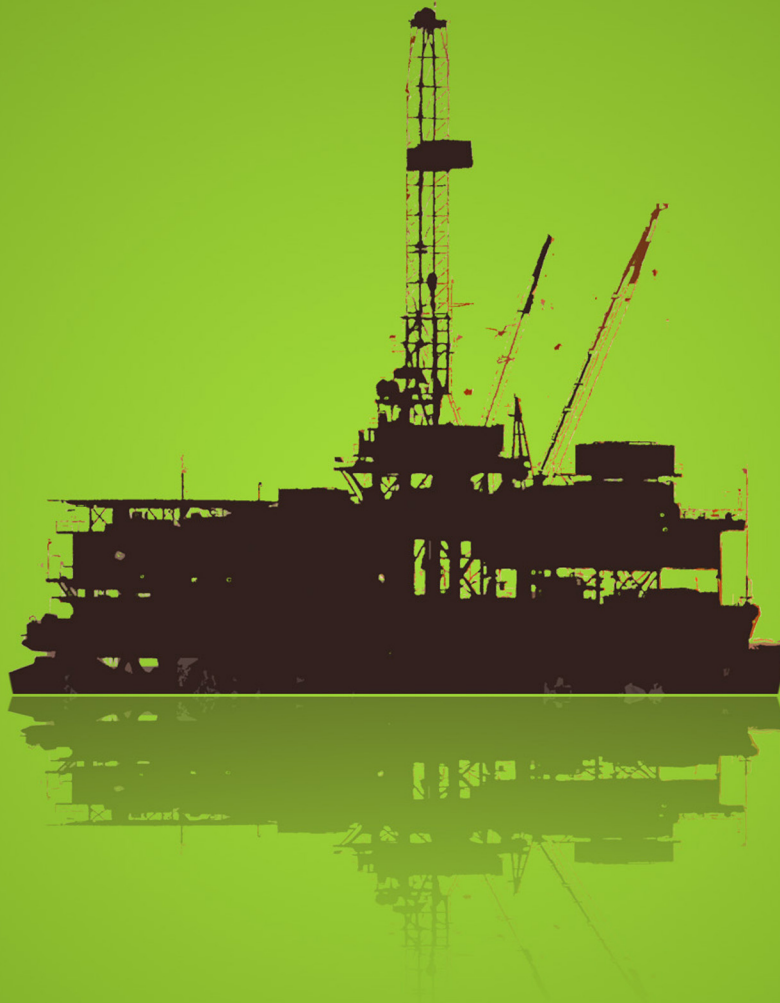




**UTM**  
UNIVERSITI TEKNOLOGI MALAYSIA

Faculty of Petroleum &  
Renewable Energy  
Engineering

RESEARCH UNIVERSITY



# FACULTY OF PETROLEUM & RENEWABLE ENERGY ENGINEERING

POSTGRADUATE 2011/2012  
**STUDENT GUIDEBOOK**

**POSTGRADUATE HANDBOOK 2011/2012**

**FACULTY OF PETROLEUM AND  
RENEWABLE ENERGY ENGINEERING  
(FPREE)  
UNIVERSITI TEKNOLOGI MALAYSIA**

**INSPIRING CREATIVE AND  
INNOVATIVE MINDS**

**[www.petroleum.utm.my](http://www.petroleum.utm.my)**

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**UNIVERSITI TEKNOLOGI MALAYSIA**  
**'INSPIRING CREATIVE AND**  
**INNOVATIVE MINDS'**



Universiti Teknologi Malaysia (UTM) is an innovation-led research university in engineering, science, and technology. Its main campus, which houses 14 faculties including Faculty of Petroleum and Renewable Energy Engineering (FPREE), is located in Johor Bahru, the southern city in Iskandar Malaysia which is a vibrant economic corridor in the south of Peninsular Malaysia. It is renowned for being at the forefront of engineering and technological knowledge and expertise, contributing to the technical and professional workforce of the nation since its inception in 1904.

Equipped with more than 2000 experienced academic staff including 200 international graduate faculty members, UTM continuously strives to enhance the quality of its undergraduate programmes to international standard and global recognition. Apart from having a cosmopolitan atmosphere in UTM with the presence of international students from Indonesia, China, Kazakhstan, Somalia, Sudan, Uganda, Iran, Yemen, Nigeria, Pakistan, Australia, and Saudi Arabia, another bold effort is taken through the engagement in academic and research collaboration with renowned institutions, namely Imperial College of London, University of Cambridge, University of Oxford, MIT, Institute Technology of Bandung, Tokyo University, etc., on areas of mutual interests and this effort is seen to promote significant contribution to academic standard.

Today, UTM has more than 10,000 full-time undergraduate students in various fields of specialization. To complement a conducive teaching and learning environment, UTM provides many basic and value-added facilities, as listed in 'Current Students' of UTM's website. Successfully produced more than 200,000 technical graduates and qualified professionals over the years, UTM has earned its place as Malaysia's premier university in Engineering and Technology which inspires creativity and innovation.

## **FPREE IN BRIEF**



Faculty of Petroleum and Renewable Energy Engineering is a new faculty. It was established on 1<sup>st</sup> June 2010 comprising of two departments; Department of Gas Engineering and Department of Petroleum Engineering. The Department of Petroleum Engineering was established much earlier in 1975 under the Faculty of Mechanical Engineering whereas Department of Gas Engineering was established in 1996 under the Faculty of Chemical and Natural Resources Engineering.

The faculty is led by a Dean and assisted by two Deputy Deans, two Head of Departments, IT Manager, a Deputy Registrar and an Assistant Registrar. At this moment, the academic staffs in the faculty are divided into two different Departments:

- Gas Engineering
- Petroleum Engineering

In addition, Head of Post Graduate Department, assisted by programme coordinators is focusing on post graduate studies to ensure the smooth running of the postgraduate programmes.

**Administrator**



Prof. Dr. Ariffin Samsuri  
Dean



Assoc. Prof. Issham Ismail  
Deputy Dean (Academic)



Prof. Dr. Zulkefli Yaacob  
Deputy Dean (Research & Consultancy)



Assoc. Prof. Dr. Radzuan Junin



Assoc. Prof. Dr. Zainal Zakaria



Assoc. Prof. Dr. Khairul Sozana Nor Kamarudin



Dr. Muhammad A. Manan  
Laboratory Manager



Mr. Azmi Arshad  
IT Manager



Ms. Sumi Isman  
Assistant Registrar (A)



Miss Hafizah Ahmad Puaát  
Assitant Registrar (HR)

**Programme Coordinator**



Dr. Muhammad A. Manan

Petroleum Eng.  
(Research Programme)



Assoc. Prof. Dr. Mat Hussin Yunan

Petroleum Eng.  
(Taught Course Programme)



Dr. Rafiziana Md Kasmani

Gas Eng.  
(Research Programme)

### **VISION**

To be a world class centre of academic and research excellence in the field of petroleum and renewable energy engineering through innovation and creativity

### **MISSION**

To lead in the development of world class professional and technology in petroleum and renewable energy engineering through excellence education and research

### **OBJECTIVES**

- 1) To produce competent human capital in petroleum and renewable energy engineering who are responsible towards the creator and the community.
- 2) To become the leading training provider and centre of reference for knowledge, product and technology development in petroleum and renewable energy sectors.
- 3) To contribute towards sustainable development of the industries and nation through research, innovation, consultancy services and smart partnership.

### **CUSTOMER CHARTER**

To provide excellence service to fulfil customer's satisfaction in accordance to stakeholders, professional body, university and government

### **QUALITY STATEMENT**

To provide service in engineering, teaching & learning, research, consultancy, publication, and societal service through innovation and creativity

### **QUALITY VALUES**

Creative & Innovative

Customer's satisfaction

Competent

## Graduate Faculty

### Department of Petroleum Engineering

**Prof. Dr. Ahmad Kamal Idris**

B.Sc. Petroleum Eng. (ITB), M.Sc. Petroleum Eng. (ITB), Ph.D Petroleum Eng. (Imperial College)

Room: N01-429 Tel: 5535606

Email: kamal@petroleum.utm.my

**Research area/Expertise:**

- Improved oil recovery
- Rock-fluid interactions
- Oil-water demulsification

**Prof. Dr. Ariffin Samsuri**

B.Sc. Petroleum Eng. (ITB), M.Sc. Petroleum Eng. (ITB), Ph.D Petroleum Eng. (Strathclyde)

Room: N01 -432 Tel: 55 35608/ 5535500

Email: ariffin@petroleum.utm.my

**Research area/Expertise:**

- Well-bore stability
- Rock mechanics
- Drilling
- Cementing

**Prof. Dr. Mohd. Nawi Derahman**

B.Sc. Chemical Eng. (UMIST), M.Sc. Petroleum Eng. (Heriot-Watt), Ph.D Petroleum Eng. (Bath)

