

# Bachelor of Engineering Technology (Petroleum)

## Units Description

Australian College of Kuwait

## **FOREWORD**

In this document, a curriculum for Bachelor of Engineering Technology (Petroleum) is explained. This Bachelor is designed to be offered by the Petroleum Engineering Department of the School of Engineering at the Australian College of Kuwait – ACK.

The bachelor is a (75) Credit Hour (CH) program with an additional 4CH optional internship unit. These Credit Hours are distributed among (4) academic semesters. All units offered by this program are mandatory except the internship unit which is optional.

## BACHELOR OF ENGINEERING TECHNOLOGY PROGRAM LEARNING OUTCOMES

1. **Solve** broadly-defined engineering problems **using** theory-based analytical techniques.
2. **Design** components and systems in the engineering discipline.
3. Work as part of a team to **implement** and **complete** engineering projects.
4. **Design** and **implement** tests in the practice area, and **analyze** and **interpret** data.
5. **Supervise** and **mentor** technical and non-technical support staff in the workplace.
6. **Ensure** health and safety in the workplace.

## TECHNICAL LEARNING OUTCOMES FOR BACHELOR OF ENGINEERING TECHNOLOGY (PETROLEUM) PROGRAM

1. **Characterize** and **evaluate** subsurface geological formations and fluid flow.
2. **Analyze** and **design** well systems.
3. **Apply** innovative technologies to drilling, mud engineering and well completion.
4. **Apply** the principles and practices of reservoir engineering to **optimize** resource development and management.
5. **Design** production systems, components and processes to meet desired needs within realistic constraints.
6. **Apply** relevant economic principles to **assess** petroleum projects.
7. **Explain** enhanced oil recovery techniques.
8. **Devise** and **apply** a field development plan.
9. **Distinguish** the different environmental issues related to oil and gas operations.

| <b>Petroleum Engineering</b> |  |                        |            |                |
|------------------------------|--|------------------------|------------|----------------|
| <b>First Semester</b>        |  |                        |            |                |
| <b>Unit Code</b>             | <b>Unit Name</b>                           | <b>Pre-Requisite</b>   | <b>PBL</b> | <b>Credits</b> |
| 151MAT316                    | Physics I                                  | N/A                    | No         | 4              |
| 151MAT314                    | Math III                                   | N/A                    | No         | 4              |
| 151PTE312                    | Petroleum Process Simulation               | N/A                    | No         | 3              |
| 151PTE313                    | Materials and Equipment                    | N/A                    | No         | 3              |
| 151PTE314                    | Programmable Logic Controllers PLC's (PBL) | N/A                    | Yes        | 6              |
| <b>Second Semester</b>       |  |                        |            |                |
| <b>Unit Code</b>             | <b>Unit Name</b>                           | <b>Pre-Requisite</b>   | <b>PBL</b> | <b>Credits</b> |
| 151MAT327                    | Physics II                                 | 151MAT316              | No         | 4              |
| 151PTE321                    | Engineering Geology                        | N/A                    | No         | 3              |
| 151PTE322                    | Engineering Economics                      | 151MAT314              | No         | 3              |
| 151PTE323                    | Advanced Process Simulation (PBL)          | 151PTE312              | Yes        | 6              |
| 151PTE324                    | Fluid Mechanics                            | 151MAT316<br>151MAT314 | No         | 3              |
| <b>Summer Semester (2)</b>   |  |                        |            |                |
| 151PTE333                    | Internship                                 | 151PTE323              | -          | 4              |
| <b>Third Semester</b>        |  |                        |            |                |
| <b>Unit Code</b>             | <b>Unit Name</b>                           | <b>Pre-Requisite</b>   | <b>PBL</b> | <b>Credits</b> |
| 151PTE410                    | Project Design and Evaluation              | 151PTE322              | No         | 3              |
| 151PTE411                    | Process Control and Optimization Systems   | 151PTE314              | No         | 3              |
| 151PTE412                    | Selected Topics (PBL)                      | 151PTE322              | Yes        | 6              |
| 151PTE413                    | Drilling Engineering                       | 151PTE324              | No         | 3              |
| 151PTE414                    | Environmental Ethics                       | N/A                    | No         | 3              |
| <b>Fourth Semester</b>       |  |                        |            |                |
| <b>Unit Code</b>             | <b>Unit Name</b>                           | <b>Pre-Requisite</b>   | <b>PBL</b> | <b>Credits</b> |
| 151PTE420                    | Sr. Petroleum Project                      | 151PTE410              | No         | 3              |
| 151PTE421                    | Codes, Standards and Specs in Oil Industry | 151PTE411              | No         | 3              |
| 151PTE422                    | Environmental Protection (PBL)             | 151PTE414              | Yes        | 6              |
| 151PTE423                    | Reservoir Engineering                      | 151PTE413              | No         | 3              |
| 151PTE424                    | Management of Tech Innovation I            | N/A                    | No         | 3              |

