

# MASTER OF PETROLEUM ENGINEERING

## PROGRAMME SPECIFICATIONS

The Master of Petroleum Engineering (MKPP) is offered both on a full-time basis, and on a part-time basis (referred to as offshore programme). The duration of study for the full-time students is between three (3) semesters to a maximum of six (6) semesters. For the offshore programme, the minimum duration of study takes four (4) normal semesters (not including the short semester), while the maximum duration is eight (8) normal semesters.

Students need to complete 47 credit hours, which also include individual Master Projects and the Field Development Project (group project). The programme is suitable for any graduate from science, technology, and engineering backgrounds who meet the entry requirement.

### General Information

<b>1. Awarding Institution</b>		<b>Universiti Teknologi Malaysia</b>	
2. Teaching Institution		Universiti Teknologi Malaysia	
3. Programme Name		Master of Petroleum Engineering	
4. Final Award		Master of Petroleum Engineering	
5. Programme Code		MKPP	
6. Professional or Statutory Body of Accreditation		MQA	
7. Language(s) of Instruction		English	
8. Mode of Study (Conventional, distance learning, etc)		Conventional (Taught Course)	
9. Mode of operation (Franchise, self-govern, etc)		Self-governing	
10. Study Scheme (Full Time/Part Time)		Full Time & Offshore Programme	
11. Study Duration		Full Time Minimum : 1.5 years Maximum : 4 years Offshore Minimum : 2 years Maximum : 4 years	
Type of Semester	No. of Semesters		No of Weeks/Semester
	Min	Max	
Normal	3	6	14
<b>Short</b>	<b>1 or 2 (for offshore)</b>		<b>10</b>

### Course Classification

No	Classification	Credit Hours	Percentage
i.	University Elective (1 course)	3	6.4
ii.	Research Methodology	3	6.4
iii.	Master Project 1 & Master Project 2	10	21.3
iv.	Programme Cores	25	53.2
v.	Programme Electives	6	12.7
	<b>Total</b>	<b>47</b>	<b>100</b>

### Programme Educational Objectives (PEO)

- PEO1 Graduates incorporate in-depth petroleum engineering knowledge and principles in their professional works.
- PEO2 Graduates manage conducive working environment and readily pursue different challenging roles in global petroleum engineering positions through effective team work, leadership and communication.
- PEO3 Graduates demonstrate ethical responsibilities including social issues, safety and environmental awareness and continuously engage in personal and professional growth.

### Programme Learning Outcomes (PLO)

- PLO1 Ability to integrate the advanced knowledge in petroleum engineering discipline.
- PLO2 Ability to apply research skills in petroleum engineering discipline.
- PLO3 Ability to analyze problems in petroleum engineering field using scientific and critical thinking approaches.
- PLO4 Ability to demonstrate professional ethics and values with full responsibility and integrity.
- PLO5 Ability to demonstrate effective communication skills in both written and oral form to report the scientific and technical facts.
- PLO6 Ability to acquire knowledge and engage in life-long learning in petroleum engineering field independently and effectively.
- PLO7 Ability to work effectively with team members that may involve diverse multi-disciplinary settings.

## GRADUATION CHECKLIST

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

NO.	CODE	COURSE	CREDIT EARNED (JKD)	CREDIT COUNT ED (JKK)	TICK (√) IF PASSED
<b>SCHOOL OF CHEMICAL &amp; ENERGY ENGINEERING COURSES</b>					
1	UXXX XXX3	University Elective (1 course)			
2	UKKP 0013	Research Methodology			
3	MKPP 1113	Petroleum Economics & Management			
4	MKPP 1213	Applied Geoscience & Geophysics			
5	MKPP 1323	Formation Evaluation			
6	MKPP 1333	Reservoir Rock & Fluids Properties			
7	MKPP 1413	Drilling Engineering & Well Completion			
8	MKPP 2353	Reservoir Engineering			
9	MKPP 2513	Petroleum Production Engineering			
10	MKPP 3804	Field Development Project			
11	MKPP 2**3	Programme Elective 1			
12	MKPP 2**3	Programme Elective 2			
13	MKPP 3904	Master Project 1			
14	MKPP 3906	Master Project 2			
<b>PROGRAMME ELECTIVES COURSES (select any two courses)</b>					
15	MKPP 2323	Reservoir Simulation			
16	MKPP 2333	Enhanced Oil Recovery			
17	MKPP 2433	Water Flooding			
18	MKPP 2523	Well Diagnosis and Treatment			
<b>UNIVERSITY ELECTIVES (select only one course)</b>					
19	UHAP 6013	Seminar Pembangunan Isu-isu Sosial dan Ekonomi Global			
20	UICW 6023	Falsafah Sains dan Ketamadunan			