Room: N01-303 Tel: 5535557

Email: nawi@petroleum.utm.my

**Research area/Expertise:**

- Reservoir simulation
- Water flooding
- Numerical simulation of oil recovery process

**Assoc. Prof. Abdul Razak Ismail**

B. Petroleum Eng. (UTM), M. Phil. Petroleum Eng. (Heriot-Watt)

Room: N01-428 Tel: 5535605

Email: razak@petroleum.utm.my

**Research area/Expertise:**

- Drilling fluids (environmental friendly, additives, shale problem)
- Formation damage
- Fluid flow and cuttings transport in vertical and horizontal pipes

**Assoc. Prof. Azmi Kamis**

B.Sc. Petroleum Eng. (W. Virginia), M.Sc. Petroleum Eng. (Southern California)

Room: N01-324 Tel: 55 35571

Email: azmik@petroleum.utm.my

**Research area/Expertise:**

- Drilling fluids
- Production engineering

**Assoc. Prof. Issham Ismail**

B. Petroleum Eng. (UTM), M.Sc. Petroleum Eng. (Imperial College)

Room: N01 -427 Tel: 55 35604

Email: issham@petroleum.utm.my

**Research area/Expertise:**

- Drilling fluids additives
- Production engineering



**Assoc. Prof. Dr. Mat Hussin Yunan**

B.Sc. Fuel and Energy Eng. (Leeds), Post Grad. Diploma Petroleum Eng. (Heriot-Watt), M.Sc. Petroleum Eng. (UNSW), Ph.D Petroleum Eng. (UTM)

Room: N01-422 Tel: 55 35599

Email: mhussin@petroleum.utm.my

**Research area/Expertise:**

- Improved oil recovery by miscible flooding
- Deposition of asphaltene during carbon dioxide gas flooding
- Rock-fluid interactions especially on wettability

**Assoc. Prof. Dr. Radzuan Junin**

B. Sc. Geology (UKM), M.Sc. Ind. Mineralogy (Hull), Ph.D Petroleum Eng. (Nottingham)

Room: N01-434 Tel: 5535732

Email: radzuan@petroleum.utm.my

**Research area/Expertise:**

- Drill cuttings disposal
- Improved oil recovery by surfactant flooding
- Reservoir rocks characterization

**Assoc. Prof. Dr. Yahya Sukirman**

B. Petroleum Eng. (UTM), M.Sc. Petroleum Eng. (Strathclyde), Ph.D Civil Eng. - Rock Mechanics (Wales-Swansea)

Room: N01-325 Tel: 5535572

Email: k-yahya@petroleum.utm.my

**Research area/Expertise:**

- Fluid mechanics especially on well-bore stability
- Numerical reservoir simulation
- Scaling mitigation

**Dr. Muhammad Abdul Manan**

B.Sc. Mineral Eng. (Petroleum), (Alabama), M.Sc. Petroleum Eng. Imperial College), Ph.D Petroleum Eng. (UTM)

Room: N01-247 Tel: 5535554

Email: m-amanan@petroleum.utm.my

**Research area/Expertise:**

- Improved oil recovery by surfactant flooding
- Multi-phase flow studies using micro models
- Separation of oil-water emulsion

**Dr. Mohd. Razif Abd. Razak**

B.Sc. Petroleum Eng. (W. Virginia), M.Sc. Petroleum Management (Tulsa), Ph.D. Mineral Economic (Portland)

Room N01-311 Tel: 5535563

Email: razif@petroleum.utm.my

**Research area/Expertise:**

- Petroleum economics
- Risk analysis
- Policies and management issues related to petroleum

**Dr. Mohd Zaidi Jaafar**

B.Sc. Petroleum Eng. (Missouri-Rolla), M.Sc. Petroleum Eng. (Imperial College), Ph.D. Petroleum Eng. (Imperial College)

Room: N01-277 Tel: 55 35539

Email: mzaidij@petroleum.utm.my

**Research area/Expertise:**

- Down hole monitoring
- Streaming potential measurements
- Intelligent wells

**Dr. Moulisree Joshi**

PhD (Geology) (India), MSc (Geology) (India)

Room: N01-402 Tel: + (6)07-5535559

Email: mollyj@petroleum.utm.my

**Research Area/Expertise:**

- Palaeontology
- Climate Change
- Geomorphology and tectonics

## Department of Gas Engineering

### **Prof. Dr. Ahmad Fauzi Ismail**

B. Petroleum Eng. (UTM), M. Chemical Eng. (UTM), Ph.D Chemical Eng. Membrane Technology (Strathclyde)

Room: N01-410 Tel: 55 35592

Email: fauzi@petroleum.utm.my

#### **Research areas:**

- Membrane Technology
- Membrane Manufacturing
- Carbon Nanostructured Material
- Advanced Material for Energy Application

### **Prof. Dr. Zulkefli Yaacob**

B.Sc. (Hons) (Camborne), A.C.S.M., M.Sc. (Texas), Ph.D. (Salford)

Room: N01-424 Tel: 5535601/5535502

Email: zuly@petroleum.utm.my

#### **Research areas:**

- NGV Technology
- Pipeline Transportation
- Transmission and Distribution
- Modeling and Simulation of Gas Flow in Pipeline

### **Assoc. Prof. Dr. Azeman Mustafa**

B.Sc. Chemical Eng. (Louisiana), M.Sc. Combustion and Energy (Leeds), Ph.D Combustion Eng. (Leeds)

Room: N01-321 Tel: 55 35568

Email: azeman@petroleum.utm.my

#### **Research areas:**

- Combustion
- Membrane Fuel Cell
- Gas Separation Membrane
- Carbon Fibres

### **Assoc. Prof. Dr. Khairul Sozana Nor Kamarudin**

B.Sc. Chemical Eng. (New South Wales), M. Chemical

Eng (UTM) Ph.D Gas Eng. (UTM)

Room: N01-255 Tel: 5535482

Email: sozana@petroleum.utm.my

#### **Research area:**

- Waste Combustion /Energy Conservation
- Adsorbent Development
- Nanomaterials

### **Assoc. Prof. Dr. Noor Shawal Nasri**

B. Chemical Eng. (UTM), M.Sc. Gas Eng. & Management (Salford), Ph.D Catalytic Combustion (Leeds)

Room: N01-323 Tel: 55 35570

Email: noorshaw@petroleum.utm.my

#### **Research area:**

- Green Technology
- Catalysis for environmental
- Renewable Energy
- Bio-Mass especially in bio-fertilizer

### **Assoc. Prof. Dr. Rahmat Mohsin**

B. Mech. Eng. (UTM), M.Sc. Gas Engineering & Management. (Salford), Ph.D Manufacturing & Mechanical Eng. (Birmingham)

Room: N01-330 Tel: 5535489

Email: rahmat@petroleum.utm.my

#### **Research area:**

- CFD development and application
- Gas Metering and Calibration
- Natural Gas Vehicle Systems (NGV)
- Gas Transmission and Distribution System

**Assoc. Prof. Dr. Zainal Zakaria**

B. Petroleum Eng. (UTM), M. Petroleum Eng (UTM), Ph.D Gas Eng. (UTM)  
Room: N01-274 Tel: 55 35497  
Email: zainalz@petroleum.utm.my

**Research area:**

- Storage System
- Transmission and Distribution
- Corrosion
- Fluid flow

**Dr. Mariani Idroas**

B.Sc. Electrical Eng. (Western Michigan), M.Sc. Instrumentation & Analytical Sc. (UMIST), Ph.D Instrumentation (Sheffield)  
Room: N01-260 Tel: 55 35487  
Email: mariani@petroleum.utm.my

**Research area:**

- Instrumentation system
- Industrial Process Tomography
- Imaging system and shape recognition

**Dr. Rafiziana Md. Kasmani**

B. Chemical Eng. (UTM), M.Sc. Fire and Explosion Eng. (Leeds), Ph.D Vented Gas Explosion (Leeds)  
Room: N01-276 Tel: 55 35499  
Email: rafiziana@petroleum.utm.my

**Research area:**

- Gas and dust explosions
- Fire engineering
- Explosion protection and mitigation

**Dr. Noorul Anam Mohd Noordin**

B.Sc. Petroleum Eng. (Univ of Tulsa, Oklahoma, USA), M.Sc Chemical Eng (UTM), Ph.D Gas Engineering (UTM)  
Room: N01-256 Tel no : 07 - 5535483  
Email: anam@petroleum.utm.my

**Research area:**

- Membrane for fuel cell technology
- Direct Methanol and Hydrogen Fuel Cell
- Membrane for separation and purification process

