Kurdistan Regional Government- Iraq
Ministry of Higher Education and
Scientific Research
Soran University

Undergraduate Degree Program Catalogue

(2026-2027)

BSc in Petroleum and Geo-energy Engineering

1. Introduction

The Petroleum Engineering Department at Soran University has focused on exploring, drilling, and producing oil and gas. While these activities remain important, the global energy landscape is changing. The world is moving towards sustainable energy, but since fossil fuels still provide most of our energy, from this point of view, the department needs to stay current and align with the labor market demand, to achieve this, a balanced approach is required to shift the department from petroleum engineering to Petroleum and Geo-Energy Engineering, which reflects this balance by combining traditional petroleum knowledge with new energy solutions.
The addition of Geo-Energy and Geo-Science helps us align with global trends, ensuring that our students are prepared for careers in both conventional petroleum and emerging energy fields. This update also makes our graduates more competitive in the job market by equipping them with a wider range of skills.
The main reasons for this transition include:

- Fossil Fuels Still Dominate Energy Production: Today, about 80% of global energy comes from fossil fuels. Even with investments in renewable energy, oil and gas will remain essential for the next few decades.
- Geo-Energy and Geo-Science are Growing Fields: Many universities and companies are expanding their focus beyond traditional petroleum engineering to include geothermal energy, subsurface storage, and sustainable resource management.
- Unconventional Reservoirs Require Advanced Knowledge: Extracting oil and gas from shale, tight reservoirs, and heavy oil requires new technologies, which are now part of our curriculum.
- Subsurface Energy Storage and Carbon Management Are Critical: Storing hydrogen, CO_2, and natural gas in underground formations is becoming an important part of energy transition efforts.
- AI and Digital Transformation Are Changing the Industry: Machine learning and big data analytics now play a major role in reservoir modeling, drilling optimization, and production forecasting.

To support this transition, the current curriculum needs to be updated by adding new modules, while keeping core petroleum engineering courses. Below is a summary of the key changes:

Unchanged Modules			
Freshman	**Sophomore**	**Junior**	**Senior**
General English	Thermodynamics	Petroleum Production Surface Facilities	Reservoir Simulation
Kurdology	General and Structural Geology	Introduction to Drilling Systems	Enhanced Oil Recovery
Engineering Ethics	Reservoir Fluid Properties	Drilling Fluids and Cementing	Capstone Project
Calculus	Reservoir Rock Properties	HSE (Health, Safety & Environment)	Well Completion & Intervention

Engineering Chemistry	Petroleum Geology	Fundamental of Reservoir Eng.	Petroleum Refinery
General Physics	Fluid Mechanics	Reservoir Engineering	Production Engineering
Academic Debate	Partial Differential Equations		Research Methodology
Information Technology	Engineering Statics & Strength of Materials		Well Testing
Critical Reading & Writing	Geophysics		
Engineering Mathematics			

Modified Modules	
Old Modules	**Modified Modules**
Introduction to Petroleum Engineering	**Introduction to Petroleum and Geo-Energy Engineering** (Expanded to include sustainable and geo-energy topics)
Formation Evaluation with Well-logs	**Well Logging** (More focus on digital interpretation methods)
Petroleum Geomechanics	**Fundamental of Petroleum and Geo-Energy Geomechanics** (Includes geomechanics applications in geothermal and subsurface storage)
Petroleum Economics	**Petroleum and Geo-Energy Economics** (Expanded to include energy transition economics)
Numerical Methods	**Numerical Computation Methods** (Now integrates AI and digital tools)

Newly Added Modules	
New Modules	**Purpose**
Introduction to Geothermal Energy	Fundamental knowledge of geothermal reservoirs, heat sources, exploration, drilling, and energy extraction methods.
Renewable Energy	Provides a broad understanding of sustainable energy sources beyond hydrocarbons.
Introduction to Underground Storage	Covers gas storage and CO_2 sequestration, which are essential for energy transition projects.
Unconventional Reservoir Engineering	Expands expertise beyond conventional reservoirs to shale gas, oil sands, and tight formations.
Well Control Fundamentals	Critical well control techniques for safe and efficient oil, gas, and geo-energy operations.
Research Methodology	Prepares students for academic and industry research opportunities.
Data Mining in Petroleum Engineering	computational techniques for optimizing petroleum and geo-energy operations. With increasing reliance on AI and big data analytics

Artificial Intelligence and Digital Transformation	Focuses on AI-driven decision-making, predictive maintenance, and smart oilfield technologies.
Natural Gas Engineering	Natural gas plays a critical role in energy transition and sustainable energy storage.

2. Practical Applications of New Modules

The new modules have direct applications in real-world energy projects. Below are some practical examples:

- Unconventional Reservoirs: The Permian Basin (USA) and Montney Formation (Canada) are examples of tight reservoirs that require advanced hydraulic fracturing techniques.
- Subsurface Energy Storage: Natural gas is stored in depleted reservoirs in Europe and North America for seasonal energy supply. Hydrogen storage in salt caverns is also being developed in Germany and the USA.
- Sustainable Energy Extraction: The Hellisheidi Geothermal Power Plant in Iceland is a successful example of geothermal energy providing both electricity and heating.
- Carbon Capture and Storage (CCS): The Sleipner Project in Norway has been storing CO_2 in a subsurface reservoir since 1996, reducing emissions into the atmosphere.

These examples demonstrate how our updated curriculum prepares students to work in cutting-edge energy projects worldwide.

3. Impact on Students and Career Opportunities

This transition offers many benefits for students, including:

- More career options: Graduates can work in both traditional petroleum roles and emerging energy fields.
- Sustainability-focused careers: Students can now specialize in geothermal energy, CO_2 storage, and hydrogen storage.
- AI and data-driven careers: With the rise of AI in energy, graduates can work in machine learning, reservoir simulations, and smart drilling operations.
- Research and academic opportunities: The new subjects provide a foundation for students who want to continue with postgraduate studies in sustainable energy.

4- Departmental Vision - دیدی بەش

The Department of Petroleum and Geoenergy Engineering will be become a distinguished and accredited department in Petroleum and Geoenergy Engineering, recognized for excellence in education, research, innovation, and professional counselling, and for actively contributing to sustainable energy development and positive change in Kurdistan and the region.

5- Departmental Mission - پەیامی بەش

The Department of Petroleum and Geoenergy Engineering aims to provide high-quality education, professional training, and academic guidance that develop students' knowledge, technical skills, talents, and professional values. The Department prepares graduates for the labour market in petroleum exploration, drilling, reservoir and production engineering, geothermal energy, carbon capture and storage, and other geoenergy fields. Through informed and directed research, innovation, and industry engagement, the Department contributes to sustainable development of the energy sector and the nation.

6- Program Vision Statement - دیدی پڕۆگرام

To become a distinguished Petroleum and Geoenergy Engineering program that provides high-quality education and prepares competent, innovative, and professionally responsible graduates to contribute effectively to the petroleum, geoenergy, and emerging energy sectors in Kurdistan, the region, and beyond.

