



PHOENICIA UNIVERSITY

Innovation . Inspiration . Integrity

College of Engineering

Suggested Petroleum Engineering Degree Plan

2023-2024

College of Engineering

COE Curriculum

The Engineering curriculum at PU is designed to provide the students with broad, yet robust foundations in mathematics, basic science, and core engineering specialty within the context of a broad liberal arts academic environment. In addition to the science and engineering courses, our students are required to take general education courses, a necessary stepping stone for being well-rounded engineers. Besides conceptual/theoretical learning, the curriculum also emphasizes experiential learning as well as teamwork via laboratory work, practical training, and other types of hands-on experiences.

BE Program Design

The BE degree is awarded upon the satisfactory completion of 147 course credits. The program is a five-year program with the possibility to be completed in a four-year time period should the students elect to take courses during the summer term.

The breakdown of the engineering program courses is as follows:

- ***General Education courses – 30 credits***

These are common courses that all students will take with minor variations pending College selection. The target is to instill a significant dose of liberal arts education in the minds of engineering students. In this respect, the General Education requirement is a precondition for graduation.

- ***Free Elective course – 3 credits***

This course gives the students the opportunity to take a course of their choice to expand their horizon, and gain knowledge in a topic that matches their own interests.

- ***Core courses – 114 credits***

This category is divided into six groups of courses:

1. *Basic science and math requirements:* These science and math courses serve as the foundations to subsequent engineering courses.
2. *General Engineering common course requirements:* These are generally common and required engineering courses spanning across various engineering disciplines. In addition, students from any engineering discipline have the flexibility to take a 3-credit elective course from the general engineering course offering.
3. *Discipline-specific technical course requirements:* These courses represent the backbone technical knowledge necessary to gain proficiency and competency in a specific engineering discipline. The course offerings integrate a depth and breadth of expertise within each engineering discipline.
4. *Capstone design project:* All engineering departments have a 4-credit capstone design project course that the students should take in their final two semesters prior to graduation.

5. *Technical electives*: All engineering departments offer a minimum of 6 credit courses of technical electives. These courses offer opportunities for students to further deepen their knowledge in their program of study.
6. *Practical training – 0 credit (Pass / Fail basis)*. The students are expected to have an eight-week of professional training in an area related to their engineering discipline. This training provides a hands-on experience while giving the students a glimpse on what to expect in their career post-graduation. In addition, this is a unique opportunity to land a job and/or network with influential people in a specific engineering discipline.

Graduation Requirements

- Course fulfillment: Students need to complete all academic requirements needed according to the BE program.
- Residence Requirements: Students must maintain full-time status over four regular consecutive semesters with at least 12 credits of completed courses per semester.
- Academic Performance: Students must obtain a minimum “Program GPA” of 2.0 and a minimum “Cumulative GPA” of 2.0; no rounding (e.g., a GPA of 1.99) —whatsoever—will be applied. Additionally, students must obtain a minimum core-course GPA of 2.0.
- Graduation Clearance: Students must obtain “Graduation Clearance” as detailed in the following section.
- College satisfaction: Students must exhibit personal and professional conduct in compliance with the “Student Conduct Policy”.

Graduation Clearance

Upon reaching senior-level status, students must fill out the graduation clearance form after completing all their degree requirements. The graduation clearance form should be signed by the following personnel: Departmental Coordinator, Dean of College, IT Director, Library Coordinator, Finance Director, Registrar Director, Career Center Director, Head of the Exit Interview Committee, President, and Chancellor. Failure to do so will delay graduation.

COE Course Nomenclature

COE course structure and nomenclature is derived based on departmental course requirements and the common general course requirements:

- General Engineering courses – GENG
- Civil & Environmental Engineering courses – CENG
- Electrical & Communication Engineering courses – EENG
- Mechanical Engineering courses – MENG
- Petroleum Engineering courses – PENG

Department of General Engineering

The Department of General Engineering was established in 2015. This department is an engineering service department; hence, it is a non-degree conferring department. The department offers basic engineering courses covering technical, managerial, economic, and professional expertise.