**Dr. Lau Woei Jye**

B.Eng. Chemical-Gas Engineering (UTM), Ph.D. Chemical Engineering (UTM)  
Room: N09-313 and N29A Tel: 07-5535926  
Email: wjlau@petroleum.utm.my

**Research area:**

- Preparation and Characterization of Nanofiltration Membranes
- Preparation and Characterization of Ultrafiltration Membranes with Enhanced Fouling Resistance using Innovative Materials
- Membrane Distillation for Wastewater Treatment
- Crude Palm Oil Refining using Membrane-Based Technology

**Dr. Mukhlis A. Rahman**

B.Eng. Chemical (UTM), M.Eng. Gas, (UTM), Ph.D Chemical Engineering (Imperial College London, UK)  
Room: -  
Tel: -

Email: mukhlis@petroleum.utm.my

**Area of Research:**

- Energy Production
- Catalyst
- Membranes Technology

**Dr. Suhaila Mohd. Sanip**

BSc Polymer Science & Technology (UMIST, UK), MSc Chemistry (UTM, Malaysia), Ph.D Engineering (NIT, Japan)

Room: N01-220

Tel: 07-5535926

Email: suhaila@petroleum.utm.my

**Area of Research:**

- Carbon nanotubes and energy related materials
- Mixed Matrix Membranes
- Fuel Cells and renewable energy

**Dr. Mohd Hafiz Dzarfan b. Othman**

B.Eng. Chemical (UTM, Malaysia), M. Eng. Gas, (UTM, Malaysia), Ph.D Chemical Engineering (Imperial College London, UK)

Room: N01-248

Tel: 07-5535555

Email: hafiz@petroleum.utm.my

**Area of Research:**

- Fuel cell
- Membranes Technology

**Dr. Zalilah Shahrer**

B.Eng. Chemical Engineering (Leeds University, UK) MSc Gas Engineering and Management (Salford University, UK),

Ph.D. Materials (Oxford University, UK)

Room: N01-269

Tel: 07-5535492

Email: zalilah@petroleum.utm.my

**Area of Research:**

- Corrosion of metals
- Protection by organic coating, studies of coating breakdown

## Facilities

UTM provides students with a conducive environment for learning and acts as a one stop agency for services related to health, accommodation, financial aid, students' general welfare and more. At present, there are 17 residential colleges on the main campus, which can accommodate more than 15,000 students. There are many types of room available in each college; single, 2-person, 3-person and 4-person's occupancy. Some colleges provide single accommodation for graduate students with each room having a network port and its own attached bathroom.



**Hostel**



**Health Centre**



**Library**

The University also provides transport services for students to commute from their on-campus residential colleges to classes. The buses provide services from 7.15 am to 11.30 pm daily. In addition, there are also public buses such as the Transit Link and Maju bus companies, which ply between Taman Universiti via the ring road of the campus to Johor Bahru City Centre. Other facilities include library, cafeteria and sport centre.



**Transportation**



**Cafeteria**



**Sultan Ismail Mosque**

The faculty itself is equipped with various facilities in order to provide conducive environment for students. Currently, FPREE has 12 laboratories, a workshop, a mini library, and qualified staff to assist in teaching, research, consultation, publications and various forms of services. The laboratories include teaching laboratories for students to learn the practical aspects in Petroleum and Gas Engineering processes whereas research and service laboratories are meant for research and consultancy activities. Student societies are also set-up to encourage active social interactions among students and staff and to inculcate positive generic skills among students.

#### **1. Student Society**

Postgraduate student society has been set up in 2011, after the establishment of the new faculty (FPREE). All postgraduates' students under Faculty of Petroleum and Renewable Energy Engineering, Universiti Teknologi Malaysia are automatically eligible for membership of the association. This provision includes part-time as well as full time students.

#### **2. Prayer Room**

Prayer rooms are available for the convenience of Muslim students to perform prayer. Two prayer rooms for the male students are located in N01-280-01 and N05. Meanwhile, a prayer room in N01-342-01 is allocated for the female Muslim students.

#### **3. The Faculty Library**

This is a mini library (resource centre) in the faculty, located at level two in the main administration block N01. It can accommodate 30 students at a time. This room is equipped with Internet and Audio Visual service for students. Reference materials, magazines and thesis from previous students as well as final year projects are also available. It is opened weekdays from 9.00 a.m. until 4.00 p.m.

#### **4. Computer Laboratory**

There are 40 Internet-ready computers in the Computer Lab, situated in block N14. This facility is provided to enable students to carry out their assignments and other academic-related matters.

### **Programmes Offered**

The Faculty of Petroleum and Renewable Energy Engineering offers graduate programmes by research and taught course. The research programmes offered are:

1. Master of Engineering (Gas)
2. Master of Engineering (Petroleum)
3. Doctor of Philosophy (Gas Engineering)
4. Doctor of Philosophy (Petroleum Engineering)

The taught course offered is:

1. Master of Science (Petroleum Engineering)

The graduate program is designed based on the quality of our faculty, our graduate students, and the cutting-edge of the collaborative researches. The background and interests of our faculty, the research facilities, and the academic excellence of our students promotes the faculty as an attractive environment for graduate study. As a faculty, we look forward to the future by acknowledged the rapid change and growth in academic world as the important aspects and inevitable in our discipline. The faculty currently has approximately 30 graduate faculty members and more 400 undergraduates and graduates students, with a strong commitment to the importance of diversity among peers and faculty for the professional development of all graduate students. A graduate degree at FPREE will enable you to develop the intellectual skills both practical and theories in facing challenging competition among the best engineers in the world. Besides, world-class training offered in this faculty provides an excellent basis for graduate to embrace and fulfill their career in industry, research, or teaching.

The candidate of Master's or PhD by research is supervised by a selected Graduate Faculty. The focused research work introduces candidates to the processes by which new knowledge is developed and applied accordingly. The academic progress of a candidate is assessed through a research progress report submitted at the end of each semester. The degree is awarded based on an oral examination (viva voce) of the thesis submitted by the candidate on completion of study.

## Programme Format

### Master degree by research

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

### Master degree by taught course

The candidate must complete a minimum of 40 credits, and must obtain a final academic grade of at least 3.0 CGPA (Cumulative Grade Point Average). The minimum 40 credits taught course consists of several courses including compulsory courses, a university elective course and a Master Project.

Each course normally carries 3 credits, and the assessment is carried out by examinations and assignments. The Master Project is to be completed in the final semester and will be assessed by a research proposal seminar, a final project report and an oral examination.

### Doctoral degree

The course is offered full-time and part-time. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

A student candidate may choose to enroll as a full-time or part-time student subject to the study program offered by the faculty.

A research student is required to complete his/her study within the duration prescribed as in Table I.

Level of Study	Full-time		Part-time	
	Minimum (Registered Semester)	Maximum (Semester)	Minimum (Registered Semester)	Maximum (Semester)
Master Degree	2	6	4	8
Doctoral degree	6	12	8	16

### Industrial PhD

Industrial PhD is a doctoral program that promotes advanced and comprehensive coverage of the specialist engineering skills required by the students who wish to update their knowledge in the area. The objective of the program is to develop industry professional as who are not only skilled in conducting research but also capable of demonstrating innovation in the application of knowledge relevant to industry.

Qualitatively, Industrial PhD is equivalent to all other types of doctoral programs, including the conventional PhD.



## Entry Requirements

### Master degree by research

Candidate must hold a Bachelor Degree in Chemical Engineering or Chemical Engineering (Gas) or with CGPA at least 3.0/4.0 (or equivalent) from recognized Higher Learning Institutions. For those having CGPA less than that, please refer to **Entry Evaluation Guidelines**.

### Doctoral degree

A Master's Degree from Universiti Teknologi Malaysia or any other Institutions of higher learning recognised by the Senate; or  
 Other qualifications equivalent to a Master's degree and experience in the relevant field recognised by the Senate; or  
 Candidates who are currently registered in a Master's Degree programme at Universiti Teknologi Malaysia, and approved by the Graduate Studies Committee of the respective faculty and the Senate.

### English Requirements

All students applying to UTM must have a TOEFL or IELTS score. Students with a TOEFL score of 550 (or 79 IBT or CBT 213) or an IELTS Band 6 will be enrolled in a faculty programme without undergoing the IEC. However, a student with a lower score and does not meet the entry requirement will have to attend and pass IEC for at least one semester or up to two semesters depending on his/her entry level (see table below). All students are required to attend and pass IEC at the Intermediate level before being allowed to register for their undergraduate or postgraduate programme. And since the IEC is a pre-requisite programme, students enrolling in IEC are not allowed to register for any faculty course in the same semester.

