

BACHELOR OF PETROLEUM ENGINEERING WITH HONOURS

PROGRAMME SPECIFICATIONS

The Bachelor of Petroleum Engineering with Honours is offered either on a full-time or part-time basis. The full-time programme is offered only at the UTM Main Campus in Johor Bahru while the part-time programme is offered at UTM Kuala Lumpur Campus and in Miri, Serawak. The duration of study for the full-time programme is subjected to the student's entry qualifications and lasts between four (4) years to a maximum of six (6) years.

The programme is offered on full-time basis and is based on a two semesters per academic session. Generally, students are expected to undertake courses equivalent to between twelve (12) to eighteen (18) credit hours per semester. Assessment is based on courseworks and final examinations given throughout the semester.

General Information

1. Awarding Institution	Universiti Teknologi Malaysia			
2. Teaching Institution	Universiti Teknologi Malaysia			
3. Programme Name	Bachelor of Petroleum Engineering with Honours			
4. Final Award	Bachelor of Petroleum Engineering with Honours			
5. Programme Code	SETPH			
6. Professional or Statutory Body of Accreditation	Board of Engineers Malaysia (BEM)			
7. Language(s) of Instruction	English and Bahasa Melayu			
8. Mode of Study	Conventional			
9. Mode of operation	Self-govern			
10. Study Scheme	Full Time			
11. Study Duration	Minimum : 4 years Maximum : 6 years			
Type of Semester	No. of Semesters		No of Weeks/Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	8	-	14	-
Short	4	-	8	-

Course Classification

No.	Classification	Credit Hours	Percentage
i.	University Courses (a) General (b) Language (c) Entrepreneurship (d) Co-Curriculum	10 8 2 3	16.6%
ii.	Faculty/Programme Core	110	79.1%
iii.	Programme Electives	6	4.3%
	Total	139	100%
A	Engineering Courses (a) Lecture/Project/Laboratory (b) Workshop/Field/Design Studio (c) Industrial Training (d) Final Year Project	74 7 5 6	67.6%
	Total Credit Hours for Part A	92	
B	Related Courses (a) Applied Science/ Mathematic/ Computer (b) Management/Law/Humanities/Ethi cs/Economy (c) Language (d) Co-Curriculum	21 12 8 3	32.4%
	Total Credit Hours for Part B	47	
	Total Credit Hours for Part A and B	139	100%
	Total Credit Hours to Graduate	139 credit hours	

Award Requirements

To graduate, students must:

- Attain a total of not less than 139 credit hours with a minimum CGPA of 2.0.
- Pass Industrial Training
- Complete all Professional Skills Certificate (PSC)
- Students from other approved programmes who wish to undertake a Minor in the programme must complete not less than 15 credit hours of specialized Chemical

engineering courses which form part of the core and/or electives of the programme, as listed in the minor programme list.

CROSS-CAMPUS PROGRAMME

Students are given the opportunity to enrol in a few courses in participating universities. The grades and credits obtained during this period are transferable (up to 1/3 of the total credits of the curriculum). Currently, there are four participating universities i.e. Universiti Teknologi Malaysia, Universiti Sains Malaysia, Universiti Malaya and Universiti Malaysia Sarawak.

The programme is open to undergraduates who have undergone a minimum of two semesters of their studies with the following conditions:

- (i) The total number of credits allowed to be taken is between twelve (12) and sixteen (16) credits only.
- (ii) The student should hold a minimum CGPA of 3.00 at the time of application.
- (iii) The student is not a residence of or originated from the state where the university that he/she intends to attend is located.

The student will not be charged tuition fees by the participating university but shall pay the regular tuition fees at UTM. However, should the participating university provide accommodation, the student will need to pay accommodation fees

COURSE MENU

YEAR 1: SEMESTER 1			
Code	Course	Credit	Pre-requisite
SSCE 1693	Engineering Mathematics 1	3	
UHLB 1112	English Communication Skills	2	
UHS 1022	Philosophy and Current Issues (Local Students)	2	
UHLM 1012	Malay Language Communication 2 (for International Students)		
SSCK 1203	Analytical Chemistry for Engineers	3	
SETP 1313	Introduction to Petroleum Engineering*	3	
SETP 1113	Engineering Mechanics	3	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	16	

YEAR 1: SEMESTER 2			
Code	Course	Credit	Pre-requisite
UHMT 1012	Graduate Success Attributes	3	
SSCE 1793	Differential Equations	2	SSCE 1693#
UHMS 1182	Appreciation Ethics and Civilizations (for Local Students)	2	
UHS 1022 OR UHMS 1182	Philosophy and Current Issues (for International Students) OR		

	Appreciation Ethics and Civilizations (for International Students)		
SETP 1123	Fluid Mechanics*	3	
SETP 1133	Engineering Drawing	3	
SETP 2113	Thermodynamics	3	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	32	

YEAR 2: SEMESTER 1

Code	Course	Credit	Pre-requisite
UHLB 2122	Academic Communication Skills	2	ULEA 1112
UHL* 1112	Foreign Language Elective	2	
SCSP 1103	Programming Technique I	3	
SSCE 1993	Engineering Mathematics II	3	SSCE 1693#
SEEU 2003	Electrical Technology	3	
SETP 2213	Basic Geosciences*	3	
SETP 2721	Geosciences Lab	1	SETP 2213
SETP 1711	Fluid Mechanics Lab.	1	SETP 1123
	TOTAL CREDIT	18	
	CUMULATIVE CREDITS	50	

YEAR 2: SEMESTER 2

Code	Course	Credit	Pre-requisite
SSCE 2193	Engineering Statistics	3	SSCE 1693#
SETP 2123	Mechanics of Materials	3	SETP 1113#
SETP 2313	Reservoir Rock and Fluids Properties*	3	
SETP 2731	Thermodynamics & Mechanics of Material Lab.	1	SETP 2123, SETP 2113#
UHIT 2302	The Thought of Science and Technology	2	
U*** 2**2	University General Elective (Soft Skills Cluster)	2	
UBSS 1032	Introduction to Entrepreneurship	2	
UKQF 2**2	Co-curriculum & Service Learning	2	
	TOTAL CREDIT	18	
	CUMULATIVE CREDITS	68	

YEAR 3: SEMESTER 1

Code	Course	Credit	Pre-requisite
SSCE 2393	Numerical Methods	3	SSCE 1693#
SETP 3413	Drilling Engineering*	3	
SETP 3741	Drilling Fluid Lab.	1	SETP 3413
SETP 3213	Formation Evaluation	3	
SETP 3313	Reservoir Engineering*	3	SETP 2313#
SETP 3731	Reservoir Engineering Lab.	1	SETP 3313