GENG Course Description

GENG 201. Introduction to Engineering – 3 cr.

This is an introductory course that gives a background to different types of engineering majors. Basic engineering projects are assigned so that students develop their individual and teamwork skills. At the end of this course, students are expected to understand the role of an engineer in society, and be able to identify the field of engineering as matching their interests. **Concurrent prerequisite: ENGL 101**

GENG 202. Statics – 3 cr.

The course covers the principles of force and moment vectors, the distribution of loads, the use of free-body diagrams and the internal forces, with applications to shear and moment diagrams under different loading conditions. **Concurrent prerequisite: MATH 201**

GENG 203. Dynamics – 3 cr.

This course presents the fundamentals of engineering dynamics, namely kinematics and kinetics. Students will learn to apply kinematics and kinetics to a particle and then move on to the principles of work and energy and impulse and momentum. These concepts are then applied to rigid bodies. **Prerequisite: GENG 202**

GENG 205. Engineering Drawings & Tools – 3 cr.

The course teaches undergraduate students the fundamentals of engineering drawing. Technical engineering drawing is covered in details: orthogonal projections, sectional views, auxiliary views, dimensions and detailing. Applications focus on using a computer to generate CAD drawings and designs (AutoCAD).

GENG 206. Mechanics of Materials – 3 cr.

This course covers the mechanical behavior (stress-strain relationships) of different materials under tension, compression, bending, and shear stress. Mohr's circle, transformation equations, and Hooke's law are discussed. **Prerequisite: GENG 202**

GENG 207. Probability & Statistics in Engineering – 3 cr.

Covered topics include understanding and interpreting statistical measures, calculating probabilities associated with multiple events as well as common probability distributions. Other covered topics include conditional probability, Bayes theorem, correlation, linear regression, confidence intervals, and hypothesis tests. The course will be given from an Engineering perspective, with focus on solving probability and statistics problems in Engineering. (*Students can substitute GENG 207 with STAT 202 (Students cannot receive credit for both GENG 207 and STAT 202)*)

GENG 208. Thermodynamics – 3 cr.

This introductory course in Thermodynamics provides students with the tools (laws, skills, etc.) required to solve classical problems involving open and closed thermodynamic systems. From the basic zeroth law of thermodynamics to the energy conservation expressed in the first law to the concept of entropy generation in the second law, students learn to calculate work, heat transfer, and compare real systems to theoretical systems having maximum efficiency.

GENG 209. Fluid Mechanics – 3 cr.

This course covers the fundamentals of fluids properties and the principles of fluid mechanics. Topics include fluid statics, fluids in motion, drag and lift, hydraulic design, energy and momentum principles, turbulent and laminar flows, and measurement techniques. Other applications include Bernoulli's and Euler's equations. **Prerequisite: GENG 202**

GENG209L. Fluid Mechanics Laboratory – 1cr.

The laboratory introduces the students to the basic fluid mechanics experiments to supplement theoretical concepts covered in the classroom. **Corequisite: GENG 209**

GENG 210. Electric Circuits – 3 cr.

This course covers electric circuits' fundamentals. Starting with basic circuit variables, definitions, and relationships, to DC circuit analysis tools, such as node and mesh analysis, source transformations, Thevenin and Norton equivalent circuits, and maximum power transfer. Students will also cover AC circuit basics, basic inductor and capacitor circuits, phasor analysis, AC power calculations, and steady-state and transient responses.

GENG 211. Material Science – 3 cr.

This course covers the relationship between the structure of materials (metals, ceramics, and polymers) and their optical, thermal, mechanical, and electrical properties. It also includes the study of the bonding and atomic structure of materials including the crystal structures and defects. Microstructural development and phase equilibria will also be covered.

GENG 212. Introduction to Engineering Programming – 3 cr.

This course aims to familiarize students with programming as a tool for solving Engineering problems. It encompasses the fundamentals of computer programming, such as language structure, arithmetic operations, operator precedence, file input and output, conditions, loops, functions, arrays, and memory allocation. The course also includes 2.5 teaching hours of weekly lab sessions.