7-Program Mission Statement - پەیامی پڕۆگرام

The mission of the Petroleum Engineering program provides an integrated education that prepares students for professional practice in petroleum exploration, drilling, reservoir and production engineering, geothermal energy,

subsurface energy systems, carbon capture and storage, and related geoenergy fields. The program develops technical knowledge, practical skills, problem-solving abilities, ethical responsibility, and sustainable engineering practices, preparing graduates for the labour market, professional advancement, and further study.

8-Department Overview - کورتەیەکی گشتگیر لە سەر بەش

The Petroleum and Geo-Energy Engineering program is designed to cater to the growing demand for education in emerging energy sectors, including oil and gas, geothermal, hydrogen, renewable energy, energy storage, and CO_2 capture and sequestration. In response to the ongoing global energy transition, this degree is strategically crafted to address the evolving landscape of the energy industry and equip graduates with the skills needed for emerging energy initiatives. The coursework is tailored to meet the shifting demands of the global energy sector, making this degree a forward-looking platform for the 21st century. It prepares students for diverse careers in both traditional and renewable subsurface energy.

The curriculum of the program focuses on key areas such as subsurface energy storage, geothermal engineering, subsurface engineering, geological characterization, carbon capture, sequestration, and storage, as well as the production of hydrogen from natural gas. These targeted areas of study ensure that students acquire specialized knowledge and skills relevant to the current and future needs of the energy industry. The program aims to cultivate a versatile skill set that allows graduates to contribute to various aspects of subsurface energy, making them well-positioned for a wide range of career opportunities in the dynamic field of energy.

9. Program Educational Objectives (PEOs)

Within 4 years after graduation, graduates of the Petroleum and Geoenergy Engineering Program are expected to:

PEO 1 – Professional Practice
Apply petroleum and geoenergy engineering knowledge effectively in professional practice.

PEO 2 – Sustainable Engineering and Problem Solving
Develop safe, efficient, innovative, and sustainable solutions to petroleum and geoenergy challenges.

PEO 3 – Professional and Ethical Development
Demonstrate ethical responsibility, teamwork, discipline integration, communication, leadership, and continuous professional development.

PEO 4 – Industry and Societal Contribution
Contribute to the development of the petroleum, geoenergy, and emerging energy sectors through professional practice, research, innovation, or postgraduate study.

10. Program Learning Outcomes (PLOs) - ئاکامەکانی فێربوون

Upon graduation, students will be able to:

PLO 1 – Engineering Knowledge and Problem Solving
Apply mathematics, science, and engineering principles to identify, formulate, analyze, and solve petroleum and geoenergy engineering problems.

PLO 2 – Engineering Design
Design engineering solutions that meet technical requirements while considering safety, environmental, economic, and sustainability factors.

PLO 3 – Experimentation and Data Analysis
Conduct experiments, analyze and interpret data, and draw conclusions using engineering judgment.

PLO 4 – Engineering Practice and Modern Tools
Apply appropriate engineering methods, technologies, modelling tools, and practical skills to petroleum and geoenergy applications.

PLO 5 – Communication, Teamwork, and Ethics
Communicate effectively, work productively in multidisciplinary teams, and demonstrate ethical and professional

responsibility.

PLO 6 – Lifelong Learning
Acquire and apply new knowledge independently in response to technological developments and changing industry needs.

PEO–PLO alignment matrix

PEO	Supporting PLOs
PEO 1 – Professional Practice	PLO 1, PLO 2, PLO 4
PEO 2 – Sustainable Engineering and Problem Solving	PLO 1, PLO 2, PLO 3, PLO 4
PEO 3 – Professional and Ethical Development	PLO 5, PLO 6
PEO 4 – Industry and Societal Contribution	PLO 2, PLO 4, PLO 5, PLO 6

11-Graduation Requirements – دەرچوون داواکاریەکان

In order to graduate with the Bachelor of Science in Petroleum and Sustainable Engineering degree, students are required to obtain a minimum of 240 ECTS and have a minimum cumulative grade point average (GPA) of 2.00/4.00 or Normal Average Grade of 50.00/100

National Requirements:

No.	Modules	ECTS
	Kurdology	4
	General English	4
	Carier Skill	4
	Entrepreneurship	4

University requirements:

No.	Modules	ECTS
	Information technology	7
	Academic Debate	4
	Critical Reading and Writing	4
	Engineering Ethics	3

Faculty requirements:

No.	Modules	ECTS
	Calculus	6
	Engineering Chemistry	6
	Introduction to Petroleum and Geoenergy Engineering	6
	Statics and Strength of materials	6
	Engineering Mathematics	6
	General and structural Geology	6

	Partial Differential Equation	6
	Fluid mechanic	6
	Numerical Computation Methods	6
	Thermodynamics	6
	General Physics	6

Core Modules

No	Modules	ECTS
	Reservoir Fluid Properties	6
	Petroleum Geology	6
	Introduction to Drilling Systems	6
	Drilling Fluid and Cementing	6
	Well control fundamentals	6
	Well Completion and Intervention	6
	Reservoir rocks Properties	6
	Geophysics	6
	Fundamental of Reservoir Engineering	6
	Reservoir Engineering	6
	Fundamentals of petroleum and Geo-Energy Geomechanics	6
	Petroleum Production Surface Facilities	6
	Petroleum Refinery	6
	Production Engineering	6
	Well Testing	6
	Fundamental of Well-logging	6
	Health, Safety and Environment (HSE)	4
	Research methodology	6
	Capstone Project	6
	Petroleum and Geo-energy Economics	6
	Reservoir Simulation	6
	Enhanced Oil Recovery	6
	Introduction to Geothermal Energy	6
	Artificial intelligence and digital transformation	6
	Introduction to underground storage	4
	Data mining in petroleum engineering	6

Elective Modules

No.	Modules	ECTS
	Properties of Petroleum Products	6
	Petrophysics	6
	Reservoir Management	6

	Energy Storage Systems	6
	Natural Gas Engineering	6
	Ground Control and Support	6
	Sustainable Practices in Petroleum Engineering	6
	Field Development and Management	6
	Geostatistics	6
	Unconventional reservoir Engineering	4

9- Curriculum Requirements - داواکارییەکانی پڕۆگرامی خوێندن

1. **General Education**

The general education program consists of five modules, each comprising **6 ECTS**. Students are required to complete a minimum of **30 ECTS**, the modules illustrated below:

1. Kurdology
2. General English
3. Critical Reading and Writing
4. Academic Debate

2. **Mathematics and Basic Sciences:**

2.1. Mathematics and basic science courses must be taken for a minimum of **48 ECTS**. These courses must have a minimum of **24 ECTS** of mathematics, beginning with the first calculus course, along with **6 ECTS** of General Geology, **6 ECTS** of General chemistry, **6 ECTS** of General Physics and **6 ECTS** information technologyCalculus