IELTS/ TOEFL Score	IEC (Level & Duration)
IELTS $\geq$ Band 6.0 TOEFL $\geq$ 550 TOEFL (IBT) $\geq$ 79 TOEFL (CBT) $\geq$ 213	Exempted
Band 5.0 $\leq$ IELTS < Band 6.0 500 $\leq$ TOEFL < 550 61 $\leq$ TOEFL (IBT) < 79 173 $\leq$ TOEFL (CBT) < 213	Intermediate Level Minimum 1 semester
Band 4.0 $\leq$ IELTS < Band 5.0 450 $\leq$ TOEFL < 500 45 $\leq$ TOEFL (IBT) < 61 133 $\leq$ TOEFL (IBT) < 173	Low Intermediate Level Minimum 2 semester

**Program Specifications****(a) Research**

<b>Program Name</b>		<b>Master of Engineering (Petroleum)</b>		
Final Award		Master of Engineering (Petroleum)		
Awarding Institution		Universiti Teknologi Malaysia		
Teaching Institution		Faculty of Petroleum and Renewable Energy Engineering (FPREE)		
Professional or Statutory Body of Accreditation		MQA		
Language of Instruction		English		
Mode of Study (Conventional, distance learning etc)		Conventional		
Mode of Operation (Franchise, self-govern, etc)		Mainstream		
Study Scheme (Full Time/Part Time)		Full Time and Part Time		
Study Duration				
Full-time		Minimum: 1 years Maximum: 3 years		
Part-time		Minimum: 2 years Maximum: 4 years		
Type of Semester	No. of Semester		No. of Weeks per Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	3	6	14	14
Short	-	-	-	-
<b>ENTRY REQUIREMENT</b>				
<p>Candidate must hold a Bachelor Degree in Petroleum Engineering with CGPA at least 3.0/4.0 (or equivalent) from a Recognised Higher Learning Institution. Candidate with CGPA less than 3.0, Appendix B of UTM entry qualification will be applied.</p> <p>Those with a Bachelor Degree in other engineering or science disciplines may also apply, but they may be required to take certain courses that will be determined by the Department of Petroleum Engineering.</p>				
<b>PROGRAM EDUCATIONAL OBJECTIVES</b>				
<p>The objectives of this programme are:</p> <ol style="list-style-type: none"> <li>1. Graduate able to apply the knowledge of petroleum engineering in implementing and solving their respective job assignments professionally.</li> <li>2. Graduate able to use creative and analytical ideas in the development and sharing of knowledge in petroleum engineering.</li> <li>3. Graduate able to adopt a team working in challenging and sustainable environments.</li> <li>4. Graduate able to commit job assignments with confidence, ethical, and integrity, with environmental and societal responsibilities.</li> </ol>				

Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(a) Applied Knowledge and Competencies</b>		
<b>PO1: Able to apply in-depth the knowledge of petroleum engineering in the related research areas</b>		
An ability to apply in-depth knowledge in petroleum engineering-related areas using the techniques, skills, and modern engineering tools necessary for petroleum engineering practice.	Discussion, presentation	Progress report
<b>PO2: Able to analyze the propose research solution creatively using petroleum engineering theories</b>		
An ability to independently analyze and manage scientific research, individually or collectively, using acceptable methodologies	Experimental work and/or simulation work	Research proposal, First stage examination
<b>PO3: Able to identify and analyze problems critically, and integrate data related to the petroleum engineering research</b>		
An ability to identify, analyze and solve research problems related to petroleum engineering through effective and critical thinking skills	Experimental work and/or simulation work	Thesis and viva presentation
<b>PO4: Able to conduct research systematically and publish scientific papers</b>		
An ability to conduct and present research systematically and write scientific paper for journal etc.	Presentation and Thesis	Thesis, technical paper and viva presentation
Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(b) Generic Skills</b>		
<b>PO5: Able to communicate effectively in written and verbal modes</b>		
An ability to communicate ideas and findings through collaborative work, oral presentation and scientific writing	Presentation and Thesis	Thesis, paper and viva presentation
<b>PO6: Able to perform individually and in a team effectively</b>		
An ability to work both independently and in team, adopt intellectual honesty and integrity through non-plagiarism	Discussion, meeting	Thesis and viva presentation
<b>PO7: Able to demonstrate work ethics and integrity</b>		
An ability to embrace intellectual honesty and integrity through non-plagiarism	Thesis	Thesis and viva presentation
<b>LO8: Able to embody life-long learning</b>		
An ability to engage life-long learning	Research proposal, Thesis	Thesis and viva presentation

### PROGRAMME STRUCTURES AND FEATURES, CURRICULUM AND AWARD REQUIREMENTS

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

The subjects are categorized as university elective, program core and program electives such as the followings:

Subject Category	Code	Course	Credit
University Elective (1 subject))	UHX XXX3	(to choose from the list given by School of Graduate Studies)	3
Research Methodology	ULP 0010	Research Methodology	0
Research (Minimum 3 semesters)	MYT 1100	Research	0
	MYT 1200	Research	0
	MYT 2100	Research	0
<b>Total Credit</b>			<b>3</b>

#### **Awards requirements:**

For the award of Master of Engineering (Petroleum), the students should submit a thesis and pass oral examination.

### REGULATION OF ASSESSMENT

Evaluation for a master student by research shall include:

- a) Evaluation of Research Proposal.  
A student is required to present a research proposal for evaluation purposes within the duration specified by the University, failing which the student may be given unsatisfactory (TM) status.
- b) Semester evaluation by the supervisor (Progress report).
- c) Thesis examination by the Internal and External Examiners.
- d) Oral defense of thesis to a Panel for Oral Examiners.

Summary of grades, marks and their interpretation for progress report are as follows:

Overall Assessment	Statement by category	Mark Description	Mark
Satisfactory	Excellent	$9.0 \leq M \leq 10.0$	
	Very good	$8.0 \leq M \leq 9.0$	
		$7.0 \leq M \leq 8.0$	
	Good	$6.0 \leq M \leq 7.0$	
$5.0 \leq M \leq 6.0$			
Unsatisfactory	Fair	$4.0 \leq M \leq 5.0$	
		$3.0 \leq M \leq 4.0$	
Fail	Poor	$2.0 \leq M \leq 3.0$	
		$1.0 \leq M \leq 2.0$	

For thesis and viva the following grading scheme applies:

After examining the thesis, I recommend that

- a) The candidate be awarded the degree of Master of Engineering
- (or) b1) The candidate be awarded the degree of Master of Engineering subject to minor corrections;
- (or) b2) The candidate be awarded the degree of Master of Engineering subject to the amendments and corrections as listed elsewhere in this report being made in the thesis to the satisfaction of the Internal/External Examiner(s);
- (or) c) The candidate not be awarded the degree of Master of Engineering but be permitted to resubmit the thesis for further examination in a revised form after a further period of study and research;
- (or) d) The candidate not be awarded the degree of Master of Engineering but a lower;
- (or) e) The candidate not be awarded the degree of Master of Engineering.

Program Name		Master of Engineering (Gas)		
Final Award		Master of Engineering (Gas)		
Awarding Institution		Universiti Teknologi Malaysia		
Teaching Institution		Faculty of Petroleum and Renewable Energy Engineering (FPREE)		
Professional or Statutory Body of Accreditation		MQA		
Language of Instruction		English		
Mode of Study (Conventional, distance learning etc)		Conventional		
Mode of Operation (Franchise, self-govern, etc)		Mainstream		
Study Scheme (Full Time/Part Time)		Full Time and Part Time		
Study Duration				
Full-time		Minimum: 1 years Maximum: 3 years		
Part-time		Minimum: 2 years Maximum: 4 years		
Type of Semester	No. of Semester		No. of Weeks per Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	3	6	14	14
Short	-	-	-	-
ENTRY REQUIREMENT				
<p>Candidate must hold a Bachelor Degree in Chemical Engineering or Chemical Engineering (Gas) or with CGPA at least 3.0/4.0 (or equivalent) from recognized higher Learning institution. For those having CGPA less than that, Appendix A of UTM entry qualification will be followed.</p> <p>Candidate holding a Bachelor Degree in other engineering or science disciplines may also apply but may be required to take some pre-requisite courses.</p>				
PROGRAM EDUCATIONAL OBJECTIVES				
<p>The objectives of this programme are:</p> <ol style="list-style-type: none"> <li>1. Graduate able to apply the knowledge of gas engineering in implementing and solving their respective job assignments professionally.</li> <li>2. Graduate able to use creative and analytical ideas in the development and sharing of knowledge in gas engineering.</li> <li>3. Graduate able to adopt a team working in challenging and sustainable environments.</li> <li>4. Graduate able to commit job assignments with confidence, ethical, and integrity, with environmental and societal responsibilities.</li> </ol>				

Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(a) Applied Knowledge and Competencies</b>		
<b>PO1: Able to apply in-depth the knowledge of gas engineering in the related research areas</b>		
Graduates able to i. apply in-depth knowledge in gas engineering-related areas using the techniques, skills, and modern engineering tools necessary for petroleum engineering practice.	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO2: Able to analyze the propose research solution creatively using gas engineering theories</b>		
Graduates able to independently analyze and manage scientific research, individually or collectively, using acceptable methodologies	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO3: Able to identify and analyze problems critically, and integrate data related to the petroleum engineering research</b>		
An ability to identify, analyze and solve research problems related to petroleum engineering through effective and critical thinking skills	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO4: Able to conduct research systematically and publish scientific papers</b>		
An ability to conduct and present research systematically and write scientific paper for journal etc.	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(b) Generic Skills</b>		
<b>PO5: Able to communicate effectively in written and verbal modes</b>		
Students able to communicate ideas and findings through collaborative work, oral presentation and scientific writing.	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis, paper and viva presentation
<b>PO6: Able to perform individually and in a team effectively</b>		
An ability to work both independently and in team, adopt intellectual honesty and integrity through non-plagiarism	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation
<b>PO7: Able to demonstrate work ethics and integrity</b>		
An ability to embrace intellectual honesty and integrity through non-plagiarism	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation
<b>PO8: Able to embody life-long learning</b>		
An ability to engage life-long learning	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation

**PROGRAMME STRUCTURES AND FEATURES, CURRICULUM AND AWARD REQUIREMENTS**

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

The subjects are categorized as university elective, program core and program electives such as the followings:

Subject Category	Code	Course	Credit
University Elective (1 subject))	UHX XXX3	(to choose from the list given by School of Graduate Studies)	3
Research Methodology	ULP 0010	Research Methodology	0
Research (Minimum 3 semesters)	MYG 1100	Research	0
	MYG 1200	Research	0
	MYG 2100	Research	0
<b>Total Credit</b>			<b>3</b>

**Awards requirements:**

For the award of Master of Engineering (Gas), the students should submit a thesis and pass oral examination.

**REGULATION OF ASSESSMENT**

Evaluation for a master student by research shall include:

- a) Evaluation of Research Proposal.  
A student is required to present a research proposal for evaluation purposes within the duration specified by the University, failing which the student may be given unsatisfactory (TM) status.
- b) Semester evaluation by the supervisor (Progress report).
- c) Thesis examination by the Internal and External Examiners.
- d) Oral defense of thesis to a Panel for Oral Examiners.

Summary of grades, marks and their interpretation for progress report are as follows:

Overall Assessment	Statement by category	Mark Description	Mark
Satisfactory	Excellent	9.0 ≤ M ≤ 10.0	
	Very good	8.0 ≤ M ≤ 9.0	
		7.0 ≤ M ≤ 8.0	
	Good	6.0 ≤ M ≤ 7.0	
5.0 ≤ M ≤ 6.0			
Unsatisfactory	Fair	4.0 ≤ M ≤ 5.0	
		3.0 ≤ M ≤ 4.0	
Fail	Poor	2.0 ≤ M ≤ 3.0	
		1.0 ≤ M ≤ 2.0	

For thesis and viva the following grading scheme applies:

After examining the thesis, I recommend that

- a) The candidate be awarded the degree of Master of Engineering
- (or) b1) The candidate be awarded the degree of Master of Engineering subject to minor corrections;
- (or) b2) The candidate be awarded the degree of Master of Engineering subject to the amendments and corrections as listed elsewhere in this report being made in the thesis to the satisfaction of the Internal/External Examiner(s);
- (or) c) The candidate not be awarded the degree of Master of Engineering but be permitted to resubmit the thesis for further examination in a revised form after a further period of study and research;
- (or) d) The candidate not be awarded the degree of Master of Engineering but a lower;
- (or) e) The candidate not be awarded the degree of Master of Engineering.

<b>Program Name</b>		<b>Doctor of Philosophy (Petroleum Engineering)</b>		
Final Award		Doctor of Philosophy (Petroleum)		
Awarding Institution		Universiti Teknologi Malaysia		
Teaching Institution		Faculty of Petroleum and Renewable Energy Engineering (FPREE)		
Professional or Statutory Body of Accreditation		MQA		
Language of Instruction		English		
Mode of Study (Conventional, distance learning etc)		Conventional		
Mode of Operation (Franchise, self-govern, etc)		Mainstream		
Study Scheme (Full Time/Part Time)		Full Time and Part Time		
Study Duration:		Full-time Minimum: 3 years Maximum: 6 years Part-time Minimum: 4 years Maximum: 8 years		
Type of Semester	No. of Semester		No. of Weeks per Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	6	8	14	14
Short	-	-	-	-
<b>ENTRY REQUIREMENT</b>				
<ul style="list-style-type: none"> <li>• A Master's Degree in science or technology from Universiti Teknologi Malaysia or any other Institutions of higher learning recognised by the Senate; or</li> <li>• Other qualifications equivalent to a Master's degree and experience in the relevant field recognised by the Senate; or</li> <li>• Candidates who a currently registered in a Master's Degree programme at UniversitiTeknologi Malaysia, and approved by the Graduate Studies Committee of the respective faculty and the Senate.</li> </ul>				
<b>PROGRAM EDUCATIONAL OBJECTIVES</b>				
The objectives of this programme are: <ol style="list-style-type: none"> <li>1. defend the proposed knowledge of petroleum engineering in implementing and solving their respective job assignments.</li> <li>2. express critical, creative, and analytical ideas in the development and sharing of knowledge in petroleum engineering.</li> <li>3. lead a team working in challenging and sustainable environments.</li> <li>4. accomplish job assignments with ethical, integrity, environmental, and societal responsibilities.</li> </ol>				



Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(a) Applied Knowledge and Competencies</b>		
<b>PO1: Able to explore</b> in-depth the knowledge of petroleum engineering in the related research areas		
Graduates able to i. apply in-depth knowledge in gas engineering-related areas using the techniques, skills, and modern engineering tools necessary for petroleum engineering practice.	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO2: Able to justify</b> the propose research solution creatively using petroleum engineering theories		
Graduates able to independently analyze and manage scientific research, individually or collectively, using acceptable methodologies	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO3: Able to identify and analyze</b> problems critically, and <b>integrate</b> data related to the petroleum engineering research		
An ability to identify, analyze and solve research problems related to petroleum engineering through effective and critical thinking skills	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO4: Able to conduct</b> research systematically and <b>publish</b> scientific papers		
An ability to conduct and present research systematically and write scientific paper for journal etc.	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(b) Generic Skills</b>		
<b>PO5: Able to communicate effectively</b> in written and verbal modes		
Students able to communicate ideas and findings through collaborative work, oral presentation and scientific writing.	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis, paper and viva presentation
<b>PO6: Able to perform individually and in a team effectively</b>		
An ability to work both independently and in team, adopt intellectual honesty and integrity through non-plagiarism	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation
<b>PO7: Able to demonstrate work ethics and integrity</b>		
An ability to embrace intellectual honesty and integrity through non-plagiarism	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation
<b>PO8: Able to embody life-long learning</b>		
An ability to engage life-long learning	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation

### PROGRAMME STRUCTURES AND FEATURES, CURRICULUM AND AWARD REQUIREMENTS

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

The subjects are categorized as university elective, program core and program electives such as the followings:

Subject Category	Code	Course	Credit
University Elective (1 subject))	UHX XXX3	(to choose from the list given by School of Graduate Studies)	3
Research Methodology	ULP 0010	Research Methodology	0
Research (Minimum 6 semesters)	PYP 1100	Research	0
	PYP 1200	Research	0
	PYP 2100	Research	0
	PYP 2200 PYP 3100, PYP 3200	Research	0
<b>Total Credit</b>			<b>3</b>

#### Awards requirements:

For the award of Doctor of Philosophy (Petroleum Engineering), the students should submit a thesis and pass oral examination.

### REGULATION OF ASSESSMENT

Evaluation for a doctoral degree student shall include:

- a) Evaluation of Research Proposal.  
A student is required to present a research proposal for evaluation purposes within the duration specified by the University, failing which the student may be given unsatisfactory (TM) status.
- b) Semester evaluation by the supervisor (Progress report).
- c) Thesis examination by the Internal and External Examiners.
- d) Oral defense of thesis to a Panel for Oral Examiners.

