

BACHELOR OF ENGINEERING (PETROLEUM)

PROGRAMME SPECIFICATIONS

The Bachelor of Engineering (Petroleum) 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 various learning centres throughout Malaysia. 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 2-Semester per academic session. Generally, students are expected to undertake courses equivalent to between fifteen (15) 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 Engineering (Petroleum)			
4. Final Award	Bachelor of Engineering (Petroleum) with Honours			
5. Programme Code	TK31			
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/ Ethics/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	

PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

Code	Intended Educational Objectives
PEO1	Perform competently in chemical/ petroleum/ bioprocess/ gas/ nuclear Industries and become important contributors to national development.
PEO2	Become creative, innovative and adaptable engineers as leaders or team members in their organizations and society.
PEO3	Contribute professionally towards the environmental well-being and sustainable development

PROGRAMME LEARNING OUTCOMES (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies

Code	Intended Learning Outcomes
PLO1 (KW)	Ability to apply knowledge of mathematics, natural science, engineering fundamentals, chemical/petroleum/bioprocess/gas/nuclear engineering principles to the solution of complex engineering problems.
PLO2 (THPA)	Ability to identify, formulate, conduct research literature, and analyze complex chemical/ petroleum/ bioprocess/ gas/ nuclear engineering problems using first principles of mathematics and engineering sciences.
PLO3 (THDS)	Ability to design solution for complex chemical/ petroleum/ bioprocess/gas/nuclear engineering problems and design system or process to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PLO4 (THI)	Ability to conduct investigation of complex chemical/ petroleum/ bioprocess/ gas/ nuclear engineering problems using research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.

PLO5 (SCMT)	Ability to inculcate modern computational techniques and tools complex chemical/ petroleum/ bioprocess/ gas/ nuclear which include prediction and modeling to solve complex engineering problem with an understanding of the limitations.
PLO6 (AD)	Ability to responsibly act as well as respond to the societal health, safety, environment, legal and cultural issues that are relevant to the professional engineering practice.
PLO7 (GCS)	Ability to explain and evaluate the sustainability and impact of professional engineering work in the solution of complex chemical/ petroleum/ bioprocess/ gas/ nuclear engineering problems in societal and environmental contexts.
PLO8 (GCE)	Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PLO9 (CS)	Ability to communicate effectively through written and oral modes to all levels of society
PLO10 (TW)	Ability to work independently, and as a member or a leader in a team to manage project in multi-disciplinary environment.
PLO11 (SC)	Ability to acquire knowledge and engage in independent and life-long learning.
PLO12 (ES)	Ability demonstrate knowledge of engineering management principles and entrepreneurial mindset to manage projects in multi-disciplinary environments.

Note: KW = Engineering Knowledge; THPA = Thinking Skills-Problem Analysis; THDS= Thinking Skills Design/Development of Solution; THI =Thinking Skills-Investigation; SCMT= Scholarship Modern Tool Usage; AD = Global Citizen Adaptability; GCS = Global Citizen Sustainability; GCE = Global Citizen Ethics; CS = Communicating Skills; TW = Leadership and Team Working; SC = Life Long Learning; ES = Enterprising Skills.

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)
- Sit for Test of English Communication Skills (TECS) for graduating Students.
- 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.

Entry Requirements

The minimum qualifications for candidates who intend to do a Bachelor of Engineering (Petroleum) are as follows:

- 1) Minimum results based on **the Malaysian High School Certificate (STPM)** (results would be based on the general requirements as well as other conditions as the pre-requisites for the programme set by the university).

University General Requirements:

- i. Passed and obtained good results in the Malaysian Certificate Examination (SPM) or its equivalent.
- ii. Passed Bahasa Melayu/Bahasa Malaysia with credit in the SPM/ equivalent.
- iii. Passed the Malaysian High School Certificate (STPM) or its equivalent and obtained the following:
 - a) Grade C (NGMP 2.00) General paper, and
 - b) Grade C (NGMP 2.00) in two other subjects
- iv. Passed the Malaysian University English Test (MUET) with minimum result of Band 2.