2.2. Engineering Math

2.3. Partial Differential Equations

2.4. Numerical Methods

2.5. General and Structural Geology

2.6. Engineering Chemistry

2.7. General physics

2.8. Information technology

3. **General Sciences:**

A strong grasp of general sciences plays a crucial role in the realm of Petroleum and Sustainable Geoenergy engineering, facilitating increased interaction between students and the global environment. The **ECTS** requirements for these sciences are **30**, and modules are listed as the following:

3.1. Geological Mapping

3.2. Petroleum Geology

3.3. Geoenergy Technologies

3.4. Petroleum and Sustainable Geoenergy Economics

4. **Engineering Core Courses:**

The **ECTS** requirements for Engineering Core Courses are **30**, and modules are listed as the following (each module has **6 ECTS**):

4.1. Introduction to Sustainable Geoenergy and Petroleum Engineering
4.2. Statics and Strength of materials
4.3. Thermodynamics
4.4. Fluid Mechanics
4.5. Applied Geophysics

The Department of Sustainable Geoenergy and Petroleum Engineering offers two programs namely Petroleum Engineering and Sustainable Geoenergy Engineering. Both programs offer Bachelor of Science (BSc.) in petroleum and Sustainable Geoenergy engineering with concentration of Petroleum Engineering or concentration of Sustainable Geoenergy engineering. The courses mentioned earlier are associated with a focus on petroleum and Sustainable Geoenergy concentration, while the courses listed below are split into two distinct programs:

5. Petroleum Program Courses:

5.1. Petroleum program science and introduction to design

The Petroleum program science and introduction to design are **60 ECTS** each one has **6 ECTS**, the modules are listed below:

5.1.1. Reservoir Fluid Properties
5.1.2. Petrology and Mineralogy
5.1.3. Formation evaluation of Well Logging
5.1.4. Rock mechanics
5.1.5. Drilling Fluid and Cementing
5.1.6. Petroleum Reservoir Engineering
5.1.7. Health, Safety and Environment (HSE) Or
5.1.8. Occupational Health, Safety, and Environmental Management
5.1.9. Petroleum Production Surface Facilities Or
5.1.10. Properties of Petroleum Products
5.1.11. Petroleum Refinery Or
5.1.12. Natural Gas Engineering
5.1.13. Exploration Drilling Or
5.1.14. Subsurface Exploration

5.2. Petroleum program design and analysis

The Petroleum program design and analysis are **42 ECTS** each one has **6 ECTS**, the modules are listed below:

5.2.1. Field and technical Reports
5.2.2. Well completion and Intervention
5.2.3. Reservoir Simulation
5.2.4. Well testing Or
5.2.5. Reservoir Testing and Analysis

5.2.6. Enhanced Oil Recovery (EOR) and Sustainable Practices Or
5.2.7. Petroleum Production Engineering
5.2.8. Field Development and Management Or
5.2.9. Geostatistics
5.2.10. Capstone Project

6. Sustainable Geoenergy Engineering Program Courses:

6.1.Sustainable Geoenergy Engineering program science and introduction to design

The Sustainable Geoenergy Engineering program science and introduction to design are **60 ECTS** each one has **6 ECTS**, the modules are listed below:

6.1.1. Petrology and Mineralogy
6.1.2. Reservoir Fluid Properties
6.1.3. Formation evaluation of Well Logging
6.1.4. Rock mechanics
6.1.5. Sustainable Energy Systems
6.1.6. Geomechanics
6.1.7. Health, Safety and Environment (HSE) Or
6.1.8. Occupational Health, Safety, and Environmental Management
6.1.9. Exploration Drilling Or
6.1.10. Subsurface Exploration
6.1.11. Petrophysics Or
6.1.12. Reservoir Management
6.1.13. Energy Storage Systems Or
6.1.14. Life Cycle Assessment (LCA) of Energy Systems

6.2.Sustainable Geoenergy Engineering program design and analysis

The Sustainable Geoenergy Engineering program design and analysis are 42 ECTS each one has 6 ECTS, the modules are listed below:

6.2.1. Field and technical Reports
6.2.2. Energy Policy and Regulations
6.2.3. Renewable Energy Integration in Petroleum Operations
6.2.4. Renewable Energy Systems Or
6.2.5. Geoenergy and Petroleum Environmental Impact Assessment
6.2.6. Ground Control and Support Or
6.2.7. Sustainable Practices in Petroleum Engineering
6.2.8. Field Development and Management Or
6.2.9. Geostatistics
6.2.10. Capstone Project

10- Program Curriculum Synopsis (Module Content) - پێکهاتەی هەر مۆدیوڵێکی پرۆگرامی خوێندن

Course code: SOU20002
Course Name: Calculus

ECTS Number: 6

Pre-requisite

Types of functions (trigonometric; inverse trigonometric functions, logarithmic functions, exponential functions, transcendental functions, other types of functions, graph of functions); Differentiation (explicit and implicit; application of derivatives in graphing); Integrals (integrals as a summation of areas; definite integrals, applications of definite integrals, areas and volumes; techniques of integration); determinants and matrices, conical section; Introduction to polar coordinates.

Course code: SOU20005

Course Name: Engineering Chemistry

ECTS Number: 6

Pre-requisite:

Analytical chemistry is a measurement science consisting of a set of powerful ideas and methods that are useful in all fields of science and medicine. Analytical chemistry deals with methods for the identification of one or more of the compounds in the sample of matter and the determination of the relative amount of each. For General objective the students will have information about some important basic concepts of analytical chemistry. For Specific objective the students should be having knowledge about main subjects in analytical chemistry. For example acid and bases, preparation of solutions…etc

Course code: SOU20003

Course Name: KURDOLOGY

ECTS Number: 4

Pre-requisite:

Kurdology is the study of Kurds and Kurdistan, history of language literature in general and geography of Kurdistan. It deals with history of Kurds and their religion also.

The course basically implies theoretical work through two semesters. In overall this course deals with history of Kurds, geography of Kurdistan, and Kurdish culture, life, language, literature, poetry and religion. By the end of the course the students will increase their knowledge and be familiar with history, geography, political changes and social life of various aspects of their nation as Kurds. Introducing Kurdish nationality is the main point in this course, and representing the Kurds as a nation that has every element which a nation can be described by, this is motivate the students to perfectly feel their real nationality and think about their future and also Kurdistan future

Course code: SOU20001

Course Name: General English

ECTS Number: 4

Pre-requisite:

Parts of speech (nouns, pronouns, verbs, adverbs, prepositions, conjunctions, interjections); kinds of sentences (simple, compound, complex); subordinate clauses; change of sentences from simple to compound and vice versa; tenses; passive and active; direct and indirect speech.

Course code: SOU20004
Course Name: Information Technology
ECTS Number: 7
Pre-requisite:

Module Summary: This course covers basic concepts about a computer: software such as Windows, Microsoft Office, etc. and hardware such as CPU, Input / Output devices, etc. In the computer Lab the physical components of the computer will be illustrated, some software applications will be applied such as Microsoft Office, windows, Internet, etc.