SETP 3921	Geology Field Work [@]	1	SETP 2213#
UHLB 3132	Professional Communication Skills	2	ULEA 2122
UKQT 3001	Extracurricular Experiential Learning (ExCEL)	1	
	TOTAL CREDIT	18	
	CUMULATIVE CREDITS	86	

YEAR 3: SEMESTER 2

Code	Course	Credit	Pre-requisite
SETP 3423	Well Completion	3	
SETP 3113	Petroleum Economics	3	
SETP 3513	Petroleum Production Engineering*	3	
SETP 3123	Health, Safety and Environment*	3	
SETP 3323	Reservoir Simulation	3	SETP 3313#, SSCE 2393#
SETP 3812	Undergraduate Project I**	2	
	TOTAL CREDIT	17	
	CUMULATIVE CREDITS	103	

YEAR 3: SEMESTER 3 (SHORT SEMESTER)

Code	Course	Credit	Pre-requisite
SETP 3915	Industrial Training	5	
	TOTAL CREDIT	5	
	CUMULATIVE CREDITS	108	

YEAR 4: SEMESTER 1

Code	Course	Credit	Pre-requisite
SETP 4814	Undergraduate Project II**	4	SETP 3812#
SETP 4822	Field Development Plan I**	2	SETP 4213, SETP 3213#, SETP 3313#, SETP 3413#, SETP 3513#
SETP 4213	Petroleum Geology	3	SETP 2213#
SETP 4113	Petroleum Management and Entrepreneurship	3	SETP 3113#
SETP 4313	Well Testing	3	SETP 3313
	TOTAL CREDIT	15	
	CUMULATIVE CREDITS	123	

YEAR 4: SEMESTER 2			
Code	Course	Credit	Pre-requisite
SETP 4834	Field Development Plan II**	4	SETP 4822#
SETP 4323	Secondary and Tertiary Oil Recovery	3	SETP 3313#
SETP 4513	Gas Engineering	3	
SETP 4**3	Petroleum Eng. Elective	3	
SET* 4**3	Technical Elective	3	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	139	

Note: * - cornerstone course; ** - capstone course;
- must pass (at least with grade D+) for prerequisite course

English prerequisite is shown below:

ENGLISH LANGUAGE TESTS	UHLB 1112	UHLB 2122	UHLB 3132
a) MUET : \geq Band 4 b) IELTS : \geq Band 5.5 c) TOEFL : \geq 525 d) TOEFL iBT : \geq 60 e) CEFR : \geq B2	Exemption*	Compulsory	Compulsory

*Eligible students are required to apply for UHLB 1112 course credit exemption. The credit exemption form (UTM.E/3.8) is provided at the academic office.

Petroleum Engineering Elective Courses

Code	Course	Credit	Pre-requisite
SETP 4123	Petroleum Refining Technology	3	
SETP 4223	Geophysics	3	
SETP 4413	Advanced Drilling Engineering	3	SETP 3413#
SETP 4423	Advanced Well Completion	3	SETP 3423#
SETP 4523	Well Diagnosis and Treatment	3	
SETP 4533	Production Data Analysis	3	

Technical Elective Courses

Code	Course	Credit	Pre-requisite
SETG 4143	Energy Management and Economics	3	
SETG 4163	Green Energy Technology	3	
SETG 4263	Fire and Explosion Safety	3	
SETG 4283	Corrosion Engineering	3	
SETN 4483	Radiographic Testing	3	
SETK 4333	Gas Transportation and Storage	3	
SETK 4223	Smart Materials	3	
SETK 4613	Fundamental of Polymer	3	
SETK 4623	Polymer Physics and Properties	3	
SETK 4633	Polymer Rheology and Processing	3	

GRADUATION CHECKLIST

To graduate, students must pass all the stated courses in this checklist. It is the responsibility of the students to ensure that all courses are taken and passed. Students who do not complete any of the courses are not allowed to graduate.

NO	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNTED (JKK)	TICK (✓) IF PASSED
PETROLEUM ENGINEERING COURSES					
1	SETP 1313	Introduction to Petroleum Engineering	3	3	
2	SETP 1113	Engineering Mechanics	3	3	
3	SETP 1123	Fluid Mechanics	3	3	
4	SETP 1133	Engineering Drawing	3	3	
5	SETP 1711	Fluid Mechanics Lab.	1	1	
6	SETP 2213	Basic Geosciences	3	3	
7	SETP 2721	Geosciences Lab	1	1	
8	SETP 2113	Thermodynamics	3	3	
9	SETP 2123	Mechanics of Materials	3	3	
10	SETP 2313	Reservoir Rock and Fluids Properties	3	3	
11	SETP 2731	Thermodynamics & Mechanics of Material Lab.	1	1	
12	SETP 3413	Drilling Engineering	3	3	
13	SETP 3741	Drilling Fluid Lab.	1	1	
14	SETP 3213	Formation Evaluation	3	3	
15	SETP 3313	Reservoir Engineering	3	3	
16	SETP 3731	Reservoir Engineering Lab.	1	1	
17	SETP 3921	Geology Field Work	1	1	
18	SETP 3423	Well Completion	3	3	
19	SETP 3113	Petroleum Economics	3	3	
20	SETP 3513	Petroleum Production Engineering	3	3	
21	SETP 3123	Health, Safety and Environment	3	3	
22	SETP 3323	Reservoir Simulation	3	3	
23	SETP 3812	Undergraduate Project I	2	2	
25	SETP 3915	Industrial Training (Year 3/Short Sem.) for 12 weeks/3 months	5	HL	
27	SETP 4814	Undergraduate Project II	4	4	
28	SETP 4822	Field Development Plan I	2	2	