Special Requirements for the Programme

- i. Obtained a CGPA of 2.80; and Passed with a minimum Grade B- (NGMP 2.67) in two of the following subjects:
 - a) Mathematics T / Further Mathematics

- b) Physics/ Chemistry/ Biology
 - ii. Passed with a minimum Grade B at SPM/equivalent examination in the following subjects:
 - a) Mathematics
 - b) Physics
 - iii. Candidate who fulfill the requirements in Physics or Biology at STPM must obtained a minimum Grade B at SPM level in Chemistry.
 - iv. Passed the Malaysian University English Test (MUET) with minimum result of Band 2.
 - v. Does not possess severe colour blindness or not physically handicapped that can constrain practical work.
- 2) Minimum requirements for **Matriculation Certificates (KPM) / Asasi Sains UM/Asasi UiTM** (fulfil the general requirements set by the university as well as other conditions of the programme).

General University Requirements

- i. Passed the Malaysian Certificate Examination (SPM) with good results.
- ii. Passed in Bahasa Melayu/Bahasa Malaysia with credits in the SPM/equivalent examination.
- iii. Passed the Matriculation Certificate Examination (KPM) / Asasi Sains UM/ Asasi UiTM with a minimum CGPA of 2.00 and passed all the core subjects.
- iv. Passed the Malaysian University English Test (MUET) with minimum result of Band 2.

Special Requirements of the Programme:

- i. Obtained a CGPA of 2.80; and Passed with a Grade B- (2.67) in two of the following subjects:
 - a) Mathematics
 - b) Chemistry/Engineering Chemistry/Physics/Engineering Physics/ Biology
- ii. Passed with a minimum Grade B at SPM/equivalent examination in the following subjects:
 - a) Mathematics
 - b) Physics
- iii. Candidate who fulfill the requirements in Physics or Biology at STPM

- must obtained a minimum Grade B at SPM level in Chemistry.
- iv. Passed the Malaysian University English Test (MUET) with minimum result of Band 2
 - v. Does not possess severe colour blindness or not physically handicapped that can constrain practical work.

3. Minimum qualifications for students with **Certificates/Diplomas**

There is no acceptance to the programme based on this qualification.

PROFESSIONAL SKILLS CERTIFICATE (PSC)

Students are given a chance to enrol in certificate programmes offered by the Centres of Excellence in the University and the School of Professional and Continuing Education (SPACE) during semester breaks

1. How to Get Yourself Employed (HTGYE)
2. ISO 9001: 2008 Quality Management System Requirement (ISO)
3. Occupational Safety and Health Awareness (OSHA)
4. How to Manage Your Personal Finance (HTMYPF)
5. Test of English Communication Skills for Graduating Students (TECS):
 - (i) TECS 1001 (Paper I – Oral Interaction)
 - (ii) TECS 1002 (Paper II - Writing)

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	
ULAB 1122	Academic English Skills	2	
UICI 1012	Islamic and Asia Civilization (for Local Students)	2	
ULAM 1**2	Malay Language Communication 2 (for International Students)		
SKTP 1313	Introduction to Petroleum Engineering*	3	
SSCK 1203	Analytical Chemistry for Engineering	3	
SKTP 1113	Engineering Mechanics	3	
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	16	

YEAR 1: SEMESTER 2			
Code	Course	Credit	Pre-requisite
UHAK 1012	Graduate Success Attributes	3	
SSCE 1793	Differential Equations	2	SSCE 1693#
SKTP 1123	Fluid Mechanics*	3	
SKTP 1133	Engineering Drawing	3	
SKTP 1711	Fluid Mechanics Lab.	1	SKTP 1123
ULA* 1112	Foreign Language Elective	2	
UHAS 1172	Dinamika Malaysia (for Local Students)	2	
UHAK 1022	Malaysia Studies 3 (for International Students)		
	TOTAL CREDIT	16	
	CUMULATIVE CREDITS	32	

YEAR 2: SEMESTER 1			
Code	Course	Credit	Pre-requisite
ULAB 2122	Advanced Academic English Skills	2	
SCSJ 1013	Programming Technique I	3	
SKEU 2003	Electrical Technology	3	
SKTP 2213	Basic Geosciences*	3	
SKTP 2721	Geosciences Lab	1	SKTP 2213
SKTP 2113	Thermodynamics	3	
SSCE 1993	Engineering Mathematics II	3	SSCE 1693#
	TOTAL CREDIT	18	
	CUMULATIVE CREDITS	50	