Non-Technical Core General Engineering Courses

GENG 204. Engineering Economics – 3 cr.

This course investigates methods of economic analysis for decision making in engineering applications. Topics include cost of capital, net present value, rates of return, investment decision, replacement analysis, capital financing and financial statement analysis.

GENG 213. Accounting & Finance for Engineers – 3 cr.

The intent of this course is to provide engineering students with the information and skills necessary to understand the language of business and, accordingly, make informed financial decision making at both an operational level and a business enterprise level. Some of the covered topics include basic principles in financial/managerial accounting, the generation and understanding of financial statements, ratio analysis, financial planning and growth, capital asset pricing model, cost of capital, capital structure and other relevant topics. **Prerequisite: GENG 204**

GENG 214. Engineering Ethics, Leadership & Professionalism – 3 cr.

This course is an analytical excursion into the behavioral aspects of the engineering leader, particularly as it relates to the moral responsibility of the engineering leader. The course first introduces the fundamental leadership theories, namely the traits' approach, the behavioral approach, the contingency approach and the contemporary approach. The course then tackles moral philosophy, including universalism, utilitarianism, relativism, egoism, and virtue ethics. The course further tackles engineering professionalism from the standpoint of how engineers ought to practice and conduct themselves to be good stewards of the profession and society. The course then explores the relative effectiveness of ethics programs, such as compliance-based versus integrity-based ethical programs. Finally, the relevance and importance of engineering licensure will be discussed. **Prerequisite: ENGL 201**

GENG 216. Engineering Management & Public Policy – 3 cr.

This course exposes students to the fundamentals of engineering management principles and exposes them to the policy making process that integrates political, economic, social, technological, ecological (sustainability) and legal considerations. **Prerequisite: MNGT 201**

GENG 217. Strategic Management for Engineers – 3 cr.

This course is an integrative, big-picture course in which the engineering professional learns the key strategic issues facing managers in engineering corporations, including strategy formulation, strategy implementation, and strategy evaluation. This course enables the student to appreciate the integrative nature of engineering in relation to other core functional disciplines such as finance, accounting, marketing, sales supply chain, and human resources. This course heavily relies on case studies and/or simulation games. **Prerequisite: GENG 216**

GENG 218. Advanced Engineering Economics – 3 cr.

This course exposes the engineering students to advanced topics in economics and finance. Some covered topics include cost of capital, financial engineering, risk diversification, and valuation tools for the levered and unlevered firm/project. This is an experiential learning course that heavily makes use of simulation techniques via spreadsheets. **Prerequisite: GENG 204**

GENG 219. Effective Communication for Engineers – 3 cr.

This course provides engineering students with the effective communication skills necessary to convey engineering ideas and technical information through well-developed oral presentations and written reports. Students will learn how to prepare persuasive engineering presentations, write technical reports, and communicate across different contexts and situations team members and leaders. **Prerequisite: ENGL 201**

GENG 220. Advanced Engineering Programming– 3 cr.

This course introduces students to MATLAB specific programming topics that are relevant to Engineering. Topics include: Vectorization, 2D and 3D plots, timer functions, hardware interfaces, and creating Graphical User Interfaces. The course includes a project where students create a complete MATLAB application that supports one of their other course requirements. **Prerequisite: GENG 212**

General Engineering Courses across various Engineering Departments

Course Code	Course Title	Prerequisite(s)
MENG210	Advanced Thermodynamics	GENG208
MENG220	Mechanics of Machines	GENG203
MENG225	Characterization & Properties of Materials	GENG211
EENG202	Analog Signal Processing	GENG210
EENG211	Fundamentals of Microcontrollers	GENG212 or CMPS200
EENG251	Power & Machines	GENG210
CENG202	Geology for Engineering	ENGL101 (<i>concurrent prerequisite</i>)
CENG240	Hydraulics & Hydrology	GENG209
CENG260	Construction & Project Management	ENGL201 & GENG204
PENG202	Petroleum Geology	ENGL101 (<i>concurrent prerequisite</i>)
NB: Any of the above listed courses can be deemed as a general engineering elective, given that the course is not part of the student's degree plan and that the prerequisite(s) is/are met.		