Course code: SOU20220
Course Name: Introduction to Sustainable Geoenergy and Petroleum Engineering
ECTS Number: 6
Pre-requisite:

Introduction to Sustainable Geoenergy and Petroleum Engineering is an introductory course designed to provide students with a comprehensive understanding of the fundamental principles, concepts, and practices in the fields of Sustainable Geoenergy and petroleum engineering. The course covers the exploration, extraction, and Sustainable Geoenergy resources and hydrocarbons, as well as the environmental and social considerations associated with these industries. Students will gain insights into the challenges and opportunities in the Sustainable Geoenergy and petroleum sectors, laying the foundation for further studies in specialized areas.

Course code: SOU20010
Course Name: Engineering Mathematics
ECTS Number: 6
Pre-requisite:

This is an elementary-level course on mathematics in continuity with calculus course. In this course students get acquainted with some basic but useful subjects like vectors and matrices and after that they go through a little bit more sophisticated subjects like application of derivatives and Integrals which is essential for all the engineering students.

Course code: SOU20013
Course Name: Academic debate
ECTS Number: 4
Pre-requisite:

This intensive course focuses on improving students' communicative and academic study skills. The module is designed to first year university students as a systematic study of critical thinking skills. It is crucial to students for enhancing their own reasoning skills as those who are progressing to higher level of academic study. It aims at raising awareness of students to know how debates are made up in written and spoken language. Furthermore, this course will provide useful general information about scientific debate and it has linked to the key citations and forms.

Course code: SOU20011
Course Name: Critical Reading and Writing
ECTS Number: 4
Pre-requisite:

This course will help First Year Engineering students to grow essential English vocabulary, communication and grammatical structures so that they can successfully make conversations and understand English well. Also, the participants will develop writing and listening skills that will enable them to apply those skills in different areas of life. The students will depend on some extra sources to make it more fun. The main focus will be on the learner's four skills: Listening, Speaking, Reading, and Writing: Skimming for main ideas and scan for details/key words, Developing reading speed, Building academic vocabulary, Summarizing and paraphrase information in a text, Separate facts from opinions, Writing a paragraph with a topic sentence, support, and concluding sentence, Understanding coherence and cohesion and using them in their writing.

Course code: SOU20225
Course Name: General and Structural Geology
ECTS Number: 6
Pre-requisite:

General and Structural Geology for Sustainable Geoenergy and Petroleum Engineering is a foundational course that provides students with a comprehensive understanding of the principles and processes of geology as they apply to Sustainable Geoenergy and petroleum exploration and extraction. The course covers the formation of Earth's crust, the structure of geological materials, the identification of rocks and minerals, and the interpretation of geological features. Students will develop essential skills in geological mapping, data analysis, and problem-solving, preparing them to tackle geological challenges in the Sustainable Geoenergy and petroleum industries. The study of geologic structures has been of prime importance in petroleum engineering, Folded and faulted rock strata commonly form traps for the

accumulation and concentration of fluids such as petroleum and natural gas. Faulted and structurally complex areas are notable as permeable zones for hydrothermal fluids and the resulting concentration areas for base and precious hydrocarbon accumulation

Course code: SOU20221
Course Name: Geological Mapping
ECTS Number: 6
Pre-requisite:

Geological Mapping is a specialized course that focuses on the principles and techniques of geological mapping as applied to exploration and resource assessment in the petroleum and Sustainable Geoenergy industries. Students will learn to create accurate geological maps, cross-sections, and 3D models of subsurface geology. The course emphasizes the integration of field observations, data analysis, and geological interpretation to make informed decisions in resource exploration and development projects. Practical exercises and fieldwork will be an essential component of this course to develop hands-on skills in geological mapping.

Course code: SOU20223
Course Name: Statics and Strength of materials
ECTS Number: 6
Pre-requisite:

Familiarities of students with the conceptualize Statics and Strength of materials fundamental, preparing students for their special modules (e.g. students need to learn concepts of Engineering Mechanics), Linking theoretical concepts to their practical parts that are related to industry (e.g. moment of inertia and analysing of plane trusses), Developing collaborative skills to illustrate students how to work as a group, how to negotiate, compromise and tolerance in a group.

Course code: SOU20020
Course Name: Partial Differential Equation
ECTS Number: 6
Pre-requisite:

The use of mathematical methods in a form suitable for the solution of engineering problem. The engineers must know how to model the problems in terms of mathematical language and solve and analyse them to give an introduction to the basic properties of PDEs and to the basic analytical techniques to solve them.

Course code: SOU20032
Course Name: Fluid Mechanics
ECTS Number: 6

Pre-requisite:

Dimensions & units, process variables; physical state; overall mass balance; overall energy balance; overall momentum balance, concept of fluid behavior; Newtonian and non-Newtonian fluids, flow measurements; Pitot tube; Venturi meter, orifice meter; Rota meter; some design equations for the flow of incompressible fluids; friction losses in pipes and fittings; two-phase flow; fluid machinery.

Course code: SOU20236
Course Name: Geoenergy Technologies
ECTS Number: 6
Pre-requisite:

Principles of Geoenergy Exploration and Exploitation is a comprehensive course designed to provide students in Sustainable Geoenergy engineering with a detailed understanding of the exploration and exploitation processes for Geoenergy resources. The course covers the theories, methodologies, and technologies used in the discovery, evaluation, and Geoenergy production. Students will learn about geological, geophysical, and geochemical exploration techniques, as well as the economic and environmental considerations involved in the exploitation of Geoenergy resources. The course aims to equip students with the knowledge and skills necessary to make informed decisions in Geoenergy exploration and resource development projects.

Course code: SOU20233
Course Name: Petroleum Geology
ECTS Number: 6
Pre-requisite:

The study of petroleum geology, throw some light on the origin of petroleum. Migration & accumulations in Traps. Also, different types & origin of these traps must be studied, the formation of the hydrocarbons are emphasized as to whether it comes from the organic or inorganic material in the" kitchen" or the "Source Rock". This is considered to be the back-bone of the Petroleum Science & Engineering. Teach the students on the aspects of oil formation, migration, as well as the "Traps". The different types of these Traps & hydrocarbon accumulation are elaborated in details. The types of rocks porosity & permeability are to explained in details.

Course code: SOU20230
Course Name: Numerical Methods
ECTS Number: 6
Pre-requisite:

This is an advanced course on mathematics that uses all previous knowledge of students on mathematics and brings it up to the level of essential analytical skills so that students are able to deal with the analytical problems that arise in the engineering world. The use of numerical analysis and numerical methods in a form suitable for the solution of engineering problems is necessary. An engineer must be familiar with numerical methods to analyse problems numerically. Our aim is to prepare students how to deal with some problems they need during computing in engineering analysis. This module helps them to promote their accuracy and use advanced numerical methods in solving engineering problems by using MATLAB.