29	SETP 4213	Petroleum Geology	3	3	
30	SETP 4113	Petroleum Management and Entrepreneurship	3	3	
31	SETP 4313	Well Testing	3	3	
32	SETP 4834	Field Development Plan II	4	4	
33	SETP 4323	Secondary and Tertiary Oil Recovery	3	3	
34	SETP 4513	Gas Engineering	3	3	
35	SETP 4**3	Petroleum Eng. Elective	3	3	
36	SET* 4**3	Technical Elective	3	3	
		TOTAL CREDIT OF PETROLEUM ENGINEERING COURSES (a)	92	87	
APPLIED SCIENCE / MATHEMATICS / COMPUTER COURSES					
1	SCSP 1103	Programming Technique I	3	3	
2	SSCE 1693	Engineering Mathematics I	3	3	
3	SSCE 1793	Differential Equations	3	3	
4	SSCE 1993	Engineering Mathematics II	3	3	
5	SSCE 2193	Engineering Statistics	3	3	
6	SSCE 2393	Numerical Methods	3	3	
7	SEEU 2003	Electrical Technology	3	3	
8	SSCK 1203	Analytical Chemistry for Engineering	3	3	
		TOTAL CREDIT OF APPLIED SCIENCE / MATHEMATICS / COMPUTER COURSES (b)	24	24	
UNIVERSITY GENERAL COURSES					
Cluster 1: Appreciation of Philosophy, Value and History (Faculty of Social Sciences and Humanities)					
1	UHMS 1182	Appreciation of Ethics and Civilizations (for Local Students)	2	2	
	UHMS 1022	Philosophy and Current Issues (for International Students)			
	OR UHMS 1182	OR Appreciation of Ethics and Civilizations (for International Students)			

2	UHS 1022	Philosophy and Current Issues (for Local Students)	2	2	
	UHLM 1012	Malay Language Communication 2 (for International Students)			
Cluster 2: Generic Skills					
1	UHMT 1012	Graduate Success Attributes	2	2	
2	U*** 2**2	University General Elective (Soft Skills Cluster)	2	2	
Cluster 3: Knowledge Enhancement					
1	UHIT 2302	The Thought of Science and Technology	2	2	
Cluster 4: Co-Curriculum and Service Learning					
1	UKQF 2**2	Co-Curriculum & Service Learning	2	2	
2	UKQT 3001	Extracurricular Experiential Learning (ExCEL)	1	1	
Cluster 5: Language Skills (Language Academy, Faculty of Social Sciences and Humanities)					
1	UHLB 1112	English Communication Skills	2	2	
2	UHLB 2122	Academic Communication Skills	2	2	
3	UHLB 3132	Professional Communication Skills	2	2	
4	UHL* 1112	Foreign Language Elective	2	2	
Cluster 6: Entrepreneurial Skills					
1	UBSS 1032	Introduction to Entrepreneurship	2	2	
		TOTAL CREDIT of UNIVERSITY GENERAL COURSES (c)	23	23	
		TOTAL CREDIT TO GRADUATE (a + b + c)	139	134	

OTHER COMPULSORY COURSES – PROFESSIONAL SKILLS CERTIFICATE (PSC)			
Students are required to enrol and pass FIVE (5) PSC courses, to be eligible to graduate. Enrol the PSC courses as follows:			
COMPULSORY PSC COURSES (Enrol All 3 Courses)			
1	GLRB0010	Design Thinking for Entrepreneur	
2	GLRM0010	Talent and Competency Management	
3	GLRL0010	English Communication Skills for Graduating Students (ECS)	
ELECTIVE PSC COURSES (Choose Any 2 Courses only)			
1	GLRT0010	Data Analytics for Organization	
2	GLRM0020	Professional Ethics and Integrity	
3	GLRT0020	Construction Measurement (Mechanical & Electrical)	
4	GLRT0030	OSHE for Engineering Industry and Laboratory	
5	GLRT0040	OSHE for Construction Industry and Laboratory Works	
6	GLRT0050	Quality Management for Build Environment and Engineering Professionals	
7	GLRT0060	Safety and Health Officer Introductory Course	
8	GLRT0070	Industrial Machinery and Lubrication	
Or any other elective PSC courses offered by UTM iLeague. Information on PSC Courses: https://ileague.utm.my/utm-professional-skills-certificate-utm-psc/ Online PSC Registration: https://elearnpsc.utmspace.edu.my/			

COURSE SYNOPSIS

CORE COURSES

SETP 1313 - Introduction to Petroleum Engineering

This course introduces students to various disciplines in petroleum engineering. The contents of the course include the origin, migration, accumulation and the exploration of petroleum, the types and properties of reservoir rocks and reservoir fluid, and type of formation evaluation. This course also briefly discusses the operation and equipment used in drilling, well completion and production of petroleum. This course is conducted by normal lectures, classroom discussion, group project and presentation.

SETP 1113 - Engineering Mechanics

This course has been designed to introduce students to the basic principles and concepts in statics and dynamics. The course is divided into two parts: the first part deals with the analysis of particle and rigid body in static, which covers the resultant and resolution of force(s) acting on a particle and rigid body, the equilibrium of a particle and rigid body, how to replace a force system with an equivalent system, and analysis of friction. The second part deals with the analysis of particle(s) in motion. It includes the kinematics and kinetics of particles and kinematics of rigid bodies. It will cover the rectilinear and curvilinear motion of particles, Newton's Second Law of particles and work and energy for particles.

SETP 1123 - Fluid Mechanics

This course introduces students to basic concepts and principles of fluid mechanics. The contents of the course include the physics of fluid, analysis of fluid in statics and in motion, friction in fluid flow, flow measurement, and dimensional analysis. This course is conducted by normal lectures, class exercise activities and group assignment.

SETP 1133 - Engineering Drawing

This course provides a fundamental background in engineering drawing to the students, which will enable them to work more effectively in the various fields of engineering. This course aims at developing the skills needed for documenting designs using drawings and for performing graphical analysis of two-dimensional and three-dimensional problems. The students will be exposed to different available CAD for engineering drawing with more emphasis on the utilization of QCAD and AutoCAD software. This course focuses on the introduction to engineering drawing, fundamentals of engineering drawing, geometry, orthographic and isometric drawing. This course also introduces the sectional and flowchart drawing and computer aided engineering drawing to the students.

SETP 1711 - Fluid Mechanics Laboratory

Co-Requisites: SETP 1123 Fluid Mechanics (Taken)

This course covers eight fluid mechanics-related experiments which are friction losses in pipe, stability of floating body, jet impact, flow measurement, water hammer, forced vortex flow, calibration of bourdon tube pressure gauge, and an open-ended laboratory work.

SETP 2213 - Basic Geoscience

This course introduces students with the introduction of geosciences/geology and subtitles of physical geology. The course emphasizes on the Earth physical & chemical characteristics, especially its surface and internal features. Then, turn to a discussion of Earth materials and the related processes. Next, Earth's internal structure and the processes that deform rocks and give rise to mountains will also be included. Finally, the course concludes with geologic time and Earth history.