Department of Petroleum Engineering

The Department of Petroleum Engineering, established in 2015, offers a BE in Petroleum Engineering. Petroleum engineering is a program designed to satisfy the growing demands of the industry. It fosters creative thinking and motivation for an ongoing learning experience; it is focused towards the development of the capabilities of students to work independently and adapt in a multinational environment. Graduates are trained to meet the challenges encountered in the exploration and production of oil and gas natural resources whether on shore or offshore in Lebanon and elsewhere. The curriculum is tailored for national and international accreditation.

PENG Program Educational Objectives

Within the first few years following graduation, the program's graduates are expected to:

- PEO1. Be competent professionals in the petroleum industry.
- PEO2. Have the breadth and in-depth technical knowledge and the required professional skills to assume leadership positions.
- PEO3. Be committed lifelong learners via graduate studies and continuous professional career development.
- PEO4. Exhibit ethical and professional judgment in understanding the impact of the design and implementation of petroleum engineering tools, mechanisms, and processes by accounting for economic, safety, societal, and environmental considerations.

PENG Program Design

The BE degree is awarded upon the satisfactory completion of 147 course credits. The program is a five-year program with the possibility to be completed in a four-year time period should the students elect to take courses during the summer term.

General Education Courses	
Arabic	3 Credits
English	6 Credits
Communication	3 Credits
Computing	3 Credits
Civilizations	6 Credits
Basic Science	3 Credits
Social Science	3 Credits
Globalization & World Cultures	3 Credits
Total GE Courses	30 Credits
Free Elective Courses	
Free Electives	3 Credits
Total Free Elective Courses	3 Credits
Core Math & Science Courses	
Math Courses	15 Credits
Science Courses	6 Credits
Total Core Math & Science Courses	21 Credits
Core General Engineering Courses	
GENG Courses	37 Credits
Total GENG	37 Credits
Petroleum Engineering Courses	
Core Courses	46 Credits
Professional Internship	0 Credits
Capstone Project	4 Credits
Engineering Technical Electives	6 Credits
Total PENG Courses	56 Credits

Suggested Petroleum Engineering Degree Plan

First Year					
Fall 1			Spring 1		
Course	Title	Wt.	Course	Title	Wt.
ENGL 201	English 1	3	ENGL 202	English 2	3
GENG 201	Introduction to Engineering	3	GENG 205	Engineering Drawings & Tools	3
GENG 202	Statics	3	GENG 203	Dynamics	3
MATH 201	Calculus & Analytical Geometry	3	MATH 212	Differential Equations	3
CHEM 201	General Principles of Chemistry	3	PHYS 201	Introduction to Physics	3
CHEM 202	Introduction to Chemical Laboratory Techniques	2	PHYS 202	Introduction to Physics Lab	1
Total Credits		17	Total Credits		16

Summer 1		
Course	Title	Wt.
ARAB 201	Arabic 1	3
GENG 204	Engineering Economics	3
GENG 212	Introduction to Engineering Programming	3
Total Credits		9

Second Year					
Fall 2			Spring 2		
Course	Title	Wt.	Course	Title	Wt.
MATH 210	Linear Algebra	3	CIVL 201	Civilizations I	3
GENG 207	Probability & Statistics	3	GENG 206	Mechanics of Materials	3
GENG 208	Thermodynamics	3	GENG 209	Fluid Mechanics	3
GENG 211	Material Science	3	GENG 209L	Fluid Mechanics Laboratory	1
PENG 202	Petroleum Geology	3	GENG 210	Electric Circuit	3
			PENG 203	Fundamentals of Geophysics	3
Total Credits		15	Total Credits		16

Summer 2		
Course	Title	Wt.
CIVL 202	World Civilizations II	3
Math 213	Numerical Methods	3
CENG 231	Surveying	2
Total Credits		8