Course code: SOU20235
Course Name: Petrology and Mineralogy
ECTS Number: 6
Pre-requisite:

Petrology and Mineralogy for Petroleum and Sustainable Geoenergy Engineering is an in-depth course that focuses on the study of rocks, minerals, and their applications in the petroleum and Sustainable Geoenergy industries. The course provides students with a comprehensive understanding of the origin, classification, and characteristics of rocks and minerals. Students will learn to identify rocks and minerals using various techniques, interpret their geological significance, and assess their engineering properties. The knowledge gained in this course will be essential for resource exploration, reservoir characterization, and Sustainable Geoenergy operations.

Course code: SOU20234
Course Name: Principles of Thermodynamics
ECTS Number: 6
Pre-requisite:

After study the thermodynamic course student will have good sympathetic to use first, second and third law of thermodynamic to explain physics problem or any phenomena . Internal energy and enthalpy are introduced in connection with the first law, entropy with the second law, and the Helmholtz and Gibbs functions in the chapter on thermodynamic relations. Many real world realistic examples have been included in this course to assist the student in gaining an understanding of thermodynamics and develop more sophisticated mental models of chemical and physical change, grounded in the fundamentals of thermodynamics and have the ability to use simple physical systems as models for understanding more complex systems.

Course code: SOU20232
Course Name: Reservoir fluid Properties
ECTS Number: 6
Pre-requisite:

The overall purpose of this course is to provide students with an understanding of the properties of Petroleum, natural gas and petroleum refined products. The knowledge included are on chemical composition and properties of petroleum (oil and gas), petroleum products and alternative fuels. Hands on skills, behaviors and attitudes are demonstrated in the laboratory, as testing techniques are taught. The course will also review the chemical engineering basis for the most important refinery processes.

Course code: SOU20247
Course Name: Apply Geophysics
ECTS Number: 6
Pre-requisite:

Geophysical methods are widely used for solving problems of theoretical geology, ecology, and in the searching for groundwater, useful Geoenergy, petroleum reservoir and engineering. This course is designed to give petroleum and Sustainable Geoenergy engineering students a basic understanding of current geophysical techniques used to explore, evaluate and monitor subsurface reservoirs. An overview of methods is given and particular emphasis is placed on understanding of seismic method as dominant tool for hydrocarbon exploration and monitoring. The course aims to develop the conceptual and empirical knowledge, analytical skills and understanding of the geophysical processes mainly in the oil and gas industry. Geophysical theory, data acquisition, equipment, software, qualitative and quantitative interpretation of data, will be discussed during this course.

Course code: SOU20243
Course Name: Formation Evaluation of Well Logging
ECTS Number: 6
Pre-requisite:

Formation Evaluation of Well Logging is a specialized course that focuses on the principles, techniques, and applications of well logging in the petroleum and Sustainable Geoenergy industries. The course provides students with an in-depth understanding of how well logs are acquired, interpreted, and utilized to assess subsurface formations and reservoir properties. Students will learn about various well logging tools and measurements, log interpretation methods, and the integration of well log data with other subsurface data for reservoir characterization and resource evaluation. The course aims to equip students with the skills necessary to make informed decisions in exploration, production, and Sustainable Geoenergy projects.

Course code: SOU20246
Course Name: Exploration Drilling
ECTS Number: 6
Pre-requisite:

Exploration Drilling for Petroleum and Sustainable Geoenergy Engineering is a specialized course that focuses on the principles, techniques, and applications of drilling in the exploration of hydrocarbons and

Geoenergy resources. The course provides students with a comprehensive understanding of drilling processes, equipment, and safety considerations in both petroleum and Sustainable Geoenergy industries. Students will learn about various drilling methods, well planning, data acquisition, and the interpretation of drilling results. The course aims to equip students with the knowledge and skills necessary to effectively plan, execute, and evaluate drilling operations in exploration projects.

Course code: SOU20244
Course Name: Rock Mechanics
ECTS Number: 6
Pre-requisite:

Rock Mechanics plays a critical role in both petroleum and Sustainable Geoenergy engineering as it deals with the behavior of rocks and rock masses in subsurface environments. The program aims to equip students with the knowledge and skills necessary to understand and manage rock-related challenges encountered in petroleum and Sustainable Geoenergy operations. The curriculum typically includes a combination of core courses, specialized subjects, and practical training.

Course code: SOU20240
Course Name: Petroleum Production Surface Facilities
ECTS Number: 6
Pre-requisite:

This course presents a basic overview of all typical oilfield treating and processing equipment. Participants should learn not only the purpose of each piece of equipment but how each works. Emphasis is on gaining a basic understanding of the purpose and internal workings of all types of surface facilities and treating equipment.

Course code: SOU20248
Course Name: Sustainable Energy Systems
ECTS Number: 6
Pre-requisite:

Sustainable Energy Systems is a specialized branch of engineering that focuses on the Overview of various sustainable energy sources (wind, solar, hydropower, etc.). The program aims to provide students with a comprehensive understanding of the principles and technologies involved in the Integration of sustainable energy into the broader energy landscape.

Course code: SOU20260
Course Name: Petroleum Reservoir Engineering
ECTS Number: 6
Pre-requisite:

Types of traps; Fluids distribution; Types of oil reservoirs; Porosity, compressibility; permeability; Poueseli law, Kozeny Equation, Darcy's law; measurements of permeability, Klinkenberg effect; Gas flow equation; Radial flow; Productivity equation; radial flow of gas; average permeability for stratified reservoirs; Flow through channels and fractures; Saturation; Capillary pressure; Wettability; Multiphase flow through porous media; Linear flow (piston like, leaky piston); Effective and relative permeability; Calculation of relative permeability; Fractional flow equation; Buckley-Leverett equation; Gas properties (Boyle and Charles laws; Avogadro law; Dalton law, equation of state); compressibility factor; liquids properties (PVT); viscosity, classification of reservoirs according to P-T diagram, Phase behavior; calculation of bubble point and dew point; behavior of non-ideal liquids; flash and differential degassing; determination of reservoir liquids; properties of formation water; Volumetric calculation of reservoirs; Isobar, Isobach, Isoporosity and bubble maps. Material balance equation; Material balance for water derive and gas derive reservoirs; Calculation of reservoir pressures.

Course code: SOU20257
Course Name: Geomechanics
ECTS Number: 6
Pre-requisite:

The course provides students with the fundamental knowledge required to undertake geomechanical investigations and design tasks. This course consists of Soil and Rock Mechanics Modules including the basics of rock and soil behaviours. Soil Mechanics Module comprises of basic soil mechanics, soil classification, phase relationships, effective stress, seepage and flow, compaction and shallow foundations. Rock Mechanics Module consists of rock material and rock mass behaviours, rock mass strength and deformability, strength of discontinuities, basic rock testing, rock mass classification systems, response of rock mass to underground excavation, stress measurement, time dependant and dynamic behaviour of rocks and rock slope stability

Course code: SOU20252
Course Name: Drilling Fluid and Cementing
ECTS Number: 6
Pre-requisite:

Introduction to drilling; classification of drilling operations; Properties and functions of drilling fluid; types and properties of clay in water; types of drilling fluids; drilling hazards dependent on mud control; drilling mud calculations, drilling methods (cable tool drilling, rotary drilling), basic component of rotary drilling equipment; drilling string and accessories; types of bits; casing of oil wells; functions of casing, types of casing, strings, parameters of casing design, selection of casing and bit types, design of string, graphical design of casing; cementing of oil wells, classification and properties of cements, classification of cementing

operations, cementing equipment, methods and calculations of cementing; Hydraulics of primary cementing operations.