SETP 2721 - Geoscience Laboratory

Co-Requisites: SETP 2213 Basic Geoscience (Taken)

This course exposes the student to the practical aspect of basic geosciences laboratory. It provides the students with the identification of minerals and rocks, geologic maps construction, particle size analysis of sediments and the use of Brunton compass in measuring strike and dip of geological structure planes.

SETP 2113 - Thermodynamics

Thermodynamics is a basic engineering course where concepts such as system, boundaries, mass, heat, work and energy are introduced. These concepts are then related in the 1st and 2nd Law of Thermodynamics. Properties of common fluid, such as water, air, and refrigerants are determined using tables of properties or equations of state. The concepts are applied in power and refrigeration cycles.

SETP 2123 - Mechanics of Materials

Pre-Requisites: SETP 1113 Engineering Mechanics (pass with at least D+)

The course covers both the theory and application of the fundamental principles of mechanics of materials. Emphasis is placed on the importance of satisfying equilibrium, compatibility of deformation, and material behavior requirement. Topics being covered include stress and strain under axial loading, torsion, bending, combined loadings, stress transformation, design of beams and shafts, and deflection of beams and shafts.

SETP 2313 - Reservoir Rock and Fluids Properties

This course introduces students to the important concepts, theories, and methods of properties determinations (calculation, correlation, and laboratory method) of some reservoir rock and fluid properties. The topics in reservoir rock properties include porosity, permeability, fluid saturation, rock compressibility, rock wettability, relative permeability, capillary pressure, and electrical properties of reservoir rocks. In reservoir fluid properties, the topics cover one- and two-phase behaviors of both ideal and real systems, gas properties, liquid properties, and reservoir fluid properties.

SETP 2731 - Thermodynamics and Mechanics of Material Lab.

Co-Requisites: SETP 2113 Thermodynamics, SETP 2123 Mechanics of Materials (Taken)

This laboratory course contains 6 experiments that cover basic concepts in Thermodynamics and Strength of Materials. Laboratory experiments are designed for hands-on experiences to understand the engineering principles. The experiments application includes First and Second Law of Thermodynamics, Properties of Pure Substances and Properties & Strength of

Materials. This course also emphasizes the technical writing aspect where all students' observation and arguments of each experiment must be reported in proper format.

SETP 3413 - Drilling Engineering

This course introduces the activities involved in drilling operations. The contents of the course include the rig components and drilling systems, types of drilling fluid and properties, drilling fluid formulations and calculations, drilling problems, drilling hydraulics calculation, formation pressures and its effect to the drilling operations, well control and well configurations. This course is conducted through lectures, group assignments, and presentations.

SETP 3741 - Drilling Fluid Laboratory

Co-Requisites: SETP 3413 Drilling Engineering (Taken)

This course requires the students to perform hands-on preparing and measuring drilling fluids properties according to the API standard. Laboratory experiments are designed to help students in better understanding of the factors controlling drilling fluid properties as well as familiarize students with field testing procedures of drilling fluids. This laboratory is equipped with complete drilling fluid testing and analysis. Equipment available include mud mixers, mud balances, marsh balances, rheometers, pH meters, resistivity meters, and the filter press unit, etc.

SETP 3213 - Formation Evaluation

This course exposes students to electric logging which covers the basic concept of reservoir resistivity, spontaneous potential, resistivity log, Gamma-ray log, neutron log, formation density log, and acoustic log. Lectures also cover on the open hole log analysis and interpretation, the use of Archie's equation and other methods to determine water saturation, lithology and porosity determination, and assessing the true formation resistivity prior to computing the hydrocarbon reserves.

SETP 3313 - Reservoir Engineering

Pre-requisites: SETP 2313 Reservoir Rock and Fluids Properties (pass with at least D+)

This course covers the fundamentals of reservoir engineering which include the description and characterization of the oil and gas reservoirs, calculation of fluid in-place and the recoverable reserves, theory and calculation of fluid flow in porous media, and the influence of aquifer on reservoir performance. This course is conducted by normal lectures and student group projects based on published reservoir data.

SETP 3731 - Reservoir Engineering Laboratory

Co-Requisites: SETP 3313 Reservoir Engineering (Taken)

The content of this laboratory works can assist students to understand better the theories they learned from the Reservoir Rock and Fluid Properties course. Measurement of absolute permeability: gas permeameter and liquid permeameter. Measurement of viscosity: glass capillary, Brookfield apparatus and Kern balance. Measurement of porosity: helium porosimeter and Ruska pump apparatus. Measurement of relative permeability: core lab retorted. Measurement of density: gas density, hydrometer. Measurement of capillary pressure.

SETP 3921 - Geology Field Work

Pre-requisites: SETP 2213 Basic Geoscience (pass with at least D+)

This course exposes the students to the practical aspect of geological field and geology of Malaysia. Students will be trained on how to make geological observations including simple geological mapping using the compass-step method.

SETP 3423 - Well Completion

The course covers casing design, cementing job, well completion practices, and completion and workover fluids in order to maintain well integrity. Lectures also cover types of perforations, tubing string and its accessories, production packer and tubing sealing assemblies that should be installed in production wells to produce oil and gas safely to the surface.

SETP 3113 - Petroleum Economics

This course introduces students to petroleum economics in evaluation of oil and gas development and production. The contents of the course include the principles, methods, and techniques of engineering economic analysis, such as topics on interest and time value of money, depreciation and income tax calculations, cash flow, economic indicators, decision making, and risk and sensitivity analysis. This course will allow students to finally be able to generate cash flow of the project and perform an economic evaluation of the project.

SETP 3513 - Petroleum Production Engineering

This course introduces students to a complete petroleum production system of a petroleum well/field. The course will provide an overview of the well/field petroleum production system components including production philosophy and objectives, present and future well productivity and performance, single and multiphase flow system for surface delivery, artificial lift system and surface facilities. By the end of the course, students should be able to identify and describe the major components of the petroleum production system, understand the mechanism of delivering the reservoir fluid to the surface and the process involved for optimum production of petroleum sellable products. This course is conducted by normal lectures, classroom work and group project report and presentation with software utilization in the classroom and group project work.

SETP 3123 - Health, Safety and Environment

The course presents a fundamental principle of safety and risk assessment in petroleum engineering. In particular, it emphasizes on the safety legislations, inherent safety design concept, methods of hazard identification, chemical health risk assessment and various methods of risk assessments. The course also covers health and environmental issues related to petroleum engineering. At the end of this course, it is expected that the students will be able to appreciate the theoretical and practical aspects of occupational safety, health and environment in petroleum engineering. Students should also be able to use the techniques of hazard identification and risk assessment in the design and operation of petroleum engineering projects.

