynamics, waves, electricity, magnetism, and optics. The module combines theoretical lectures with laboratory experiments, allowing students to test physical laws and analyze data. Practical applications in material properties, energy systems, and electromagnetic devices are emphasized. The course builds critical problem-solving and analytical skills, preparing students for advanced studies in engineering physics and related fields.			

Module 10

Code	Course/Module Title	ECTS	Semester
PENG124	Chemistry	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
This module explores the fundamental principles of chemistry, focusing on their relevance to engineering and materials science. Topics include atomic structure, chemical bonding, thermodynamics, kinetics, and electrochemistry. Students also study the properties and applications of materials such as metals, polymers, and composites. Laboratory sessions enhance theoretical learning through hands-on experiments, including titrations, material testing, and chemical analysis. The course equips students with a deeper understanding of chemical processes and their applications in engineering solutions, such as corrosion prevention, fuel development, and material synthesis.			

Module 11

Code	Course/Module Title	ECTS	Semester
CENG123	Mathematics II	6	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
Building on Mathematics I, this course focuses on advanced topics such as multivariable calculus, partial differential equations, and vector analysis. Students also explore Fourier series, Laplace transforms, and numerical methods essential for solving complex engineering problems. Practical applications in fluid mechanics, thermodynamics, and electrical circuits are emphasized. Through lectures, tutorials, and problem-solving sessions, students gain the analytical tools required to tackle real-world challenges in engineering and technology. This module strengthens their mathematical foundation for advanced technical studies.			

Module 12

Code	Course/Module Title	ECTS	Semester
CENG122	Engineering Drawing and Descrptive Geometry	4	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	3	63	37
Description			
This module introduces students to technical drawing and graphical communication, essential for engineering design. Topics include orthographic projection, isometric drawing, sectional views, and dimensioning. Descriptive geometry principles, such as intersections, developments, and 3D visualization, are covered to enhance spatial reasoning skills. Students use both manual drafting tools and computer-aided design (CAD) software to create precise technical drawings. The course emphasizes accuracy, attention to detail, and adherence to engineering standards, preparing students for design and drafting roles in engineering projects.			

Module 13

Code	Course/Module Title	ECTS	Semester
GE121	Engineering Practices	3	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	52
Description			
This hands-on module focuses on practical engineering skills and workshop techniques. Students gain experience in areas such as machining, welding, carpentry, plumbing, and electrical wiring. The module emphasizes safety procedures, quality control, and teamwork in a workshop setting. Students also learn the basics of project planning, material selection, and fabrication techniques. Through practical assignments and group projects, they develop the technical expertise and confidence required for engineering practice in real-world industrial environments.			

Module 14

Code	Course/Module Title	ECTS	Semester
GE120	Arabic Language	2	2
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**US WL (hr/w)**
2	0	33	17
Description			
This course enhances students' proficiency in the Arabic language, focusing on grammar, vocabulary, and effective communication skills. It emphasizes reading, writing, and speaking for academic and professional purposes. Students practice technical and formal writing, including report preparation and documentation. The module also includes cultural and literary aspects, fostering an appreciation for Arabic heritage and its role in scientific and technical development. This course equips students with the linguistic and communication skills necessary for academic success and professional engagement in Arabic-speaking environments.			

Module 15

Code	Course/Module Title	ECTS	Semester
PENG216	Structural Geology	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72

Description
This course delves into the analysis of geological structures, focusing on their formation, classification, and significance in petroleum and engineering applications. Topics include faults, folds, joints, and unconformities, as well as stress and strain in rocks. Students learn to interpret structural features using geological maps, cross-sections, and stereonets. Practical exercises emphasize structural analysis, seismic interpretation, and field mapping techniques. By understanding the behavior of rocks under stress, students are equipped to assess geological risks, locate hydrocarbon traps, and design infrastructure in complex geological settings.

Module16

Code	Course/Module Title	ECTS	Semester
PENG215	Fundamentals of Petroleum Engineering	6	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	87
Description			
This introductory course provides an overview of petroleum engineering, focusing on the exploration, production, and processing of oil and gas. Topics include the origin of hydrocarbons, reservoir characteristics, drilling methods, and production techniques. Students learn about the petroleum value chain, from exploration to refining. The module emphasizes the use of modern technologies, such as reservoir simulation and well logging. Case studies and industry-relevant projects prepare students for further specialization in petroleum engineering and energy resource management.			

Module17

Code	Course/Module Title	ECTS	Semester
PENG214	Petroleum Properties	4	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
This module focuses on the physical and chemical properties of petroleum and natural gas. Topics include phase behavior, viscosity, density, thermal conductivity, and compressibility of hydrocarbon systems. Students explore how these properties affect reservoir performance, production strategies, and refining processes. Laboratory sessions provide hands-on experience in measuring key properties and analyzing fluid behavior under varying pressure and temperature conditions. This course is essential for understanding fluid dynamics in reservoirs and optimizing oil and gas production.			

Module18

Code	Course/Module Title	ECTS	Semester
CENG213	Mathematics III	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	77
Description			
This advanced course expands on previous mathematics modules, introducing topics such as advanced linear algebra, complex analysis, and numerical methods. Emphasis is placed on solving partial differential equations and applying mathematical models to engineering problems, such as fluid flow, heat transfer, and structural mechanics. Students also explore optimization techniques and statistical methods for data analysis. By mastering these tools, students gain the ability to solve complex engineering challenges in petroleum, thermodynamics, and computational sciences.			