Course code: SOU20258
Course Name: Subsurface exploration
ECTS Number: 6
Pre-requisite:

Subsurface exploration is a critical aspect of both petroleum and Sustainable Geoenergy engineering. It involves studying the characteristics of the subsurface to identify and assess potential resources, understand geotechnical conditions, and design safe and efficient engineering projects. Below is a program curriculum synopsis that combines key topics relevant to both petroleum and Sustainable Geoenergy engineering: Introduction to Subsurface Exploration, Geology and Sedimentary Environments, Well Logging and Petrophysics, Sustainable Geoenergy Exploration and Resource Evaluation, Case Studies and Field Trips, Emerging Technologies in Subsurface Exploration

Course code: SOU20259
Course Name: Petroleum and Sustainable Geoenergy Economics
ECTS Number: 6
Pre-requisite:

Oil and gas reserve, organizations of petroleum and Sustainable Geoenergy exporting and importing countries, international supply and demand of petroleum and Sustainable Geoenergy, classification of petroleum and Sustainable Geoenergy, petroleum and Geoenergy resource pricing, alternative energy, international strategy of energy, time value of money, types of interest rates, rate of return, methods of engineering decisions, depreciation, depletion, amortization, taxation, inflation, sensitivity analysis of engineering projects, risk analysis production decline curves, evaluation of future production of oil and gas well sand ,Expenditure and Net present value.

Course code: SOU20245
Course Name: Properties of Petroleum Products
ECTS Number: 6
Pre-requisite:

The overall purpose of this course is to provide students with an understanding of the properties of Petroleum, natural gas, petroleum refined and Sustainable Geoenergy products. The knowledge included are on chemical composition and properties of petroleum (oil and gas), petroleum products and alternative fuels. Hands on skills, behaviors and attitudes are demonstrated in the laboratory, as testing techniques are taught. The course will also review the chemical engineering basis for the most important refinery processes.

Course code: SOU20254
Course Name: Health, Safety and Environment (HSE)
ECTS Number: 6
Pre-requisite:

The course deals with: Objectives for work with Health, Safety and Environment (HSE). Regulations and guidelines concerning HSE-work, Systematic HSE work, Reporting of HSE problems and discrepancies, Risk Assessment, HSE responsibilities, roles and resources worldwide generally and Kurdistan Region inclusively, Emergency preparedness: what are you going to do and who to notify when something happens, Fire protection-theory and practical exercises using fire extinguishing equipment, First aid-theory and practical exercises in heart-lung resuscitation and the use of heart starter. The course does not provide specific training in HSE aimed at various laboratory fields and activities. This training is done by the individual departments and is a little bit different for any work environment depends on it's own regulations.

Course code: SOU20265
Course Name: Petrophysics
ECTS Number: 6
Pre-requisite:

Petrophysics is a specialized field that focuses on characterization of rock formations in Sustainable Geoenergy, petroleum engineering projects. The curriculum provides students with an understanding of the principles, methods, and practical applications of petrophysics.

Course code: SOU20266
Course Name: Reservoir Management
ECTS Number: 6
Pre-requisite:

Reservoir Management is a multidisciplinary field that deals with the efficient and sustainable exploitation of hydrocarbon reservoirs. It involves the integration of geoscience, engineering, and economic principles to optimize production and recovery from oil and gas reservoirs.

Course code: SOU20255
Course Name: Petroleum Refinery

ECTS Number: 6
Pre-requisite:

This course is intended to provide chemical and petroleum engineering students with a background in petroleum refining processes including separation, production, catalytic chemical processes as well as treatment processes for removing contaminants from crude oil and products. Manufacturing processes carried out in petroleum refineries including manufacturing of synthetic fuels, lubricating oils and some chemicals and plastics are also demonstrated. The objectives of all the refining processes s are highlighted by studying the process variables supported by the corresponding schematic flow diagrams.

Course code: SOU20250
Course Name: Well completion and Intervention
ECTS Number: 6
Pre-requisite:

The upstream of the petroleum industry involves itself in the business of oil and gas exploration and production activities. While the exploration activities find oil and gas reserves, the production activities deliver oil and gas to the downstream of the industry (i.e., processing plants). The petroleum production is definitely the heart of the petroleum industry.
Petroleum production engineering is that part of petroleum engineering that attempts to maximize oil and gas production in a cost-effective manner. To achieve this objective, production engineers need to have a thorough understanding of the petroleum production systems with which they work. To perform their job correctly, production engineers should have solid background and sound knowledge about the properties of fluids they produce and working principles of all the major components of producing wells and surface facilities.

Course code: SOU20267
Course Name: Energy Storage Systems
ECTS Number: 6
Pre-requisite:

Energy Storage Systems is a comprehensive course designed to provide students with an in-depth understanding of the Technologies for storing energy from renewable sources within Sustainable Geoenergy operations. The course covers various methods of Integration of energy storage in sustainable energy systems.

Course code: SOU20272
Course Name: Well Testing
ECTS Number: 6

Pre-requisite:

This course will focus on the different types of tests and techniques, both analytical and graphical, for data representation and analysis of well tests. Types of techniques covered will include diagnostic plots-derivative for draw down, and build up tests. Participants will learn about the interpretation of complex data, such as those from well test in naturally fractured reservoirs, hydraulically fractured wells, horizontal wells, along with gas and gas condensate reservoirs.

Course code: SOU20261
Course Name: Field and technical Reports
ECTS Number: 6
Pre-requisite:

The Field and Technical Reports course is designed to equip students with the necessary skills to effectively document and communicate findings from fieldwork and technical analyses in the petroleum and Sustainable Geoenergy engineering sectors. The course covers various aspects of report writing, data analysis, interpretation, and presentation, ensuring that students are capable of producing high-quality reports that are critical for decision-making and project management.

Course code: SOU20268
Course Name: Energy Policy and Regulations
ECTS Number: 6
Pre-requisite:

The Sustainable Geoenergy Surveying course is designed to equip students with the fundamental concepts and practical skills required for conducting accurate and efficient Study of national and international energy policies in Sustainable Geoenergy environments. The course covers various energy policies, , and software used in Sustainable Geoenergy, ensuring that students are capable of providing crucial data for energy planning, design, and safety.

Course code: SOU20276
Course Name: Life Cycle Assessment (LCA) of Energy Systems
ECTS Number: 6
Pre-requisite:

The Principles of Life Cycle Assessment (LCA) of Energy Systems course aims to equip students with a solid foundation in the principles, techniques, and technologies used to Evaluation of the environmental impact of energy systems. The course covers various aspects of Application of LCA principles to assess sustainability. Students will learn about the scientific and engineering principles underlying these

processes, enabling them to contribute effectively to Evaluation of the environmental impact of energy systems.