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	Very good	$8.0 \leq M \leq 9.0$	
		$7.0 \leq M \leq 8.0$	
	Good	$6.0 \leq M \leq 7.0$	
$5.0 \leq M \leq 6.0$			
Unsatisfactory	Fair	$4.0 \leq M \leq 5.0$	
		$3.0 \leq M \leq 4.0$	
Fail	Poor	$2.0 \leq M \leq 3.0$	
		$1.0 \leq M \leq 2.0$	

For thesis and viva the following grading scheme applies:

After examining the thesis, I recommend that

- (or) a) The candidate be awarded the degree of Doctor of Philosophy
- (or) b1) The candidate be awarded the degree of Doctor of Philosophy subject to minor corrections
- (or) b2) The candidate be awarded the degree of Doctor of Philosophy subject to the amendments and corrections as listed elsewhere in this report being made in the thesis to the satisfaction of the Internal/External Examiner(s)
- (or) c) The candidate not be awarded the degree of Doctor of Philosophy but be permitted to resubmit the thesis for further examination in a revised form after a further period of study and research
- (or) d) The candidate not be awarded the degree of Doctor of Philosophy but a lower
- (or) e) The candidate not be awarded the degree of Doctor of Philosophy.

Program Name		Doctor of Philosophy (Gas Engineering)		
Final Award		Doctor of Philosophy (Gas Engineering)		
Awarding Institution		Universiti Teknologi Malaysia		
Teaching Institution		Faculty of Petroleum and Renewable Energy Engineering (FPREE)		
Professional or Statutory Body of Accreditation		MQA		
Language of Instruction		English		
Mode of Study (Conventional, distance learning etc)		Conventional		
Mode of Operation (Franchise, self-govern, etc)		Mainstream		
Study Scheme (Full Time/Part Time)		Full Time and Part Time		
Study Duration				
Full-time		Minimum: 3 years Maximum: 6 years		
Part-time		Minimum: 4 years Maximum: 8 years		
Type of Semester	No. of Semester		No. of Weeks per Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	6	8	14	14
Short	-	-	-	-
ENTRY REQUIREMENT				
<ul style="list-style-type: none"> <li>• A Master's Degree in science or technology from Universiti Teknologi Malaysia or any other Institutions of higher learning recognised by the Senate; or</li> <li>• Other qualifications equivalent to a Master's degree and experience in the relevant field recognised by the Senate; or</li> <li>• Candidates who are currently registered in a Master's Degree programme at Universiti Teknologi Malaysia, and approved by the Graduate Studies Committee of the respective faculty and the Senate.</li> </ul>				
PROGRAM EDUCATIONAL OBJECTIVES				
<p>The objectives of this programme are:</p> <ol style="list-style-type: none"> <li>1. Graduate able to apply the knowledge of gas engineering in implementing and solving their respective job assignments professionally.</li> <li>2. Graduate able to use creative and analytical ideas in the development and sharing of knowledge in gas engineering.</li> <li>3. Graduate able to adopt a team working in challenging and sustainable environments.</li> <li>4. Graduate able to commit job assignments with confidence, ethical, and integrity, with environmental and societal responsibilities.</li> </ol>				

Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(a) Applied Knowledge and Competencies</b>		
<b>PO1: Able to apply in-depth the knowledge of gas engineering in the related research areas</b>		
Graduates able to i. apply in-depth knowledge in gas engineering-related areas using the techniques, skills, and modern engineering tools necessary for petroleum engineering practice.	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO2: Able to analyze the propose research solution creatively using gas engineering theories</b>		
Graduates able to independently analyze and manage scientific research, individually or collectively, using acceptable methodologies	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO3: Able to identify and analyze problems critically, and integrate data related to the petroleum engineering research</b>		
An ability to identify, analyze and solve research problems related to petroleum engineering through effective and critical thinking skills	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
<b>PO4: Able to conduct research systematically and publish scientific papers</b>		
An ability to conduct and present research systematically and write scientific paper for journal etc.	Guided independent research, cooperative and collaborative learning	Progress report, first stage-examination report, thesis, viva
Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(b) Generic Skills</b>		
<b>PO5: Able to communicate effectively in written and verbal modes</b>		
Students able to communicate ideas and findings through collaborative work, oral presentation and scientific writing.	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis, paper and viva presentation
<b>PO6: Able to perform individually and in a team effectively</b>		
An ability to work both independently and in team, adopt intellectual honesty and integrity through non-plagiarism	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation
<b>PO7: Able to demonstrate work ethics and integrity</b>		
An ability to embrace intellectual honesty and integrity through non-plagiarism	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation
<b>PO8: Able to embody life-long learning</b>		
An ability to engage life-long learning	Guided independent research, cooperative and collaborative learning, postgraduate seminar presentation	Thesis and viva presentation

### PROGRAMME STRUCTURES AND FEATURES, CURRICULUM AND AWARD REQUIREMENTS

The course is offered in full-time and part-time with a specific subjects being delivered and assessed in each semester. The assessment of the research is based on the progress report, supervisor's evaluation, research proposal and viva.

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Research (Minimum 6 semesters)	PYG 1100	Research	0
	PYG 1200	Research	0
	PYG 2100	Research	0
	PYG 2200, PYG 3100, PYG 3200	Research	0
<b>Total Credit</b>			<b>3</b>

#### Awards requirements:

For the award of Doctor of Philosophy (Gas Engineering), the students should submit a thesis and pass oral examination.

### REGULATION OF ASSESSMENT

Evaluation for a doctoral degree student shall include:

- a) Evaluation of Research Proposal.  
A student is required to present a research proposal for evaluation purposes within the duration specified by the University, failing which the student may be given unsatisfactory (TM) status.
- b) Semester evaluation by the supervisor (Progress report).
- c) Thesis examination by the Internal and External Examiners.
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		$7.0 \leq M \leq 8.0$	
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$5.0 \leq M \leq 6.0$			
Unsatisfactory	Fair	$4.0 \leq M \leq 5.0$	
		$3.0 \leq M \leq 4.0$	
Fail	Poor	$2.0 \leq M \leq 3.0$	
		$1.0 \leq M \leq 2.0$	

For thesis and viva the following grading scheme applies:

After examining the thesis, I recommend that

- a) The candidate be awarded the degree of Doctor of Philosophy
- (or) b1) The candidate be awarded the degree of Doctor of Philosophy subject to minor corrections
- (or) b2) The candidate be awarded the degree of Doctor of Philosophy subject to the amendments and corrections as listed elsewhere in this report being made in the thesis to the satisfaction of the Internal/External Examiner(s)
- (or) c) The candidate not be awarded the degree of Doctor of Philosophy but be permitted to resubmit the thesis for further examination in a revised form after a further period of study and research
- (or) d) The candidate not be awarded the degree of Doctor of Philosophy but a lower
- (or) e) The candidate not be awarded the degree of Doctor of Philosophy.

### **Guidelines for Thesis/Dissertation Submission**

- 1) Thesis/dissertation/master project report must follow the guidelines prescribed in the **UTM Thesis Manual**.
- 2) A thesis or dissertation submitted for examination must be approved by the supervisor.
- 3) A master student is required to submit his/her thesis/dissertation/master project report to the faculty for evaluation according to the specified requirements.
- 4) For master by research and doctoral programs:
  - a. A student should submit Notice For Submission of Thesis approved by the supervisor at least three (3) months prior to submission of the thesis for examination, or three (3) months before expiry of the maximum study duration.
  - b. A student should submit his/her thesis/dissertation for examination within or before the end of the maximum duration of study. Only a registered student is allowed to submit his/her thesis/dissertation.
- 5) After the oral examination and fulfillment of all specified requirements, a doctoral or a master student by research/taught course and research is required to submit bound and digital copies of thesis/dissertation according to the specified number and submission date determined by the University.
- 6) Taking into consideration the evaluation of the thesis and the recommendation of the Panel for Oral Examination, the examination results of a thesis/dissertation will be verified by JKTS for endorsement by the Senate.
- 7) University will not accept a thesis/dissertation that has been submitted for the purpose of examination either to UTM or any other institutions of higher learning.
- 8) A doctoral thesis/dissertation should not exceed 300 pages excluding appendices. Master thesis/dissertation or the Master project report should not exceed 200 pages excluding appendices.
- 9) A thesis/dissertation or Master project report may either be written in Bahasa Melayu or English.
- 10) All thesis/dissertations/master project reports are the property of the University.

**(b) Taught Course**

Program Name		Master of Science (Petroleum Engineering)		
Final Award		Master of Science (Petroleum Engineering)		
Awarding Institution		Universiti Teknologi Malaysia		
Teaching Institution		Faculty of Petroleum and Renewable Energy Engineering (FPREE)		
Professional or Statutory Body of Accreditation		MQA		
Language of Instruction		English		
Mode of Study (Conventional, distance learning etc)		Conventional		
Mode of Operation (Franchise, self-govern, etc)		Mainstream		
Study Scheme (Full Time/Part Time)		Full Time and Part Time		
Study Duration				
Full-time		Minimum: 1.5 years Maximum: 3 years		
Part-time		Minimum: 3 years Maximum: 5 years		
Type of Semester	No. of Semester		No. of Weeks per Semester	
	Full Time	Part Time	Full Time	Part Time
Normal	3	6	14	14
Short	-	-	-	-

**ENTRY REQUIREMENT**

Good Bachelor degree in selected engineering or science disciplines from recognized institution (CPA >3.00). Graduates from other fields can apply if they have at least 2 years of work experience in upstream petroleum industry.