YEAR 2: SEMESTER 2			
Code	Course	Credit	Pre-requisite
SSCE 2193	Engineering Statistics	3	SSCE 1693#
SKTP 2123	Mechanics of Materials	3	SKTP 1113#
SKTP 2313	Reservoir Rock and Fluids Properties*	3	
SKTP 2731	Thermodynamics & Mechanics of Material Lab.	1	SKTP 2123, SKTP 2113#
UICL 2302	The Thought of Science and Technology	2	
UHAK 2**2	Soft Skills Elective	2	
UHAK 1032	Introduction to Entrepreneurship	2	
UKQ* ***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#
SKTP 3413	Drilling Engineering*	3	
SKTP 3741	Drilling Fluid Lab.	1	SKTP 3413
SKTP 3213	Formation Evaluation	3	
SKTP 3313	Reservoir Engineering*	3	SKTP 2313#
SKTP 3741	Reservoir Engineering Lab.	1	SKTP 3313
SKTP 3921	Geology Field Work [®]	1	SKTP 2213#
ULAB 3162	English for Professional Purposes	2	
UKQ 3001	Extracurricular Experiential Learning	1	
	TOTAL CREDIT	18	
	CUMULATIVE CREDITS	86	

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

YEAR 3: SEMESTER 3 (SHORT SEMESTER)			
Code	Course	Credit	Pre-requisite
SKTP 3915	Industrial Training	5	
	TOTAL CREDIT	5	
	CUMULATIVE CREDITS	108	

YEAR 4: SEMESTER 1			
Code	Course	Credit	Pre-requisite
SKTP 4814	Undergraduate Project II**	4	SKTP 3812#
SKTP 4822	Field Development Plan I**	2	SKTP 4213, SKTP 3213#, SKTP 3313#, SKTP 3413#, SKTP 3513#
SKTP 4213	Petroleum Geology	3	SKTP 2213#
SKTP 4113	Petroleum Management and Entrepreneurship	3	SKTP 3113#
SKTP 4313	Well Testing	3	SKTP 3313
	TOTAL CREDIT	15	
	CUMULATIVE CREDITS	123	

YEAR 4: SEMESTER 2			
Code	Course	Credit	Pre-requisite
SKTP 4834	Field Development Plan II**	4	SKTP 4822#
SKTP 4323	Secondary and Tertiary Oil Recovery	3	SKTP 3313#
SKTP 4513	Gas Engineering	3	
SKTP 4**3	Petroleum Eng. Elective	3	
SKT* 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

Petroleum Elective Courses

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

Courses for Minor Programme of Petroleum Engineering

Code	Course	Credit	Pre-requisite
SKTP 2213	Basic Geosciences*	3	
SKTP 2313	Reservoir Rock and Fluids Properties*	3	
SKTP 3313	Reservoir Engineering*	3	SKTP 2313#
SKTP 3413	Drilling Engineering*	3	
SKTP 3513	Petroleum Production Engineering*	3	
	Total Credits For Minor	15	

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	SKTP 1313	Introduction to Petroleum Engineering	3	3	
2	SKTP 1113	Engineering Mechanics	3	3	
3	SKTP 1123	Fluid Mechanics	3	3	
4	SKTP 1133	Engineering Drawing	3	3	
5	SKTP 1711	Fluid Mechanics Lab.	1	1	
6	SKTP 2213	Basic Geosciences	3	3	
7	SKTP 2721	Geosciences Lab	1	1	
8	SKTP 2113	Thermodynamics	3	3	
9	SKTP 2123	Mechanics of Materials	3	3	
10	SKTP 2313	Reservoir Rock and Fluids Properties	3	3	
11	SKTP 2731	Thermodynamics & Mechanics of Material Lab.	1	1	
	SKTP 3413	Drilling Engineering	3	3	
12	SKTP 3741	Drilling Fluid Lab.	1	1	
13	SKTP 3213	Formation Evaluation	3	3	
14	SKTP 3313	Reservoir Engineering	3	3	
15	SKTP 3741	Reservoir Engineering Lab.	1	1	
16	SKTP 3921	Geology Field Work	1	1	
17	SKTP 3423	Well Completion	3	3	
18	SKTP 3113	Petroleum Economics	3	3	
19	SKTP 3513	Petroleum Production Engineering	3	3	
20	SKTP 3123	Health, Safety and Environment	3	3	
21	SKTP 3323	Reservoir Simulation	3	3	
22	SKTP 3812	Undergraduate Project I	2	2	
23	SKTP 3915	Industrial Training (YEAR 3/SHORT SEM.) for 12 weeks/3 months	5	HL	
25	SKTP 4814	Undergraduate Project II	4	4	
27	SKTP 4822	Field Development Plan I	2	2	
28	SKTP 4213	Petroleum Geology	3	3	
29	SKTP 4113	Petroleum Management and Entrepreneurship	3	3	
30	SKTP 4313	Well Testing	3	3	
31	SKTP 4834	Field Development Plan II	4	4	
32	SKTP 4323	Secondary and Tertiary Oil Recovery	3	3	