Third Year					
Fall 3			Spring 3		
Course	Title	Wt.	Course	Title	Wt.
MNGT 201	Principles of Management & Organizational Behavior	3	GENG 214	Engineering Ethics, Leadership & Professionalism	3
PENG 211	Reservoir Rock Properties	2	PENG 215	Completion & Workover	3
PENG 211L	Reservoir Rock Properties Lab	1	PENG 216	Reservoir Engineering	3
PENG 212	Petroleum Fluid Properties	2	GENG 216	Engineering Management & Public Policy	3
PENG 212L	Petroleum Fluid Properties Lab	1	PENG 218	Formation Evaluation & Well Logging	3
PENG 214	Drilling Engineering I	2	COMM 201	Communication Elective (Public Speaking)	3
PENG 214L	Drilling Engineering Laboratory	1			
XXXX XXX	Free Elective	3			
BCOM 300	Workplace Etiquette (Mandatory Workshop)				
Total Credits		15	Total Credits		18

Summer 3	
Course	Title
PENG 290	Professional Internship
Total Credits	

Fourth Year					
Fall 4			Spring 4		
Course	Title	Wt.	Course	Title	Wt.
PENG 217	Well Testing	3	SOCL 210	Globalization & World Cultures	3
PENG 291	Final Year Project I	1	PENG 292	Final Year Project II	3
PENG 219	Production Engineering	3	PENG 221	Drilling Engineering II	3
PENG 220	Natural Gas Engineering	3	PENG 222	Enhanced Recovery	3
PENG 223	Reservoir Simulation	3	PENG 224	Reservoir Management & Economics	2
XXXX XXX	Engineering Elective 1	3	XXXX XXX	Engineering Elective 2	3
Total Credits		16	Total Credits		17

PENG Technical Elective Courses

Course Details		Cr.
PENG 226	Petroleum Storage & Transmission	3
PENG 227	Artificial Lift	3
PENG 228	Corrosion in Oil & Gas Industry	3
PENG 229	Selected Topics in Petroleum Engineering	3
PENG 293	Honor Thesis	3
CENG 240	Hydraulics and Hydrology	3
CENG 241	Environmental Engineering	3

PENG Course Description

PENG 202. Petroleum Geology – 3 cr.

Basic concepts of geology are explained: reservoir rocks and minerals, sedimentary rocks, oil and gas accumulation and migration, timing and preservation of traps, porosity, migration and accumulation, subsurface geology and maps, basic understanding of concepts of field exploration (seismic; magnetic and gravity), and introduction to well logging and well development. **Concurrent prerequisite: ENGL 101**

PENG 203. Fundamentals of Geophysics – 3 cr.

Geophysical techniques are explained: inversion of geophysical data, traps, seismic reflection technique, seismic wave propagation and attenuation, seismic data acquisition, seismic data processing, seismic resolution, seismic modeling, seismic attributes, spectral decomposition, absorption, similarity/coherency/curvature, amplitude variations with offset, multicomponent seismic technique, vertical seismic profile, cross well seismic, gravity techniques, magnetic technique, electrical and electromagnetic surveys, and cross well electromagnetic technique. **Concurrent prerequisite: PENG 202**

PENG 211. Reservoir Rock Properties – 2 cr.

Petro physical properties of rocks are explained: Lithology, porosity, permeability and capillary pressure, Rock-fluid interactions, Reservoir fluid and gas properties including compressibility, phase behavior of ideal and real reservoir fluids and hydrocarbon vapor-liquid equilibria. The course also covers the derivation of the basic flow equations for real gas and their solutions and applications for analyzing gas well testing, including hydraulically-fractured gas wells. **Prerequisite: PENG 203**

PENG 211L. Reservoir Rock Properties Laboratory – 1 cr.

Core plug preparation is explained: core analysis, density, porosity, permeability, wettability, interfacial tension and contact angle, resistivity, water saturation, compressibility, and capillary pressure. **Concurrent prerequisite: PENG 211**

PENG 212. Petroleum Fluid Properties – 2 cr.

