Minor in Petroleum Engineering

The minor in Petroleum Engineering is open to AUB students from all majors, who have finished their first one academic year (non-engineering students) and their first academic two years (engineering students), and have attained a GPA ≥ 70.

Minor Program Requirements (18 Credits)

The Student taking the minor is required to complete 18 credits from the list given below. The student has to complete 9 credits of core courses and 9 credits of elective courses. (*If students took 2 out of the 4 core courses form the core courses list, the remaining 2 courses can be taken as an elective for the minor*).

Required Core Courses (9 Credits)

- PETR 200 Introduction to Petroleum Engineering [3 cr.] *Prerequisite: NA*

Two courses from the following list:

- PETR 322 / CHEN 595 Drilling Engineering I [3 cr.] *Prerequisite: NA*
- PETR 421 / CHEN 690 Reservoir Engineering [3 cr.] *Prerequisite: NA*
- PETR 432 / CHEN 592 Production Engineering [3 cr.] *Prerequisite: NA*
- PETR 312 / CHEN 593 Reservoir Petrophysics [3 cr.] *Prerequisite: NA*

Elective Courses (9 Credits) selected from the following courses:

- PETR 300 Petroleum Exploration [3 cr.] *Prerequisite: PETR 200 / CHEN 490*
- PETR 321 / CHEN 594 Reservoir Fluids [3 cr.] *Prerequisite: CHEN 214 / MECH 310*
- PETR 520 / CHEN 696 Reservoir Modeling [3 cr.] *Prerequisite: PETR 421 / CHEN 690*
- PETR 514 / CHEN 697 Reservoir Econ. & Risk Mngmnt. [3 cr.] *Prerequisite: PETR 421 / CHEN 690*
- CHEN 480 Safety and Loss Prevention [3 cr.] *Prerequisite: CHEN 312*
- CHEN 590 Petroleum Refining [3 cr.] *Prerequisite: PETR 200 / CHEN 490*
- CHEN 591 Natural Gas Processing [3 cr.] *Prerequisite: CHEN 311, CHEN 312, CHEN 314, CHEM204 / CHEM 201*
- MECH 768 Transport through Porous Media [3 cr.] *Prerequisite: MECH 412 / CHEN 411*
- GEOL 225 Petroleum Geology [3 cr.] *Prerequisite: GEOL 213 / GEOL 222 or consent of instructor*
- GEOL 226 Introduction to Geophysics [3 cr.] *Prerequisite: GEOL 201*

Note: *Other courses may be approved as minor equivalents at the consent of the Baha and Walid Basstne Department of Chemical Engineering and Advanced Energy. Students cannot receive more than 6 credits for both major and minor courses as technical electives in chemical engineering major.*

PETR Course Description

PETR 200 / CHEN 490 Introduction to Petroleum Engineering [3 cr.]

This course gives an overview on the hydrocarbon reservoirs lifecycle starting from the exploration stage till the production and reservoir management stage. It will introduce students to the fundamental concepts of petroleum engineering including petroleum geosciences, drilling engineering, formation evaluation, reservoir engineering, production engineering and hydrocarbon reservoirs economic evaluation. As an outcome of this course, students will gain a foundational understanding of the upstream petroleum industry and will get accustomed with its integrated nature, involved terminology and multiple disciplines.
Students cannot receive credit for both CHEN 490 and PETR 200.

PETR 300 Petroleum Exploration [3 cr.]

This course focuses on the major foundation concepts about how the Earth works as an integrated system, and particularly, how petroleum systems operate within an important part of the crust – sedimentary basins. Also throughout the course relevant aspects of geoscience are discussed, impacts

of these concepts on various exploration and reservoir development activities are emphasized. Importance of real rock samples, the processes of deposition, subsurface imaging and evaluation of petrophysical properties are discussed. Effect of heterogeneities on fluid distribution and flow, and relations between engineering concepts and geological structures will be introduced. *Prerequisites: PETR 200 / CHEN 490.*

PETR 312 / CHEN 593 Reservoir Petrophysics [3 cr.]
This course provides students with a systematic understanding of physical properties of petroleum reservoir rocks; lithology, porosity, relative and effective permeability, fluid saturations, capillary characteristics, compressibility, rock stress, and fluid-rock interaction. The different sources of formation evaluation data acquired to characterize oil and gas reservoirs will be introduced together with the process through which data is interpreted to estimate the reservoir properties.

PETR 321 / CHEN 594 Reservoir Fluids [3 cr.]
This course will discuss the different types of reservoir fluids and their related fundamental thermodynamics properties. It will equip the students with practical understanding of oil and gas reservoir fluids properties & related behavior as applied reservoir and production engineering studies. The different types of experimental data acquired and used to build PVT models for reservoir and production system simulation. *Prerequisites: CHEN 214.*

PETR 322 / CHEN 595 Drilling Engineering I [3 cr.]
This course acquaints the students with the terminology, concepts, equipment, techniques, and processes used in the oil and natural gas well drilling operations.

PETR 421 / CHEN 690 Oil and Gas Reservoir Engineering [3 cr.]
This course will cover both fundamental and applied reservoir engineering concepts. It aims at understanding the rock and fluid properties and how these properties interact to affect production from a hydrocarbon reservoir. From a practical aspect, the course will focus on classical reservoir engineering, reservoir drive mechanisms, well testing and well test analysis as well as the use of reservoir simulation to assist the reservoir engineer at different stages of a hydrocarbon reservoir lifecycle. *Students cannot receive credit for both CHEN 690 and PETR 421*.

PETR 432 / CHEN 592 Production Engineering [3 cr.]
The course covers the principles and methods used to produce oil and natural gas from the reservoir to the surface facilities. It provides techniques for predicting the flow within the system including reservoir and wellbore hydraulics. Performance analysis methods and equipment used are discussed along with methods to enhance well performance.

PETR 514 / CHEN 697 Reservoir Economics and Risk Management [3 cr.]
Review of financial concepts and economic evaluation techniques and related financial concepts that are used in the oil and gas upstream business to assist decision making on either the investment of capital or the divestment of assets. The course will be focused upon the conversion of hydrocarbon volumes to 'monetary value' and the requirement for consistent means of determining both the absolute and relative attractiveness of investment opportunities, from new field developments to portfolio management decisions. *Prerequisites: PETR 421 / CHEN 690.*

PETR 520 / CHEN 696 Reservoir Modeling [3 cr.]
This course introduces students to the theory and practice of hydrocarbon reservoir simulation. It details the mathematics of the governing equations and numerical techniques that form reservoir simulation models. The course will cover data preparation, simulation grid preparation, reservoir model calibration, forecasting of future performance, and interpretation of simulation results. Students will learn about the elements of a reservoir simulation model, the types of reservoir simulators and the role of simulation in field development planning, reservoir management and production optimization. *Prerequisites: PETR 421 / CHEN 690.*