SETP 3323 - Reservoir Simulation

Pre-Requisites: SETP 3313 Reservoir Engineering, SSCE 2393 Numerical Methods (pass with at least D+)

This course includes derivations of basic equations and underlying principles used in developing reservoir simulators. It covers the development of a simple governing equation, partial differential equations for single-phase and multiphase flow in porous media. Finite difference approximations are used to solve the equations. Input data requirements and applications of simulation models for history matching and prediction of field performance will be discussed. A spreadsheet, i.e. Microsoft Excel, would be used for many of the examples and exercises.

SETP 3812 - Undergraduate Project 1

This course is designed to train students on some important aspects of research management. In the first part of the undergraduate research project course, the students are not only required to carry out preliminary studies on the assigned petroleum engineering related topics but are also required to plan the research methodology that will be implemented in the following semester and maintain a log book. At the end of this course, students are required to prepare a complete research proposal, and subsequently present it. In addition, students will have the opportunity to gain important generic skills such as communication, team working, problem-solving and creative and critical thinking.

SETP 3915 - Industrial Training

A 12-week training in industry. The main rationale of introducing the programme is to provide UTM students with exposure to practical aspects of industry and their work practices. During the programme, the students will have the opportunity to relate their theoretical understanding to the real application in industry and to develop skills in work ethics, management, communication and human relations.

SETP 4814 - Undergraduate Project II

Pre-Requisites: SETP 3812 Undergraduate Project I (pass with at least D+)

This course is a continuation of the Undergraduate Project I. The second part of the Undergraduate Project requires students to implement the research proposal that has been prepared in the previous semester. This might involve practical activities such as laboratory works, data collection from industry and computer programming/simulation. At the end of the course, students should be able to prepare a full report compiling the first and second part of the Undergraduate Research Project and subsequently present their research findings. Finally, students must submit a bound thesis according to the UTM thesis-writing format. In addition, at the end of the course, students will have the opportunity to gain important generic skills such as communication, team working, problem-solving and creative and critical thinking.

SETP 4822 - Field Development Plan I

Pre-Requisites: SETP 3213 Formation Evaluation, SETP 3313 Reservoir Engineering, SETP 3413 Drilling Engineering, SETP 3513 Petroleum Production Engineering (pass with at least D+)

Co-Requisites: SETP 4213 Petroleum Geology (Taken)

Field Development Plan courses expose students to the process and methods in developing an optimum plan for a particular petroleum field. It covers all aspects of field development planning, commencing with screening studies, after discovering hydrocarbons, to project sanction. The first part of the course covers collection and analysis of data, including proving of resources and reduction of uncertainty and risk. Students must build a model of geological layering of the subsurface to estimate the initial volume of oil and gas in the reservoir.

SETP 4213 - Petroleum Geology

Pre-Requisites: SETP 2213 Basic Geoscience (pass with at least D+)

This course exposes the students with the introduction of petroleum geology, sedimentology and applied geophysics to the search for and production of oil and gas. Explanation will be given on the source rocks, kerogen, the concept of maturity of organic matter, and the process of generation of petroleum. The topics on sedimentology and stratigraphy will also be included, to give the knowledge of reservoir rock characteristics and identifying areas of petroleum accumulation. The processes of migration, entrapment of petroleum, types of sedimentary basins and petroleum system will also be discussed to give an idea of the locations and distribution of oil and gas fields around the world as well as its relationship to the zone of seismicity.

SETP 4113 - Petroleum Management and Entrepreneurship

Pre-Requisites: SETP 3113 Petroleum Economics (pass with at least D+)

This course is pertinent to petroleum engineering and business topics. It will cover the types of PSC normally practised in Malaysia. A group project, utilizing a widely used industry software package for economic evaluations will be given. The project consisted of information regarding possible investments in oil and/or gas fields to determine the best options of development for the fields that would yield the maximum total return on investment. The knowledge of financing, costing, and budgeting will be considered in the analysis.

SETP 4313 - Well Testing

Pre-Requisites: SETP 3313 Reservoir Engineering (pass with at least D+)

This course introduces students to well testing practices in oil and gas industries. The contents of the course include the concept and principles of well testing, equipment, well test interpretation methods and well test design. This course is conducted by normal lectures, class workshop, and application software activities.

SETP 4834 - Field Development Plan II

Pre-Requisites: SETP 4822 Field Development Plan I (pass with at least D+)

The objective of this course is to provide training, assignment and understanding of a particular development plan and profitability analysis on a particular gas or oil fields or both which are found either onshore or offshore. The second part of the course covers the simulation of the reservoir fluid flow behavior and optimises the field development scenario. This simulation

leads to the design of an appropriate production system. An economic assessment is performed taking into account revenue according to production forecasts and the estimated development costs. Students are required to work in small groups, submit written plans, and present their proposals to a panel.

SETP 4323 - Secondary and Tertiary Oil Recovery

Pre-Requisites: SETP 3313 Reservoir Engineering (pass with at least D+)

This course provides students with important concepts, theories, and methods of enhanced oil recovery (EOR). This course covers the general classification of EOR processes, microscopic displacement of multiphase fluids in porous media, the concept of mobilization and trapping of oil, mobility ratio, capillary number, gravity segregation, and recovery efficiencies. Also included are the important concepts and operational procedures of various types of EOR methods such as polymer flooding, surfactant/micellar flooding, alkaline flooding, ASP flooding, miscible gas flooding, thermal recovery processes and microbial EOR.

SETP 4513 - Gas Engineering

The course introduces students to connect the relationship between upstream and downstream gas processing which covers both theories and calculations. The contents of the course include the gas well deliverability, gas well performance, gas pipeline flow, gas compressors, gas dehydration, gas treatment, and gas measurement. This course is conducted through lectures, group assignments, and presentations.

PETROLEUM ENGINEERING ELECTIVE COURSES

SETP 4123 - Petroleum Refining Technology

This course introduces the characteristics of crude oil and that each of the hydrocarbon compounds has its own boiling temperature. The principles of distillation are introduced leading to the separation into fractions according to cut points. Maximisations of cuts or fractions are achieved through processes like catalytic cracking, alkylation, catalytic reforming and hydro cracking. Gasoline blending is introduced to increase octane number for better performance and to provide designed vapour pressure in gasoline to cope with seasonal altitudinal needs.