## **BEng Tech Petroleum Unit Outline**

### **First Semester**

- **151MAT316 Physics I (4hr-L,3hr-Lab)**

This course introduces the principles of engineering physics and aims to develop a fundamental understanding of several broad areas of physics (mechanics, fluids, wave properties, properties of matter and heat) applied to engineering and technology. The course provides practical experience in experimental and measurement techniques used to investigate these physical phenomena and develops related professional communication, information literacy and teamwork skills.

Credits: 4

Prerequisite: None

- **151MAT314 Engineering Mathematics (4hr-L)**

In this course students apply the essential calculus concepts, processes and techniques to develop mathematical models for engineering problems. They use the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function and apply the theorem to engineering problems involving definite integrals. Differential calculus is used to construct mathematical models which investigate a variety of rate of change and optimization problems. The standard rules and techniques of integration are included. Differential equations are introduced and applied to investigate more interesting problems in an engineering setting. Other important elements of this course are the communication of results, concepts and ideas using mathematics as a language, being able to document the solution to problems in a way that demonstrates a clear, logical and precise approach and communicating, working and learning in peer learning teams where appropriate.

Credits: 4

Prerequisite: None

- **151PTE312 Petroleum Process Simulation (1.5hr-L, 1.5hr-Lab)**

The study of basic Chemical principles involved in Petroleum Processing with focus on a wide variety of gas processing units. Gas sweetening, dehydration and treatment by different methods are discussed. A working knowledge of relevant correlations and mathematical relationships will also be acquired.

Credits: 3

Prerequisite: None

- **151PTE313 Materials and Equipment (3hr-L)**

A study of the materials selection process for equipment used in gas and oil operations. Corrosion mechanisms and inhibition methods are covered. Codes, standards, and applicable specifications are presented along with their applications.

Credits: 3

Prerequisite: None

- **151PTE314 PLCs (4hr-L, 2hr-Lab) (PBL)**

The role of special use programmable logic controllers in industry develops expertise in logic controller programs.

Credits: 6

Prerequisite: None

## **Second Semester**

- **151MAT327 Physics II (4hr-L, 3hr-Lab)**

The course provides practical experience in experimental and measurement techniques used to investigate these physical phenomena and develops related professional communication, information literacy and teamwork skills and magnetism, atomic and nuclear physics) applied to engineering and technology.

Credits: 4

Prerequisite: 151MAT316

- **151PTE321 Engineering Geology (3hr-L)**

Geology is of fundamental importance when deciding on the location and design of all engineering works (including oil and gas platforms, drilling rigs and pipelines) and it is essential that engineers have a basic knowledge of the subject

Credits: 3

Prerequisite: None

- **151PTE322 Engineering Economics (3hr-L)**

Deals with the economics of decision-making. After introduction of fundamental concepts and cash flow diagrams, interest factors are dealt with in detail. Students apply the concepts to a variety of engineering design and management issues, both locally and internationally.

Credits: 3

Prerequisite: MATH2104.

- **151PTE323 Advanced Process Simulation (4hr-L, 2hr-T) (PBL)**

Utilization of simulation software to model process operation and examine the effects of variation of process conditions. Concentration on unit operations and production variation models using three different modules which are oil production system, gas production system and fractionation train system.