Fundamentals of phase behavior and properties of hydrocarbons as it related to petroleum recovery are explained: behavior of ideal and real gases, bubble point and dew point curves, characterization of reservoir fluids, API gravity, specific gravity, estimating reserves, PVT properties, single and multi-component two-phase systems, vapor-liquid equilibria and properties of reservoir fluids under varying conditions of temperature and pressure. **Prerequisite: GENG 208; Concurrent prerequisite: PENG 211**

PENG 212L. Petroleum Fluid Properties Laboratory – 1 cr.

Single and multiphase systems are explained: classification of reservoir fluids, compressibility factor, crude density and viscosity, gas solubility and viscosity, PVT determination under reservoir conditions, significance of PVT analysis to identify fluid behavior under reservoir conditions, and lab tests on fluids. **Concurrent prerequisite: PENG 212**

PENG 214. Drilling Engineering I – 2 cr.

The course exposes the students to the factors affecting the rate of penetration and addresses various drilling techniques such as horizontal and directional drilling, coiled tubing, multi-lateral drilling, and wellbore surveying techniques as well as subsurface pressure and temperature, casing, cementing, drilling fluids, hazards and safety, rotary drilling bit, drill string, and bottom-hole assembly design/evaluation. **Concurrent prerequisite: PENG 211**

PENG 214L. Drilling Engineering Laboratory – 1 cr.

This course explains drilling simulation with the objective of optimizing drilling operations, bit classification, hole problems, access well trajectory, blow out preventers (BOP), well safety and hazards, well killing, data acquisition, rate of penetration, and state of the art directional software is applied. **Concurrent prerequisite: PENG 214.**

PENG 215. Completion & Workover – 3 cr.

Completion techniques are explained: well bore productivity, perforation, completion fluids, sand control, subsea completion, workover operations, corrosion problems, and corrosion control. **Prerequisite: PENG 214**

PENG 216. Reservoir Engineering – 3 cr.

Properties and classification of oil and gas reservoirs are explained: fluid and rock characteristics of reservoirs, oil and gas calculations, material balance, reservoir depletion, flow characteristics, fractional flow, water flooding, and pressure control. **Prerequisite: PENG 211**

PENG 218. Formation Evaluation & Well Logging – 3 cr.

Modern well logging techniques are explained including resistivity logs, porosity logs, gamma ray logs and lithology logs, open-hole and cased-hole log interpretation methods, well design and safety, production logging, well logging tools, logging while drilling, logging on bit and geosteering, correlation between well logging and core analysis, radiation techniques, reserve estimation, and open hole and cased logging. **Concurrent prerequisite: PENG 214**

PENG 217. Well Testing – 3 cr.

Fluid flow methods are explained: diffusivity, build up, draw down and variable rate testing, drill stem testing, reservoir computer simulation techniques including design, production forecasting, optimization and economic analysis, performance prediction and optimization. **Prerequisite: PENG 216**

PENG 219. Production Engineering – 3 cr.

Reservoir oil and gas flow regime are explained: vertical, horizontal and multilateral production, offshore and deep water production, tight formations and fractured wells, multiphase flow, pumps, formation damage, hydraulic fracturing, stimulation, reserves estimation, and gas separation. **Prerequisite: PENG 215**

PENG 220. Natural Gas Engineering – 3 cr.

Phase behavior in multicomponent systems are explained: solubility of gas in reservoir fluids, flow regime, and non-Darcy flow, tight formations, and formation damage, compressibility factor and computations, gas production and liquefaction, sweetening and hydrate control. **Prerequisite: PENG 216**

PENG 221. Drilling Engineering II – 3 cr.

Controlled drilling is explained: managed pressure drilling, multilateral drilling, underbalanced drilling, modern drilling techniques, hole problems, well design and fishing operations, well control, offshore deep water drilling, directional drilling, directional trajectory, tubing, casing, and drill bits. **Prerequisite: PENG 214**

PENG 222. Enhanced Recovery – 3 cr.

Principals of enhanced recovery are explained: economic limits and cost of remedial intervention of abandoned reservoirs, immiscible displacement, water flooding, polymer flooding, surfactant flooding, gas flooding, mobility ratio, recovery efficiency, and thermal and microbial EOR. **Prerequisite: PENG 218**

PENG 223. Reservoir Simulation – 3 cr.