SETP 4223 - Geophysics

This course introduces students with the introduction and application of exploration geophysics in resource exploration and development, and pollution control. The course emphasis on the methods of geophysical techniques, especially seismic methods, including some of the modern interpretation techniques. It will discuss the general approach, equipment and field operations of the methods used. The course will also provide practice in carrying out a small-scale fieldwork project to investigate shallow geological features which are presumed to exist in the subsurface.

SETP 4413 - Advanced Drilling Engineering

Pre-Requisites: SETP3413 Drilling Engineering (pass with at least D+)

This course introduces students to special operations such as coring and fishing, advanced drilling operations and techniques used in the industry, drilling optimization and, procedures and legislation of well abandonment.

SETP 4423 - Advanced Well Completion

Pre-Requisites: SETP3423 Well Completion (pass with at least D+)

Upon completion of this course, students should be able to prepare well space-out for single and dual completions. This course also exposes students to a safe slickline and completion operations, and preparation of a completion report after the respective well has been released to production and slickline report upon completion of its operation. The content delivered also covers deepwater completion and slickline operations, and completion in unconventional hydrocarbon energy sources.

SETP 4523 - Well Diagnosis & Treatment

Pre-Requisites: SKTP3413 Drilling Engineering (pass with at least D+)

The course covers problem wells, diagnosis of problem wells, through tubing production tubing, formation damage, work over planning, sand control, and stimulation.

SETP 4533 - Production Data Analysis

This course introduces students how to analyze the data from oil and gas production history. The contents of the course include the methods of how to analyze rate-time production data to estimate reserves, to analyze pressure-rate-time production data to obtain reservoir volume, and to make performance forecasts for well reservoir systems. This course is conducted by normal lectures, class workshop, and application software activities.

TECHNICAL ELECTIVE COURSES

SETG 4143 - Energy Management and Economics

This course introduces basic background, terminology, and fundamentals of energy conversion. Discusses current and emerging technologies for production of thermal, mechanical, and electrical energy. Topics include fossil and nuclear fuels, solar energy, wind energy, fuel cells, and energy storage.

SETG 4163 - Green Energy Technology

The aim of the programme is to prepare students for a professional career in the development of advanced technologies and systems that can satisfy energy demand while striving for environmental, social and economic sustainability. In addition to in-depth knowledge of energy technologies and systems, students will be trained to understand the basic challenges of sustainable development, with a specific focus on the challenges that face the energy system. The course is unique in that it deals with the energy system on all relevant systems levels and that the courses are integrated in such a way that students are trained to approach problem solving in an interdisciplinary way. At the end of the course, students will have acquired a thorough insight into the possibilities and limitations of energy systems, specifically in relation to sustainable development.

SETG 4263 - Fire and Explosion Safety

This course enables students to understand the basic concept of fire science and combustion and related calculations as well as to expose them to the concept of explosion and detonation. In addition, the principles of fire and explosion protection and mitigation will be discussed within the context of understanding the fire and explosion development mechanism. At the end of the course, students should be able to explain and relate the fundamental knowledge of combustion, flame and explosion and its important safety aspects involving gaseous fuel utilization. Students should be able to apply general combustion and engineering principles to fires and explosion and should know the parameters involved on the initiation of both fire and explosion. The students should be also able to use CFD fire modeling (CFast) to analyze the fire development on the case studies given.

SETG 4283 - Corrosion Engineering

The aim of this course is to provide basic knowledge of corrosion and corrosion protection of metals and alloys from electrochemistry perspective. This course is specially designed for students who want to have a basic understanding of the corrosion process. Students will be introduced to the underlying science of corrosion engineering principles, corrosion management with particular emphasis on the corrosion design of pipeline corrosion protection. Different types of corrosion, methods of corrosion protection and prevention standard corrosion tests will be discussed. This course also covers most traditional and non-traditional tests for corrosion studies, including electrochemical techniques for corrosion, analysis of corrosion phenomenon and corrosion monitoring principles. This course will examine the general mechanisms of corrosion and relate these to specific engineering issues and methods being used to reduce the cost of corrosion. Finally at the end of the course student will be required to do a case study on corrosion problem that shall introduces students on real corrosion problem in industries and group project allow students to become familiar with directing their own investigations of corrosion problem.

SETN 4483 - Radiographic Testing

This course describes Non-Destructive Testing (NDT) which is the process of inspecting, testing or evaluating materials, components or assemblies for discontinuities without destroying their serviceability. The course introduces the six most common NDT methods which are Visual Testing, Liquid Penetrant Testing, Magnetic Particle Testing, Radiographic Testing, Ultrasonic Testing and Eddy Current Testing. Emphasis will be given to Radiographic Testing which is also known as Industrial Radiography. Metal forming and manufacturing processes and possible defects present in each process will be described. The most widely used industry inspection and acceptance standards for NDT such as ASME V, VIII and API 1104 will be described.

SETK 4333 - Gas Transportation and Storage

This course enables students to develop an advanced knowledge in gas transportation and storage facilities. The course module covers a wide range of scope which includes the flow principles, operation and construction and maintenance. Sustainability of supply and storage system is well reviewed to incorporate state-of-the-art technology. The module also integrates the standards design of transportation system and relevant code of practices. Malaysian standard requirements also are highlighted thoroughly.

SETK 4223 - Smart Materials

This course will provide deeper understanding of smart materials and smart microstructures, as well as of the increased functionality of both inorganic and organic materials. This course also covers on the material synthesis as well as microstructure and properties relationships.

SETK 4613 - Fundamentals of Polymer

Basic terminologies, principles on polymers and structural relationship towards polymer classification are discussed. An overview on the polymer industry is elaborated together with its impact on human life. Molecular weight relationships toward polymer properties and its implication are briefly presented. This course emphasizes specifically on the advanced of polymer synthesis including step-growth, chain-growth and co-ordination polymerizations. Kinetic for the polymerization mechanism is described and its relationship to molecular weight is explained in details. The limitations and application for each polymerization mechanism are discussed. The polymerization systems used for the polymerization process are discussed together with their advantages and the disadvantages. Finally, this course also exposed students to the pilot scale set-up of the polymerization systems.