Course code: SOU20277
Course Name: Ground Control and Support
ECTS Number: 6
Pre-requisite:

The Ground Control and Support course is designed to provide students with a comprehensive understanding of the principles, methods, and technologies used to ensure the stability and safety of Sustainable Geoenergy excavations. The course covers various aspects of ground control, including rock mechanics, support systems, monitoring, and risk assessment. Students will learn to apply these principles to prevent ground failures and maintain a safe working environment in Sustainable Geoenergy operations.

Course code: SOU20278
Course Name: Sustainable Practices in Petroleum Engineering
ECTS Number: 6
Pre-requisite:

The Sustainable Practices in Petroleum Engineering course aims to equip students with a comprehensive understanding of different Sustainable drilling and production practices methods and techniques used in both surface and underground operations. The course covers various aspects of Environmental considerations in oil and gas projects, including exploration, planning, equipment selection, extraction, safety considerations. Students will gain insights into the challenges and opportunities in the petroleum industry and how to effectively manage mining petroleum.

Course code: SOU20270
Course Name: Reservoir Simulation
ECTS Number: 6
Pre-requisite:

Interpolation,(Linear; Lagrange); Matrices, Review of matrix properties, Determinants, inverse of matrix; Solution of system of linear equations (Gaussian elimination, Gauss Jordan method, Jacobi method, Gauss Seidel method); Least square method (Linear equations; Polynomial equations); Reservoir simulation (Introduction, types of simulators); Flow through Porous Media (derivation of single-phase, onedimensional flow equation, Two and three-dimensional flow equation); Finite Difference Method (Taylor series; Forward difference; Backward difference; Central difference; Concepts of explicit and implicit methods); Solution of system of difference equations (tridiagonal algorithm); Use of Irregular Gridding: Transmissibility; The finite difference form of the flow equation in terms of Transmissibility; Averaging of rock and fluid properties; Solution of radial form of the flow equation; Two dimensional flow, setting up the finite difference form;

Ordering schemes; Standard row ordering; Standard column ordering; Resulting matrix structure; Introduction to multi-phase flow through porous media.

Course code: SOU20269
Course Name: Natural Gas Engineering
ECTS Number: 6
Pre-requisite:

Understanding and modeling of multiphase flow in geological formation is required for making decisions associated with the management of natural gas reservoirs. This course will cover the basic theory and analytical computation of natural gas flow in porous media. In the class, we present not only the models that describe phenomena of natural gas flow in porous media, but also emphasize the theoretical foundation and the various assumptions that simplify the complex reality to the extent that it can be described by rather simple and solvable models. We will first provide basic physical laws governing flow and transport in porous media, and then we discuss rock and fluid properties. Then derivation of mathematical models for multiphase flow in porous media will be covered. Since the equations governing a mathematical model of a reservoir can be solved by analytical methods in general. We will be formulated and discussed in details for the pressure equation and the saturation equation (for immiscible flow) or the gas condensate transport equation (for compositional flow).Properties of gases; gas system analysis; gas flow through P. M.; gas transportation, gas treatment & liquefaction; gas sweetening and dehydration.

Course code: SOU20279
Course Name: Renewable Energy
ECTS Number: 6
Pre-requisite:

The Renewable Energy Integration in Petroleum Operations course is designed to equip students with the necessary knowledge and skills to create detailed and effective Integration of renewable energy sources in oil and gas facilities. The course covers various Case studies on hybrid energy systems design, including geological assessment, infrastructure planning, equipment selection, and economic analysis. Students will learn how to integrate technical, economic, and environmental factors to create Renewable Energy Integration.

Course code: SOU20273
Course Name: Enhanced Oil Recovery (EOR) and Sustainable Practices
ECTS Number: 6
Pre-requisite:

To enable the students to understand the basics of oil recovery methods in oil & gas Industry. The subject is Enhanced Oil Recovery (EOR) and Sustainable Practices used to improve recovery beyond that expected by

pressure depletion. Water injection, hydrocarbon (HC) gas injection, and combined water/gas injection (WAG) are the most common EOR methods used in the industry today.

Other EOR methods (typically more expensive and technically more complicated) covered are non-hydrocarbon (CO2 and N2) injection, compositional effects e.g vaporization, and developed miscibility, both in conventional reservoirs and naturally fractured reservoirs.

The course will primarily consider reservoir aspects of EOR methods using HC gas and water injection. Key parameters include microscopic (pore-level) recovery, areal and vertical sweep efficiency. Variations in reservoir rock i.e. heterogeneities and fluid property variations with depth can have a strong influence on the success of EOR methods. Therefore we will concentrate on accurate geologic and fluid description and its influence on recovery.

Course code: SOU20272
Course Name: Well testing
ECTS Number: 6
Pre-requisite:

This course starts with introducing the purpose of well testing and the basic methodology. The theory and fundamental equations, as well as various understanding analytical solutions are covered before introducing specific analysis techniques for homogeneous oil and gas reservoirs. Non-homogeneous situations and more advanced topics are also covered. Assumptions made in deriving equations and solutions and models used in test interpretation are stressed. Operational aspects are covered in terms of test design and use of specialised testing equipment. The course covers well test objectives and concepts; fluid flow equations and fundamental solutions; classical methods for drawdown and build-up analysis, bounded reservoirs, gas well testing, dual-porosity, hydraulic fractures, interference and pulse testing, test design.

Overview of practical methods, some field examples and browsing the commercial software will introduce students into practice of well testing and pressure transient analysis.

Course code: SOU20271
Course Name: Capstone Project
ECTS Number: 6
Pre-requisite:

Students as groups (of 3 or 4) are requested to carry out a study on one of the problems related to petroleum and Sustainable Geoenergy engineering under the supervision of one of the staff members. Each group must submit a report before the end of the second term. The students must give a presentation of their work to an interview committee of staff members.

Course code: SOU20264
Course Name: Petroleum Production Engineering
ECTS Number: 6

Pre-requisite:

Well completion operations (parameter of design, completion methods, equipment, completion fluids); perforation of oil and gas wells (perforation methods, selection of perforation intervals); water and gas coning; methods for deterSustainable Geoenergy oil production rate without coning; completion efficiency, drill stem test (DTS) (test method, equipment, pressure versus time curve, theory of pressure buildup, reservoir properties obtained, depletion); Helical buckling of tubing (forces, homogeneous completion, packers permitting free and limited motions, compound completion of wells); surface gathering systems (types of gathering systems, behavior of fluid flow, flow lines, essential flowing lines, valves); separation of oil, gas, & water (types of separators, components of separators and functions); oil storage (storage tanks and accessories, calibration, measurement of liquid level); Production by pumps (sucker and submersible pumps).

Course code: SOU20280
Course Name: Carbon Capture and Storage (CCS)
ECTS Number: 6
Pre-requisite:

The Carbon Capture and Storage (CCS) course aims to equip students with a deep understanding of the Principles of capturing and storing carbon emissions, including the Technologies and challenges of CCS implementation in the petroleum industry. The course covers various aspects of Carbon Capture and Storage.