**PROGRAM EDUCATIONAL OBJECTIVES**

The objectives of this programme are:

1. Ability to synthesise all the knowledge of petroleum engineering covering geoscience, formation evaluation, drilling engineering, reservoir engineering, production engineering and project management in their professional work.
2. Ability to implement and develop petroleum related projects as required by petroleum industry and regulatory bodies.
3. Ability to communicate effectively with people of different and diverse background and contribute significantly in a team-project either as a team member or as a team leader.
4. Ability to improve themselves continuously through life-long learning.
5. Ability to practise ethical and societal responsibilities.
6. Ability to outline a business plan.

Intended Learning Outcomes	Teaching and Learning Methods	Assessment
<b>(a) Applied Knowledge and Competencies</b>		
<b>PO1: Ability to integrate all knowledge about petroleum engineering and evaluate oilfield development project in professional practice.</b>		
Synthesize knowledge of petroleum engineering that covers geology, formation evaluation, drilling, reservoir engineering, production engineering and petroleum economics.	Conventional lectures, seminars, individual and group discussion and assignment and examinations.	Examinations, assignments, group and individual presentations, discussions, and group and individual projects.
<b>PO2: Ability to formulate hypothesis, design, organize and perform research scientifically and analyse observed phenomena.</b>		
Able to plan, execute, and justify projects. Ability to write technical reports and technical papers.	Laboratory and/or simulation works done in master project, and field development project.	Log book and report of master and field development projects. Technical paper.
<b>(b) Generic Skills</b>		
<b>PO3: Ability to analyse situation and adapt oneself to practice communication in verbal and written modes to people from the same or different background.</b>		
Able to supervise team members, negotiate and reach agreement, and responsible to group decision.	Field development project, industrial visit, SPE-UTM meeting, and group assignments.	Final report, presentation, industrial trip report, peer assessment, assessment by industry.
<b>PO4: Ability to demonstrate professional ethics and adapt ethics in research and oilfield development.</b>		
Able to integrate ethics in personal life, society, and professional practice.	Lectures, field development project, master project, assignments, SPE-UTM activities.	Examinations, Reports of master and field development projects, seminar and assignments.
<b>PO5: Ability to organize, adapt and apply contemporary knowledge independently and manage information effectively.</b>		
Able to search and acquire new knowledge throughout his/her life.	Group projects, assignments/trips, field development project, and master project.	Examinations, final reports, and presentation.
<b>PO6: Ability to demonstrate and manage effectively, identify business opportunity and plan business.</b>		
Able to identify and outline business plan.	Lectures, field development project, SPE-UTM activities.	Examinations, SPE-UTM reports, field development report, and industrial visit.



**PROGRAMME STRUCTURES AND FEATURES, CURRICULUM AND AWARD REQUIREMENTS**

The program is offered on full-time mode only and based on a 2-semester Academic Year.

**Courses Offered:**

Course Code	Course Name	Credit
MYP 1213	Applied Geology and Geophysics	3
MYP 1323	Formation Evaluation	3
MYP 1413	Drilling Engineering and Well Completion	3
MYP 1313	Reservoir Engineering I	3
MYP 2313	Reservoir Engineering II	3
MYP 2323	Reservoir Simulation	3
MYP 2513	Production Engineering	3
MYP 1113	Petroleum Economics and Management	3
MYP 2333	Enhanced Oil Recovery	3
Uxx xxx3	University Elective	3
MYP 3804	Field Development Project (Group)	4
MYP 3806	Masters Project (Individual)	6

Assessment is made from course works (consist of of tests, assignments and presentation) and examination held at the end of semester.

**Assessment Breakdown:**

Course work : 50 %

Examination : 50 %

**Awards requirements:**

For the award of Master of Science (Petroleum Engineering), Student should:

- Pass all subjects with a minimum of 65 % mark.
- Complete all 40 credit hours with a minimum CGPA of 3.0

**(Example of Courses taken by Full-time Students)**

<b>Semester 1</b>	<b>Semester 2</b>	<b>Semester 3</b>
MYP 1213	MYP 2313	MYP 3804
MYP 1323	MYP 2513	MYP 3806
MYP 1413	MYP 1113	
MYP 1313	MYP 2323	
Uxx XXX3	MYP 2333	
<b>Total 15</b>	<b>Total 15</b>	<b>Total 10</b>
<b>credit hours</b>	<b>credit hours</b>	<b>credit hours</b>

## REGULATION OF ASSESSMENT

Assessment is divided into three parts:-

I) Course Assessment

Each course will be assessed in the form of a written examination or other kind of assessment such as group work, individual assignments, and presentations.

II) Master of Project Evaluation

The Master's Project is equivalent to 6 credit hours. Evaluation will be made on the research proposal, log book, the final report and seminar presentation

III) Field Development Project Evaluation

It is a group project. The distribution of marks is as follows:

Final Report = 60%

Seminar Presentation = 20%

Project Management (mark group) = 10%

Individual Contributions in Group = 10%

The relationship between marks, grade, points, and achievement levels of the course is given in Table below:

Marks	Grade	Points	Level of Achievement
90 - 100	A+	4.00	Excellent pass
80 - 89	A	4.00	
75 - 79	A-	3.67	
70 - 74	B+	3.33	Good pass
65 - 69	B	3.00	
60 - 64	B-	2.67	Pass
55 - 59	C+	2.33	Fail
50 - 54	C	2.00	
45 - 49	C-	1.67	
40 - 44	D+	1.33	
35 - 39	D	1.00	
30 - 34	D-	0.67	
00 - 29	E	0.00	

<b>Synopses Of Courses</b>	
<b>Applied Geoscience and Geophysics (MYP 1213)</b>	<p>This course introduces students with the fundamental of petroleum geology, sedimentology and applied geophysics to the search for and production of oil and gas. The course emphasis on the Earth Materials, processes, basin and petroleum systems (Plate Tectonic context of petroleum basins). These aspects will be viewed in relation to the transport, deposition and deformation processes of sediment. Besides, advanced coverage on the reservoir heterogeneity, architecture and faults seals will be explored. The geophysical technique used to locate a reservoir using mapping and correlation will be taught before the estimation on the volume of such reservoirs will be made.</p>
<b>Formation Evaluation (MYP 1123)</b>	<p>This course exposes the students on methods of formation evaluation, both direct and indirect (wireline logging). The concept, acquisition and application of drill cuttings and core samples including the important aspects of commonly used well logging techniques, like the working principles of tools, how measurements takes place, applications, advantages and disadvantages of the various techniques, and how to make interpretations from various log data will be discussed. Besides this, shaly sand analysis, cross-plotting and overlaying techniques for determination of lithology, permeability, mineral identification and other important parameters will be introduced. This course ends with an overview depicting a general scenario of new developments and techniques of well-logging.</p>
<b>Drilling Engineering and Well Completion (MYP 1413)</b>	<p>The course covers the drilling systems, drilling fluids, well control and procedures, various types of drilling techniques, configurations and measurements, special operations, design of casing and tubing string and their recommended running procedures, cementing, well completion practices, subsurface equipment, well space-out, and slickline operation.</p>
<b>Reservoir Engineering I (MYP1313)</b>	<p>This course covers the fundamentals of reservoir engineering which include the description and characterizing reservoir rock and fluid properties of the oil and gas reservoir, calculation of fluid in-place and the recoverable reserves. This course is conducted by normal lectures and student group project based on published reservoir data.</p>
<b>Petroleum Economics and Management (MYP 1213)</b>	<p>Understanding of the big picture petroleum industry is an important prerequisite to successfully identifying, evaluating and selecting petroleum projects. These are many factors that need to be taken into consideration and these factors need to be evaluated accordingly. The course focuses in giving an understanding of petroleum industry and factors that influence the feasibility of the petroleum upstream project. The cash flow model incorporating PSC fiscal terms is introduced and several risk analysis methods also introduced to be incorporated in the cash flow model.</p>
<b>Reservoir Engineering II (MYP 2323)</b>	<p>This course is intended to explore advanced concepts in reservoir engineering. Students are presented with the physics of reservoir engineering using mathematical techniques to complex reservoir problems. The course covers topics such as the theory and practice of well testing and pressure analysis techniques, the various water-influx models, the mathematical treatment of unconventional gas reservoirs, the oil recovery mechanisms and the various forms of the material balance equation, the practical application of the MBE in predicting the oil reservoir performance under different scenarios of driving mechanisms, and the immiscible displacements.</p>
<b>Reservoir Simulation (MYP 2333)</b>	<p>This course includes basic equations, deprivations and underlying principles used in developing reservoir simulators. It covers the development of simple governing equation, partial differential equations for single-phase and multi-phase fluid flow in porous media, and the use of finite difference approximation to solve the equations. Input data requirements and applications of stimulation models for history matching and prediction of field performance will be discussed. Microsoft Excel will be used for many of the examples and exercises.</p>
<b>Petroleum Production Engineering (MYP 2513)</b>	<p>This course covers the principles and methodology for productivity of oil and gas wells, encompassing a wide range of petroleum production fundamentals, pertinent to the modern petroleum industry. It includes the essentials of the vapour/liquid mixtures behavior in the production system and the necessary calculation, analysis and evaluation of the productivity and performance of the well, particularly the design of down-hole and surface production systems, well performance prediction to optimize the controlled recovery of pipeline quality crude oil and gas, artificial lift systems and stimulation work for productivity improvement.</p>

**Enhanced Oil Recovery (MYP 2343)**

Provides students with an 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 and thermal recovery processes.