SETK 4623 - Polymer Physics and Properties

This course is designed to expose students to the properties of polymer which have great importance. It will emphasize on the mechanical properties, electrical properties, chemical resistance, degradation effects and flammability properties, A strong emphasis will be given on the mechanical properties which include viscoelastic behavior, tensile, flexural and impact properties. Long term test using creep deformation is also included. At the end of the course the student should be able to explain the interrelation between polymer properties, structures and applications. The students should also be able to describe the appropriate test and characterization for each property.

SETK 4633 - Polymer Rheology and Processing

This course will discuss about Newtonian and non-Newtonian flow, pseudo-plastic, Bingham, dilatant and thixotropic behavior, origin of non-Newtonian flow. Students will be able to do Modelling of polymer melt flow-isothermal flow of Newtonian and power law fluids (drag and pressure flow) through different channels of uniform cross-section. This course will also cover topic such as measurement of flow properties, melt flow indexer, capillary viscometers, and cone and plate viscometer, characteristics and Rabinowitch correction. Students should be able to explain the application of rheological studies in polymer processing-extruder screw and die, analysis of pressure, drag and leakage flow, characterization and interaction of screw and die, balanced runner molding.

INTEGRATED BACHELOR - MASTER PROGRAMME (PRISMS) ELECTIVE COURSES

LIST of PRISMS ELECTIVE COURSES

1. Master of Science (Energy Management)

- SKTK 5113 / SETK 5113 - Energy Life Cycle Cost and Emission Analysis
- SKTK 5123 / SETK 5123 - Energy Planning for Sustainable Development
- SKTK 5133 / SETK 5133 - Mechanical and Electrical Energy Management

2. Master of Science (Safety, Health and Environment)

- SKTK 5213 / SETK 5213 - Occupational Safety

3. Master of Science in Polymer Technology

- SKTK 5613 / SETK 5613 - Polymer Characterization
- SKTK 5623 / SETK 5623 - Polymer Synthesis
- SKTK 5633 / SETK 5633 - Polymer Additives, Blends and Rheology
- SKTK 5643 / SETK 5643 - Polymer Processing

4. Master of Engineering in Chemical

- SKTK 5513 / SETK 5513 - Advanced Thermodynamics
- SKTK 5523 / SETK 5523 - Numerical Computation in Chemical Engineering
- SKTK 5533 / SETK 5533 - Advanced Chemical Reaction Engineering

5. Master of Engineering in Bioprocess

- SETB 5103 - Biotechnology for Engineers
- SETB 5113 - Industrial Bio-processing
- SETB 5123 - Facilities and Infrastructure in Bioprocess Engineering
- SETB 5133 - Advanced Bio-product Development

6. Master of Gas Engineering and Management

- SETG 5123 - Hydrocarbon Gas Transportation and Storage
- SETG 5223 - Asset Management and Control
- SETG 5233 - Hydrocarbon Gas Contract Negotiation and Implementation
- SETG 5243 - Hydrocarbon Gas Project Planning, Development and Financing

PRISMS ELECTIVE COURSE SYNOPSIS

1. Master of Science (Energy Management)

SKTK 5113/SETK 5113 - Energy Life Cycle Cost and Emission Analysis

This course discusses life cycle cost analysis for energy conservation projects and emission analysis through the life cycle of a product. It presents the principles, methodology and case studies to develop an understanding of life cycle cost and emission analysis that can reduce environmental impact and promote sustainable practice.

SKKC 5123 / SKTK 5123 - Energy Planning for Sustainable Development

This course provides students with the ability to use computer aided tools for sustainable energy planning. Emphasis will be placed on the formulation of mathematical models, solve and interpret meaningful problems in energy related issues. The student will be exposed on the formulation of various energy issues including micro and macro level.

SKKC 5133 / SKTK 5133 - Mechanical and Electrical Energy Management

This course introduced the students on techniques to conduct mechanical and electrical energy audits for buildings. This course presents 3 parts of lecture, Part A is the introduction to general energy audit. Part B will cover energy audit on mechanical equipment such as electric motor, chiller, cooling tower, fans & blower, pumps, air compressor energy audit and Part C is the electrical systems energy audit that covers electrical systems.

2. Master of Science (Safety, Health and Environment)

SKKC 5213 / SKTK 5213 - Occupational Safety

Occupational safety is an area concerned with the safety, health and well-being of people engaged in work or employment. It is a two-way relationship between work environment and safety. Occupational safety is a part of the safety science curriculum. Compared to process safety, occupational safety concerns more on the workers welfare merely due to day-to-day work activities than the impacts on lives, assets and environment due to abnormal process operation. This course introduces concepts of occupational safety with primary focus on various types of occupational hazards in a typical workplace environment. For each type of hazard, students are provided with detailed discussion, ranging from understanding the hazard to the factors that may cause the accidents in the workplace. Also the types of injuries that may be caused by the hazards are also discussed before appropriate recommendations and strategies to avoid or reduce the hazards are presented. Overall, through this course, students will acquire the knowledge and judgment to function as an entry-level practitioner in occupational safety and health. Students also should be able to contribute to the development and maintenance of a safe and healthy work environment.

3. Master of Science in Polymer Technology

SKKC 5613 / SKTK 5613 - Polymer Characterization

This course introduces students with comprehensive knowledge of the various techniques available to characterize polymeric materials, the underlying principles of each characterization method, the use and the limitations of each technique. This course will focus mainly on four approaches of characterization, which are characterization of polymers in solution, spectroscopy, thermal analysis and microscopy. In characterization of polymers in solution, it will cover measurements of molecular weight and molecular weight distribution. In spectroscopy students will learn classification of spectroscopic methods and different types of spectroscopy instruments. In thermal analysis students will learn various techniques of thermal analysis such as differential scanning calorimeter (DSC), thermal gravimetric analysis (TGA), and dynamic mechanical analysis (DMA). The microscopy topic will cover various techniques of microscopy analysis such as optical microscopy, scanning electron microscopy (SEM), transmission electron microscopy (TEM) and atomic force microscopy (AFM).

SKKC 5623 / SKTK 5623 - Polymer Synthesis

Basic terminologies, principles on polymers and structural relationship towards polymer classification are discussed. An overview on the polymer industry is elaborated together with its impact on human life. Molecular weight relationships toward polymer properties and its implication are briefly presented. This course emphasizes specifically on the advance of polymer synthesis including step-growth, chain-growth and coordination polymerizations. Kinetic for the polymerization mechanism is described and its relationship to molecular weight is explained in detail. The limitations and application for each polymerization mechanism are discussed. The polymerization systems used for the polymerization process are discussed together with their advantages and the disadvantages. Finally, this course also exposed students to the pilot scale set-up of the polymerization systems.