33	SKTP 4513	Gas Engineering	3	3	
34	SKTP 4**3	Petroleum Eng. Elective	3	3	
35	SKT* 4**3	Technical Elective	3	3	
		TOTAL CREDIT OF PETROLEUM ENGINEERING COURSES (a)	92	87	
APPLIED SCIENCE / MATHEMATICS / COMPUTER COURSES					
1	SCSJ 1013	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	SKEU 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 & History (Faculty of Social Sciences and Humanities)					
1	UHAS 1172	Dinamika Malaysia (for Local Students)	2	2	
	UHAK 1022	Malaysia Studies 3 (for International Students)			
2	UICI 1012	Islamic and Asian Civilization (for Local Students)	2	2	
	ULAM 1**2	Malay Language Communication 2 (for International Students)			
Cluster 2: Generic Skills					
1	UHAK 1012	Graduate Success Attributes	2	2	
2	UHAK 1032	Introduction to Entrepreneurship	2	2	
3	UHAK 2**2	Soft Skills Elective	2	2	
Cluster 3: Expansion of Knowledge					
1	UICL 2302	The Thought of Science and Technology	2	2	
Cluster 4: Co-Curriculum and Service Learning					
1	UKQ* 2**2	Co-Curriculum & Service Learning	2	2	
2	UKQ 3001	Extracurricular Experiential Learning	1	1	
Cluster 5: Language Skill (Language Academy, Faculty of Social Sciences and Humanities)					
1	ULAB 1122	Academic English Skills	2	2	
2	ULAB 2122	Advanced Academic English	2	2	

		Skills			
3	ULAB 3162	English for Professional Purposes	2	2	
4	ULA* 1112	Foreign Language Elective	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) (UTMSPACE/ School)					
1	GLL 1001	How to Get Your Self Employed			
2	GLL 1029	ISO 9001:2008 Quality Management System Requirement			
3	GLL 1040	Occupational Safety, Health and Environment			
4	GLL 1041	How to Manage Your Personal Finance			
Test of English Communication Skill (TECS) (Language Academy, Faculty of Social Sciences and Humanities)					
1	TECS 1001	Oral Interaction			
2	TECS 1002	Writing			

COURSE SYNOPSIS

CORE COURSES

SKTP 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.

SKTP 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.

SKTP 1123 Fluid Mechanics

This course introduces students to basic concept 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.

SKTP 1711 Fluid Mechanics Laboratory

Co-Requisites: SKTP 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.

SKTP 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. Besides that, this course also provides the basic skills and concept on the technical drawing of the gas engineering related Piping & Instrumentation Diagram (P&ID) that is essential for process industries.

SKTP 2213 Basic Geoscience

This course introduces students with the introduction of geosciences/geology and subtitles of physical geology. The course emphasis on the Earth physical & chemical characteristic, 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.

SKTP 2721 Geoscience Laboratory

Co-Requisites: SKTP 2213 Basic Geoscience (Taken)

This course exposes the students 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.

SKTP 2113 Thermodynamics

Thermodynamics is an important basic engineering subject where concepts such as systems, boundaries, mass, heat, work and energy are introduced. These concepts are then related using the 1st and 2nd Law of Thermodynamics. In this subject property of common substances such as water, air and general working fluids are introduced using property tables and basic state equations. These concepts are applied in many engineering equipment, basic refrigeration and power cycles. Such basic concepts are vital because they form the fundamentals for future chemical engineering subjects.

SKTP 2123 Mechanic of Materials

Pre-Requisites: SKTP 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.

SKTP 2711 Thermodynamics and Mechanics of Material Laboratory

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

Experiments performed in this laboratory include boiler tests, diesel engine performance test, equilibrium test, energy (heat engine), tensile test, metal metallography, determination of Young modulus, air compressor, cooling system, torsion testing, stress and strain analysis.

SKTP 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.