Credits: 6

Prerequisite: 151PTE312

- **151PTE324 Fluid Mechanics (3hr-L, 3hr-Lab)**

This course concentrates on the theory and problem solving regarding fluid properties, hydrostatic pressure, buoyancy, and fluid flow, and Bernoulli equation, energy losses in piping systems, flow measurement, and open channel flow.

Credits: 3

Prerequisite: 151MAT 316,151MAT 314

- **151PTE333 Internship**

An internship experience provides the student with professional experience and an opportunity to explore career interests while applying knowledge and skills learned in the classroom in a work setting. The experience also helps students gain a clearer sense of what they still need to learn and provides an opportunity to build professional networks.

Credits: 4

Prerequisite: 151PTE323

### Third semester

- **151PTE410 Project Design and Evaluation (3hr-L)**

This course requires the student to design, evaluate, and present a petroleum project. The report will cover technical, operational, scheduling, regulatory, and economic issues. A written and oral

Credits: 3

Prerequisite: 151PTE322

- **151PTE411 Process Control and Optimization Systems (1.5hr-L, 1.5hr-Lab)**

Detailed examination of petroleum production characteristics and fluid properties. Study of measurement and interface equipment. Detailed simulation experiments with production and equipment variation.

Credits: 3

Prerequisite: 151PTE314

- **151PTE412 Selected Topics (4hr-L, 2hr-T) (PBL)**

This course provides a forum for directed study on a number of issues and concerns within the petroleum industry. Faculty as well as guest lecturers from academia, industry and government will address students on pertinent topics and developments. Site visits and visual presentations on student exercises will supplement these seminars. Presentation of the study will be conducted.

Credits: 6

Prerequisite: 151PTE322

- **151PTE413 Drilling Engineering (3hr- L, 3Hr- Lab)**

This unit covers drilling equipment, fluids and drilling techniques employed in exploration and production of oil and gas. Methods of streamlining and optimizing drilling rig operations are also described. Drilling fluids and their specific applications together with some logging fundamentals will also be covered in this unit.

Credits: 3

Prerequisite: 151PTE324

- **151PTE414 Environmental Ethics (3hr-L)**

Environmental ethics is a multidisciplinary subject, involving scientific, ecological, ethical, economical, historical, political, and philosophical dimensions. One objective of the course is to acquaint students with some of the main streams of thought in environmental philosophy; another is to assist the student in the



development of his or her own philosophical and ethical attitudes concerning the environment, nature, and the impact of our lifestyles upon them.

Credits: 3

Prerequisite: None

### **Fourth Semester**

- **151PTE420 Sr. Petroleum Project (3hr-Lab)**

This course provides petroleum students with the technical, economic and environmental tools to assess a petroleum project. Project development describes the process of evaluating the feasibility (economic, environmental, and political) of a petroleum project by studying specific projects. The students will identify and research the applicable consideration for each phase of the project.

Credits: 3

Prerequisite: 151PTE410

- **151PTE421 Codes and Specifications in the Petroleum Industry (3hr-L)**

Examination and background information on code jurisdiction and interpretation of standards and specifications relevant to the petroleum industry. API, ASME, EPA, ASTM and ANSI codes are included.

Credits: 3

Prerequisite: 151PTE411

- **151PTE422 Environmental Protection (4hr-L, 2hr-T) (PBL)**

A study of the sources, characteristics, environmental effects, and regulatory aspects of material/product control and the impact on the marine environment.

Credits: 6

Prerequisite: 151PTE414

- **151PTE423 Reservoir Engineering (3hr-L)**

Introduction to the following topics:

Examination of characteristics of hydrocarbon bearing reservoirs , Calculation of porosity and permeability, coring and core properties, Determination of hydrocarbon in place and reservoir drive mechanisms, Properties of Reservoirs, Fundamentals of Reservoir Engineering, Classification of Petroleum Reservoirs, Oil and Gas Calculations; Reserves Principle

Credits: 3

Prerequisite: 151PTE413

- **151PTE424 Management of Tech Innovation I (3hr-L)**

This course examines the process whereby a research and development invention is converted into a socially useful and commercially successful new product. Small and large companies are studied. Petroleum case studies. Matched with PETR 3161.

Credits: 3

Prerequisite: None