SKTK 5633 / SETK 5633 - Polymer Additives, Blends and Rheology

This course consists of three parts: (a) polymer Additives (b) blending (c) rheology. Polymer additives cover the topics on heat and light stabilisers, impact modifiers, antioxidants, lubricants, plasticisers, flame retardants and colourants. The theory and mechanism of each additive will be explained. In polymer blending the methods of blending, compatibilizing mechanism and current development in polymer blends will be explained. Whilst polymer rheology elaborates the behaviour of polymer flow in a pipe as well as between plates. Polymer rheology covers a flow and deformation of polymer melts, understanding regarding the effect of shear on flow properties will be discussed in detail. Experimental method and equipment will provide an understanding of rheological properties of polymer melts. Data obtained from rheological experiments will be corrected by using several methods and models. Finally, final properties of polymer melts will be analysed and step by step methods will be explored to solve any defects and problems.

SKTK 5643 / SETK 5643 - Polymer Processing

This course introduces students on processing of thermoplastic and composite materials in general. Details fundamental of polymer processing such as extrusion and injection moulding will be emphasized. Elements of product design will also be covered in this course. The course will further discuss and explain the preparation and manufacture of fibre reinforced polymer composite. At the end of the course, students should be able to assess manufacturing processes to produce variation of polymer composite products.

4. Master of Engineering in Chemical

SKTK 5513 / SETK 5513 - Advanced Thermodynamics

This course presents the fundamentals of thermodynamics theories in equilibrium systems. Selected equation of states as well as several equilibrium models will be utilised in predicting the chemical properties of chemical components at equilibrium with and without chemical reactions. The course features extensive work group exercises as well as individual projects and assignments.

SKTK 5523 / SETK 5523 - Numerical Computation in Chemical Engineering

The main objective of this course is to provide the students with the opportunity to improve their programming skills using the MATLAB environment as a tool for solving problems in chemical engineering. This course includes the coverage of basics and application of MATLAB software to solve problems arising in chemical engineering which involve numerical operations like root of equations, curve fitting and ordinary differential equations problem. With this foundation of basic MATLAB applications in engineering problem solving, the course provides opportunities to explore advanced topics in application of MATLAB as a powerful engineering tool.

SKKC 5533 / SKTK 5533 - Advanced Chemical Reaction Engineering

This course introduces students to chemical reactor design and theories in the area of chemical reaction engineering with emphasis on homogeneous and heterogeneous reactions. It will examine problems related to multiple reactions and non-isothermal operations. Students will also work cooperatively on computer assignments to expose them to solving problems using software packages such as PolyMath.

5. Master of Engineering in Bioprocess

SETB 5103 - Biotechnology for Engineers

This course covers basic understanding of microorganisms and genetic engineering involved in biotechnology. First, biotechnology definition and timeline is presented. The concept of protein expression, different expression systems used in biotechnology and the omics technology are also covered. The course is aimed at providing the fundamentals of biotechnology and knowledge on how biotechnology evolves from the ancient time. This course also consists of 6 modules and 1 fieldwork. The first 3 modules cover biotechnology application in different areas i.e. food, agriculture, medical, and environment. Next, 2 modules on the global scenario of biotechnology industry and biotechnology in Malaysia and current issues are discussed. It also discusses how this technology contributes towards wealth creation, health improvement, environmental protection and issues related to social security globally. The active involvement of Malaysia in biotechnology for a new source of economic engine is also discussed and evaluated. The last module deals with bioethics issues in biotechnology.

SETB 5113 - Industrial Bio-processing

This course introduces students to the fundamentals of various industrial bioprocessing areas based on the sources and applications. Emphasis will be on the technologies in which the students will be guided in being independently acquired and explain information on some key issues in food and bioproducts engineering, biopharmaceutical engineering, renewable resources and waste management bioprocessing science and technology.

SETB 5123 - Facilities and Infrastructure in Bioprocess Engineering

This course provides a complete overview about the production facility from the beginning of the project up to the production process and how to perform all project steps according to the guidelines of the Good Manufacturing Practice (cGMP). Topics will include: the primary and detailed engineering in the production area, flow inside the facility (personnel, material,

product and waste flow), the design of the HVAC system and clean area according to the cGMP requirements. Besides the engineering and design aspects, the course also encompasses all aspects of the cGMP requirements for the production equipment, from cell bank to the final product. Furthermore non-design/equipment components of the cGMP such as, human resource, process design and operation procedure based on Standard Operation Procedures (SOPs) sheet is also introduced.

SETB 5133 - Advanced Bio-product Development

This course introduces students to the advance of bio-product development based on the sources and functional applications. Emphasis will be on the technologies in the development of bio-products; various types of materials/bio-materials, design, operations and analysis of their desired performances. The course also exposes students to the different stages in the development of a bio-product, from the research and development to manufacturing, bio-product approval and release of the final product.

6. Master of Gas Engineering and Management

SETG 5123 - Hydrocarbon Gas Transportation and Storage

This subject enables students to acquire and practice the fundamental knowledge of liquefied petroleum gases (LPG), and natural gases (NG) transportation and storage. The students are also required to prepare a group technical report and present their project at the end of the course. Students will also utilise computer software in executing their project.

SETG 5223 - Asset Management and Control

The Asset Management and Control course is dealing with the study of systems/methods/approaches/techniques that monitors and maintains things of value to an entity of a group/organization/company. It may apply to both tangible assets and to intangible concepts. Throughout the course, strong emphasis is placed on how the practice of managing assets to achieve the greatest return (particularly useful for productive assets such as plant and equipment) and the process of monitoring and maintaining facilities systems with the objective of providing the best possible service to users.

SETG 5233 - Hydrocarbon Gas Contract Negotiation and Implementation

This course enables students to understand the concept of hydrocarbon gas negotiation to sustain the stable supply of energy since consumers are interested in long term stability, predict the potential policy mistake, gas development risks, strategy for the gas chain and relationship between gas supply and purchase agreement, prepare the draft invoice for gas supply and purchase agreement, legal framework, contract structure, and explain the role of government with regard to the energy supply.

SETG 5243 - Hydrocarbon Gas Project Planning, Development and Financing

This course enables students to elaborate confidently on government policy and regulatory framework related to oil and gas industry, set out the principles of planning on development of gas projects, become leader in safe and efficient operation in the oil, gas and petrochemical industry in Malaysia, and prepare an analysis on investment and financing of gas potential projects.