Application of modern commercial reservoir simulation software techniques are explained: model design concepts, fluid flow in porous media, single, multiphase and incompressible flow, diffusivity, data analysis and modeling, history match, and optimization techniques. Students will be introduced to state of the art industrial simulation software. **Prerequisites: GENG 212 and PENG 216**

PENG 224. Reservoir Management & Economics – 2 cr.

Concepts, tools and techniques of technical project management are explained: reserve estimates, risk management, cost estimates, analysis of profitability, spill control, environmental hazards, regional and global legislation and taxation, and economic incentives. **Prerequisites: PENG 216 and GENG 204**

PENG 226. Petroleum Storage & Transmission – 3 cr.

Handling and storage methods from well heads to safe locations are explained: storage of crude, condensate and gas procedures, design and construction of pipelines, pumping and boosting stations, pressure drop through transmission pipelines, onshore and offshore transmission, stock calculations and monitoring of storage systems. **Prerequisite: Senior Standing**

PENG 227. Artificial Lift – 3 cr.

Methods of artificial lift are explained: sucker rod pumping and design, economic value of artificial lift, design skills to choose most appropriate method, and modern technical tools for artificial lift techniques. **Prerequisite: Senior Standing**

PENG 228. Corrosion in Oil & Gas Industry – 3 cr.

Principals of corrosion in aqueous media are explained: three phase boundary, water and salt corrosion in exploration, drilling and production operations, corrosion detection in pipelines, methods of protection, and remediation, stress corrosion cracking, bacterial corrosion, and industrial case study. **Prerequisite: Senior Standing**

PENG 229. Selected Topics in Petroleum Engineering – 3 cr.

Topics may include advanced exploration, drilling or production technology. The course maybe offered as independent study given to one or more students in various oil and gas related fields. **Prerequisite: Senior Standing**

PENG 230. Topics in Petroleum Engineering (Downstream) – 3 cr.

In this course, students explore the various conditions crude oil experiences during its journey from rock formation to the wellbore and all the way to the surface through pipelines, pumps, and chokes. Students also explore the need to resolve the change in conditions form (O/W emulsions or W/O emulsions) at the surface through emulsion treater. This course stresses phase separation, desalting, de-sulfurization, de-nitronization, cracking, and reformation as essential processes in downstream operations. **Prerequisite: Senior Standing**

PENG 290. Professional Internship

This course encompasses an eight-week professional training in an area related to petroleum engineering. Students become eligible to register for this course after completing 90 credit hours.

Prerequisites: PENG 211, PENG 212, PENG 214, PENG 216, BCOM 300, ENGL 202, COMM 201, and MNGT 201.

PENG 291. Final Year Project I – 1 cr.

The intent of this course is to provide the students with the design experience on the application of petroleum and gas engineering in the context of Lebanon and the surrounding region. The group of students is expected to define the project, state its objectives, complete a literature survey, and select a design method(s) that will culminate in the completion of the project. The criteria to evaluate project proposal include a substantive evaluation of proposal content, an ability to communicate effectively (both orally and in writing), and a keen awareness of project management skills, health, safety, social, economic and environmental impacts of their proposals. **Prerequisites:** Senior Standing, PENG214, PENG215, PENG216, and Departmental Approval

PENG 292. Final Year Project II – 3 cr.

This course is a continuation of PENG 291: Final project 1. The students are expected to refine their designs following the feedback from an industrial outfit and their faculty mentor. The final output is in the form of an oral presentation and a written delivery. **Prerequisite:** PENG 291

PENG 293. Honor Thesis – 3 cr.

This course gives exceptional students the opportunity to work on a challenging research or industry project, where the outcome is either a research publication or industry prototype. **Prerequisite:** PENG 290

BCOM 300. Workplace Etiquette

This is a mandatory workshop that all students should successfully complete prior to their internships. The course comprises a series of workshops that focus on workplace etiquette and communication in formal and professional settings. In this course, students develop their business etiquette and professional practice skills in addition to their presentation skills so that they are well-equipped for their internships. **Prerequisite:** ENGL 201



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