SKTP 3921 Geology Fieldwork

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

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

SKTP 3313 Reservoir Engineering

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

This course covers the fundamentals of reservoir engineering which include the description and characterizing of the oil and gas reservoir, 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. Students are first introduced to the volumetric calculation method and the Material Balance Equation for the application in gas reservoirs. The methods are then extended to gas condensate reservoirs, and to oil reservoirs (saturated and undersaturated). The concept of superposition is also discussed and the fundamental equations for the pressure transient analysis are derived. This course is conducted by normal lectures and student group project based on published reservoir data.

SKTP 3731 Reservoir Engineering Laboratory

Co-Requisites: SKTP 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.

SKTP 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.

SKPP 3741 Drilling Fluid Laboratory

Co-Requisites: SKTP 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 better understand 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 blenders, mud balances, marsh balances, rheometers, pH meters, resistivity meters, and the filter press unit, etc.

SKTP 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 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.

SKTP 3812 Undergraduate Project I

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.

SKTP 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 student to finally be able to generate cash flow of the project and perform an economic evaluation of the project.

SKTP 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.

SKTP 3513 Petroleum Production Engineering

This course introduces students to 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.

SKTP 3323 Reservoir Simulation

Pre-Requisites: SKTP 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.

SKTP 3123 Health, Safety and Environment

The course presents fundamental principle of safety and risk assessment in petroleum engineering. It emphasizes on 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.

SKTP 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.

SKTP 4814 Undergraduate Project II

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

This course is a continuation of the Undergraduate Project I. The second part of 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.

SKTP 4822 Field Development Plan I

Pre-Requisites: SKTP 3213 Formation Evaluation, SKTP 3313 Reservoir Engineering, SKTP 3413 Drilling Engineering, SKTP 3513 Petroleum Production Engineering (pass with at least D+)
Co-Requisites: SKTP 4213 Petroleum Geology (Taken)

Field Development Plan courses expose students to the process and methods in developing an optimum plan for a 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.

SKTP 4213 Petroleum Geology

Pre-Requisites: SKTP 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.

SKTP 4113 Petroleum Management and Entrepreneurship

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

This course is pertinent to petroleum engineering and business topics. A group project evaluation utilized a widely used industry software package for economic evaluations. 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.

SKTP 4313 Well Testing

Pre-Requisites: SKTP 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.

SKTP 4834 Field Development Plan II

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

The second part of the courses cover the simulation of the reservoir fluid flow behavior and optimize the field development scenario. This simulation leads to the design of an appropriate production system. An economic assessment is performed considering 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.

SKTP 4323 Secondary and Tertiary Oil Recovery

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

This course will provide the students with knowledge of advanced topics in Reservoir Engineering. The students are introduced to secondary and tertiary methods of oil production from reservoir rocks. The contents of course include the factors determining movement of oil in reservoirs, different Reservoir Drive Mechanisms and different methods of enhancing Production of Oil. This course conducted through lecture-oriented with assignments, tests and case studies.

SKTP 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.

ELECTIVE COURSES

SKTP 4153 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. Maximizations 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 vapor pressure in gasoline to cope with seasonal altitudinal needs

SKTP 4533 Production Data Analysis

The aim of this course is to provide familiarization of the principles and applications of various theories and techniques necessary to design, estimate and maximize production performance in a cost-effective manner within various constraints from the oil and gas well systems. Attempts will be made to understand how these techniques could be applied to identify the best way of exploiting petroleum reserves, as well as maximizing ultimate production. This course will address details of reservoir inflow performance, well flowing performance, design of artificial lift systems, familiarization of petroleum production facilities, and analysis and optimization of total petroleum production systems using conventional and nodal analysis.

SKTP 4253 Geophysics

This course introduces students with the introduction and application of applied 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 also discusses the general approach, equipment and field operations of the methods used. The course provides practice in carrying out a small-scale fieldwork project to investigate shallow geological features which are presumed to exist in the subsurface.

SKPP 4413 Advanced Drilling Engineering

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

This course covers the special operations such as coring and fishing, identification of kick or blow out and methods of well control, advance drilling operations used in the industry, drilling optimization and procedures and legislation of well abandonment.

SKTP 4423 Advanced Well Completion

Pre-Requisites: SKTP3423 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 slick line and completion operations, and preparation of a completion report after the respective well has been released to production and slick line report upon completion of its operation. The content delivered also covers deep sea completion and slick line operations, and completion in unconventional hydrocarbon energy sources.

SKTP 4513 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.