Module19

Code	Course/Module Title	ECTS	Semester
CENG212	Computer Science ll	3	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
1	2	48	27
Description			
This module builds on the foundational concepts introduced in Computer Science I. It covers advanced programming techniques, data structures, and algorithms, with a focus on efficiency and optimization. Students explore topics like object-oriented programming, database management, and software engineering principles. Practical assignments involve developing and debugging software applications for engineering problems. The course also introduces computational modeling and simulation tools used in petroleum engineering, preparing students for interdisciplinary challenges in technology-driven industries.			

Module20

Code	Course/Module Title	ECTS	Semester
GE211	Arabic LanguageII	2	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
This advanced module enhances proficiency in Arabic, focusing on technical and professional communication. Students practice formal writing, including research papers, reports, and technical documentation. The module also emphasizes advanced grammar, vocabulary, and oral presentation skills. Cultural and literary discussions explore the contributions of Arabic-speaking regions to science and technology. By honing their linguistic abilities, students are prepared to excel in academic and professional settings, particularly in industries where Arabic is the primary language of communication.			

Module21

Code	Course/Module Title	ECTS	Semester
PE210	Thermodynamics	5	3
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	1	63	37
Description			
This course introduces the principles of thermodynamics and their applications in engineering. Topics include energy systems, heat transfer, thermodynamic properties of fluids, and the laws of thermodynamics. Students study processes such as combustion, refrigeration, and power generation, with a focus on efficiency and sustainability. Laboratory experiments and computational tools are used to analyze thermodynamic systems. This module provides a critical foundation for understanding energy systems in petroleum engineering, mechanical design, and environmental management.			

Module22

Code	Course/Module Title	ECTS	Semester
PENG226	Petroleum Geology	6	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
3	2	78	72

Description
This course explores the geological processes and principles that influence the formation and distribution of oil and gas reservoirs. Topics include the origin of hydrocarbons, reservoir rock properties, stratigraphy, sedimentology, and structural traps. Students study the relationship between source rocks, migration paths, and accumulation in reservoirs. The module also covers exploration techniques such as seismic surveys and well logging. Practical sessions involve interpreting geological maps, cross-sections, and core samples. This course equips students with the skills needed to locate and evaluate petroleum resources effectively.

Module23

Code	Course/Module Title	ECTS	Semester
PENG225	Fluid Mechanics	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	2	63	37
Description			
This module introduces the principles of fluid behavior in engineering systems, focusing on fluid statics, dynamics, and flow properties. Topics include Bernoulli's equation, laminar and turbulent flow, and flow through pipes and channels. Students analyze fluid systems using computational tools and laboratory experiments. Applications include hydraulic systems, pipeline design, and reservoir flow. This course is essential for understanding fluid transport in petroleum engineering, water management, and energy systems.			

Module24

Code	Course/Module Title	ECTS	Semester
PENG224	Strength of Materials	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	4	63	37
Description			
This course focuses on the mechanical behavior of materials under various forces and conditions. Topics include stress, strain, elasticity, torsion, bending, and failure criteria. Students analyze structural components to determine their strength and deformation under loads. Laboratory experiments and computational tools are used to test materials and predict performance. Applications include the design			

of safe and efficient structures, machinery, and components used in petroleum and civil engineering projects.

Module25

Code	Course/Module Title	ECTS	Semester
CENG223	Mathematics IV	4	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	1	48	77
Description			
This advanced module covers topics such as differential equations, numerical analysis, probability, and statistical methods. Students explore complex problem-solving techniques and their application to engineering scenarios			

Module26

Code	Course/Module Title	ECTS	Semester
PENG222	Petrophysical Rock Properties	7	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	3	78	97
Description			
This course examines the physical and mechanical properties of reservoir rocks and their impact on hydrocarbon exploration and production. Topics include porosity, permeability, capillary pressure, and wettability. Students learn how to evaluate reservoir potential using petrophysical data from core samples and well logs. Practical sessions involve laboratory measurements of rock properties and data interpretation. This course is critical for understanding fluid flow in reservoirs and optimizing hydrocarbon recovery			

Module27

Code	Course/Module Title	ECTS	Semester
GE221	English Language ll	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17

Description
Building on English Language I, this module emphasizes advanced communication skills for technical and academic purposes. Students practice writing research papers, preparing technical reports, and delivering professional presentations. The course also focuses on critical reading and analytical writing, enabling students to engage with complex texts effectively. Grammar, vocabulary, and oral communication skills are further refined, preparing students for international academic and professional environments.

Module 28

Code	Course/Module Title	ECTS	Semester
GE220	Baath Regime Crimes in Iraq	2	4
Class (hr/w)	**Lect/Lab./Prac./Tutor**	**SSWL (hr/sem)**	**USWL (hr/w)**
2	0	33	17
Description			
This course explores the history, policies, and human rights violations committed under the Baath regime in Iraq. Topics include political oppression, ethnic cleansing, war crimes, and the impact of these events on Iraqi society. Students analyze historical documents, testimonies, and case studies to understand the regime's legacy and its effects on governance, justice, and reconciliation. The module encourages critical reflection on the importance of accountability, human rights, and the rule of law in rebuilding societies after systemic violence.			

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