Course code: SOU20281
Course Name: Geoenergy and Petroleum Environmental Impact Assessment
ECTS Number: 6
Pre-requisite:

The Geoenergy and Petroleum Environmental Impact Assessment course aims to equip students with the necessary skills and knowledge to provide Principles of environmental impact assessment. The course covers various aspects of Case studies on assessing and mitigating environmental impacts in energy projects. Students will learn how to integrate technical expertise to optimize energy processes and contribute to effective decision-making in the energy industry.

12- Credits, Grading and GPA -یەکەکان، شێوازی هەڵەچنین، نمرەی دەرچوون

ECTS, GRADING AND GPA	
CREDITS	Soran University is following Bologna Process with the European Credit Transfer System (ECTS) credit system. 1 ECTS is equivalent to 27 hours of student workloads, including structured and unstructured workload.

GRADING	Before the evaluation, the results are divided into two subgroups: pass and fail.Therefore, the results are independent of the students who failed a course. The grading system is defined as below:
GPA, CALCULATING	A: 90 - 100 B: 80 – less than 90 C: 70 – less than 80 D: 60 – less than 70 E: 50 – less than 60F: less than 50 Calculation of the Grade point Average (GPA) ▪ Each alphabetical grade is substituted by numerical equivalent: A=5.0, B=4.0, C=3.0, D=2.0 and E=1 ▪ The numerical equivalent is multiplied by the number of credits for thecourse ▪ The products of the course and credits are totaled ▪ The sum is divided by the total number of credits ▪ The quotient is calculated to three decimal points ▪ GPAs are not rounded up

13- Program Curriculum Structure (Typical) - پێکهاتەی پڕۆگرامی خوێندن

Curriculum – BSc. in Petroleum and Geoenergy Engineering

Semester I

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205001	Information Technology	2		4		7		
2	SOU205002	General Physics	3			1	6		
3	SOU205003	General English	2				4		
4	SOU205004	Kurdology	2				4		
5	SOU205005	Calculus	3			1	6		
6	SOU205006	Engineering Ethics	2				3		

Semester 2

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205010	Academic Skills	2				4		
2	SOU205011	Engineering Chemistry	2	3			6		

3	SOU205012	Critical Reading and Writing	2				4		
4	SOU205013	Engineering Mathematics	3			1	6		
5	SOU205014	General and Structural Geology	2	3			6		
6	SOU205015	Carier Skill	2				4		

Semester 3

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205020	Thermodynamics	3			1	6		
2	SOU205021	Introduction to Petroleum and Geoenergy Engineering	3			1	6		
3	SOU205022	Reservoir Fluids Properties	2	3			6		
4	SOU205023	Partial Differential Equation	3			1	6		
5	SOU205024	Statics and Strength of Materials	3			1	6		

Semester 4

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205030	Fluid Mechanics	2	3		1	6		
2	SOU205031	Petroleum Geology	2		3		6		
3	SOU205032	Numerical Methods	3			1	6		
4	SOU205033	Reservoir Rock Properties	2		3		6		
5	SOU205034	Petroleum Geophysics	3			1	6		
6									

Semester 5

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205040	Introduction to Drilling Systems	3			1	6		
2	SOU205041	Fundamental of Reservoir Engineering	3			1	6		
3	SOU205042	Introduction to Geothermal Engineering	3			1	6		
4	SOU205043	Formation Evaluation with Well-logs	2		3		6		
5	SOU205044	Fundamental of Petroleum and Geo-Energy Geomechanics	3			1	6		
6	SOU205045	Renewable Energy	3			1	6		

Semester 6

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205050	Reservoir Engineering	3			1	6	C	
2	SOU205051	Introduction to underground storage	3				4	E	
3	SOU205052	Health, Safety and Environment (HSE)	3				4	C	
4	SOU205053	Petroleum Production Surface Facilities	3		3		6	C	
5	SOU205054	Drilling Fluid and Cementing	2			1	6	C	
6	SOU205055	Entrepreneurship	3				6	S	
7	SOU205056	Unconventional reservoir Engineering	3					E	

Semester 7

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	Pre-request
1	SOU205060	Well Testing	3			1	6	C	
2	SOU205061	Fundamental of well control	3			1	6	C	
3	SOU205062	Research Methodology	2				6	C	
4	SOU205063	Petroleum and Geo-Energy Economics	2				3	C	
5	SOU205064	Production Engineering	3			1	6	C	
6	SOU205065	Petroleum Refinery	3			1	6	E	
7	SOU205066	Natural Gas Engineering	3			1	6	E	

Semester 8

No.	Code	Suggested Modules	Th	T	L	P	ECTS	Type	
1	SOU205070	Reservoir Simulation	2		3		6	C	
2	SOU205071	Enhanced Oil Recovery	1		5		6	C	
3	SOU205072	Well Completion and Intervention	2		3		6	C	
4	SOU205073	Capstone Project	3			1	6	C	
5	SOU205074	Data Minig in Petroleum Engineering	3			1	6	E	
6	SOU205075	Artificial intelligence and digital transformation	3			1	6	E	

14- Academic Staff

No.	Name	Qualification	Designation	Email
1	Hewa Hussein Omar	PhD	Head of Department	hewa.omar@soran.edu.iq
2	Jagar Abdulaziz Ali	PhD	Assistant professor	jagar.ali@soran.edu.iq
3	Namam Mahmud Salih	PhD	Assistant professor	namam.salih@soran.edu.iq
4	Abbas Khaksar Manshad	PhD	Assistant professor	khaksar@put.ac.ir
5	Fwad Hatam Yousefi	M.Sc	Coordinator	foad.yousefi@soran.edu.iq
6	Nizar Shaker Piro	M.Sc	Lecturer	nzar.piro@soran.edu.iq
7	Sarkar Muhddin Hamma	M.Sc	Lecturer	sarkar.hama@gmail.com
8	Shahab Ahmad Ahmadiazar	M.Sc	Assistant lecturer	shahab.abdulla@soran.edu.iq
9	Fenk Abdulrazaq Sleman	BSc	Assistant lecturer	fenk.sleman@gmail.com
10	Rekar Najat Ahmad	BSc	Lab Assistant	rekar.ahmad@foe.soran.edu.iq

15- Contact

CONTACT INFORMATION	
Dr. **Hewa Hussein Omar**	Program chair Ph.D. Mechanical Engineering hewa.omar@soran.edu.iq
Mr. **Fwad Hatam Yousefi**	Program coordinator, MSc Petroleum Engineering foad.yousefi@soran.edu.iq

16- Conclusion

The transition from Petroleum Engineering to Petroleum and Geo-Energy Engineering is a necessary step to align with global energy trends. By integrating geo-energy, AI, and sustainable resource management, this change ensures that our graduates are ready for the future energy industry.This transformation strengthens our department's reputation, provides students with better job opportunities, and ensures that our curriculum remains relevant.