**Field Development Project (MYP 3804)**

Field Development Planning gives an overview of the process and methods for 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. Analysis of this data results in an assessment of the reservoir and leads to the design of an appropriate production system. Participants work in small teams and will submit written plans and give presentations in front of a panel

**Master Project (MKP 3806)**

The project aims to encourage students to perform scientific research either by experiment or simulation. The students will learn all scope of research from the conceptual part (research proposal), execution, analysis and reporting of the research. This course has six credits and student has one semester to complete it.

**Research Facilities**



The faculty is equipped with various facilities in order to provide excellent learning and living experiences for students. Currently, FPRE has 11 laboratories, a workshop, a library known as ExxonMobil Resource Centre as well as IT-supported classrooms. The laboratories are equipped with state of the art equipment to support teaching and research requirement. In addition, technical services to the industries are also provided through certified analytical facilities. Software such as ESCLIPSE, HYSIS, MATLAB, FLUENT, GINA and Design II are also available to use.

Faculty/ Department	Laboratory
Gas Engineering	Gas Combustion
	Gas Utilization
	Calibration
	Gas Flow System
	Membrane Research Unit
Petroleum Engineering	Reservoir
	Geoscience
	Drilling
	Heavy Duty
FPREE	Workshop
	Computer Laboratory
	Petroleum Product Testing

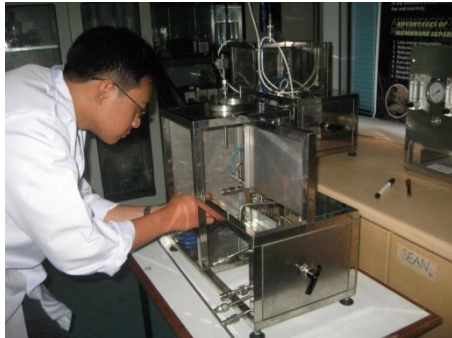
- **Gas Combustion Laboratory** is equipped with a complete range of domestic and industrial equipment that are used in research and academic purposes such as fuel combustion system, flame characteristics test rig, industrial combustion simulation software, recuperative and regenerative burner system and various types of industrial burners for combustion efficiency and exhaust emission studies. This lab is also equipped with the fuel emission analyzer.
- **Gas Utilization Laboratory** provides services for experiments on the quality and characteristics of gas and liquid fuel such as density, dew point and calorific value. Thermal energy research work is actively studied for hydrogen gas product in auto-thermal reaction (ATR) system in fuel cell utilization, environment study using catalytic combustion system for high and low temperatures, energy saving by combined heat and power (CHP) and design system using the art of simulation modeling (CFD).
- **Calibration Laboratory** provides services and facilities for calibrations and experiments on pressure and temperature system as well as fluid flow studies which include low to medium flow calibration facilities and metering research.
- **Gas Flow System Laboratory** provides facilities for experiments related to gas control system and gas transmission which includes metering methods and pressure regulating. It also includes facilities for pipe installation systems using material such as PE, Carbon Steel and Copper pipe. This laboratory is also equipped with installations for LPG Storage System and Compressed Air Supply.
- **Membrane Research Laboratory** is dedicated to carrying out an advanced study of membrane-based research for various domestic and industrial applications.
- **Geology Laboratory** is equipped with major equipment such as optical microscope, stereo microscope, geophysics apparatus, sample preparation apparatus, thin section apparatus, field sampling apparatus, field work apparatus and analysis apparatus, such as liquid and plastic limit set, Anderson pipet, Image Analyzer and Point counter.
- **Reservoir Laboratory** has several equipment such core cleaner, core trimmer, porosimeter, permeameter, resistivity meter, Kg/Ko relative permeameter, Hg injection capillary pressure, ultra-centrifuge for capillary pressure, air-liquid capillary apparatus, displacement study apparatus, kinematic viscometer, tensiometer, aniline point apparatus and surface tension apparatus.
- **Drilling Laboratory** provides major equipment in the mud section (mud mixture, mud balance, rheometer, marsh funnel, filtration testing apparatus, sand filtration set, retort, pH meter, resistivity meter and methyl blue test set).
- Other facilities include **Heavy Duty Laboratory** and **Petroleum Testing Laboratory**

### **Centre of Excellent**

The Faculty of Petroleum and Renewable Engineering (FPREE) promotes the educational, consultancy service and research goal of the faculty and university by providing services to the community and offers technical expertise to local industries in the form of professional courses, laboratory testing as well as other forms of consultancy services. Over the years, many companies have benefited from the variety of services provided by the following centre of excellence:

- 1) Advanced Membrane Technology Research Centre (AMTEC)
- 2) Gas Technology Centre (GASTEG)

### **Advanced Membrane Technology Research Centre (AMTEC)**



Advanced Membrane Technology Research Centre (AMTEC) formerly known as Membrane Research Unit (MRU) is a research center for advanced membrane technology and new membrane applications. The mission and vision of AMTEC is to be a leader in membrane technology and applications especially in the Asia Pacific region and globally through innovation and creative technologies.

The center produces postgraduate students as well as provides training for engineers, scientists and technicians from Malaysia and abroad in the area of membrane technology to enhance the nation human capital and productivity. AMTEC incorporate a business venture laboratory that is involved in the design, fabrication and commercialization of customized membrane module and membrane system for local and overseas applications.

### **Gas Technology Centre (GASTEG)**

GASTEG is a centre of excellence to promote training, research and services activities. It is one of the first centre of its kind being established in South East Asia. With its excellent geographical position in the centre of oil and gas platform and home of related activities, GASTEG is targeted to become a prime reference for the regional gas industry before expanding to international recognition. It is attached to the Faculty of Petroleum and Renewable Energy Engineering and located at the Universiti Teknologi Malaysia main campus in Skudai, Johor.

Today's complex challenges demand new ideas and partnerships. To date; there is limited number of institution which focus in training, research and services to support the gas industry. Thus, there is a need for more bodies to be responsible in organizing and implementing the technical organization of the industry. Based on the aforementioned statement, UTM has taken the lead to form the GAS TECHNOLOGY CENTRE (GASTEG). It is the intention of GASTEG to become the coordination centre for activity undertaken by local and international gas industry.



**Postgraduate Student Society**

<b>POSTGRADUATE STUDENTS SOCIETY 2011</b> <b>FACULTY OF PETROLEUM AND RENEWABLE ENERGY ENGINEERING</b>	
<b>Chairperson</b>	Ahmad Abd-Al-Qahhar bin Termizi
<b>Vice-Chairperson</b>	Umar Mukhtar Baba
<b>Honorary Secretary</b>	Mawarni Fazliana binti Mohamad
<b>Honorary Treasurer</b>	Siti Noraisyahbinti Ismail
<b>External Relations</b>	Mohd Nazri bin MohdSokri
<b>Publications</b>	Nur Myra Rahayu binti Razali
<b>Membership</b>	Siti Norfaizah binti Razali
<b>Sport Program</b>	Mohd Azlan bin Mustafa
<b>Social Program</b>	Nurzhanov Yerla
<b>Academic Program</b>	Aizuddin bin Supee

Faculty of Petroleum and Renewable Energy (FPREE) is the home for more than 70 postgraduate students of various nationalities. In 2010, the enrolment consists of research and taught course students, inclusive of both full-time and part-time candidates. Together, they organize activities through the postgraduate student society of FPREE. All postgraduates' students under Faculty of Petroleum and Renewable Energy Engineering, Universiti Teknologi Malaysia are automatically eligible for membership of the association.



The aim of postgraduate society is to make research and learning experience memorable and conducive. Among others, activities include series of talks by visiting researchers and expertise, industrial visits, field trips, social function and leisure trips were organised.



Further enquiry:

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**UTM**  
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Renewable Energy  
Engineering

RESEARCH UNIVERSITY

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