2 1	UPPF 6033	Kepimpinan Dinamik			
2 2	UCSM 1263	Pengurusan Projek IT			
2 3	UDPE 1123	Organizational Behavior and Development			
2 4	UHAZ 6123	Masyarakat dan Budaya Malaysia			
2 5	ULAB 6013/ ULAB 6023	Kursus Bahasa Inggeris Pascasiswazah			

## **COURSE SYNOPSIS**

### **CORE COURSES**

#### **UKKP 0013 - Research Methodology**

The course is designed to deliver some important aspects and skills regarding research methodology to the postgraduate students. In general, this course will enable the students to identify and apply appropriate research methodology in order to plan, conduct, and evaluate the undertaken research. Students will be taught the approaches to write meaningful problem statement, measurable objectives, and systematic scope of study. Students will also be introduced to the techniques and useful resources to conduct an effective literature review. The purposes of planning a proper research design and the relationships between the research methodology and research design are clearly described to the students. This course also aims to deliver the technique for data collections and analysis. Finally, the students will be exposed to the skills and techniques required for the preparation of research proposal and thesis, as well as the final thesis oral assessment.

#### **MKPP 1113 - Petroleum Economics & Management**

Understanding of the big picture of petroleum industry is an important prerequisite to successfully identifying, evaluating and selecting petroleum projects. There are many factors that need to be considered and these factors need to be evaluated accordingly. The course focuses in giving an understanding of petroleum industry and factors that influence the economic feasibility of the petroleum upstream project. The cash flow model incorporating fiscal terms is introduced with discounting and sensitivity aspects into the cash flow model of the project, the oil company, and the government (national oil company). Important economic indicators such as Net Present Value (NPV), payback period, unit technical cost (UTC), profit-investment ratio (PIR) will be discussed. The last part covers the managing of the field under production, declining production and abandonment phases.

#### **MKPP 1213 - Applied Geoscience & Geophysics**

This course introduces students with the introduction 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 (including Plate Tectonic context of petroleum basins). These aspects will be viewed in relation to the transport, deposition and deformation processes of sediment. Next, explore the reservoir heterogeneity, architecture, faults and seals. The geophysical techniques used to locate a reservoir. Mapping and correlation. Finally, to estimate the bulk volume of such reservoirs.

#### **MKPP 1323 - Formation Evaluation**

The course covers 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 the tools, how measurements take place, application, advantages and disadvantages of the various techniques, and how to make interpretations from various log data are discussed. Shaly sand analysis, cross-plotting and overlaying techniques for determination of lithology, mineral identification and other important parameters are also included in the teaching and delivery.

### **MKPP 1333 - Reservoir Rock and Fluids Properties**

This course covers the description and characterization of reservoir rock and fluid properties of the oil and gas reservoir, calculation of fluid in-place and the recoverable reserves, determination of reservoir phase behaviours, calculation of reservoir fluid and rock properties, PVT analysis, effect of capillary pressure, interaction of fluid-rock system, and investigation of reservoir formation heterogeneity.

### **MKPP 1413 - Drilling Engineering & Well Completion**

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.

### **MKPP 2353 - Reservoir Engineering**

This course is intended to explore further concepts in reservoir engineering. Students are presented with the physics of reservoir engineering and mathematical techniques to solve complex reservoir problems. The course covers topics such as the equation of fluid flow in reservoir, oil recovery mechanisms, vapor-liquid equilibrium relations, material balance equation including various water-influx models, and the immiscible displacement theory.

### **MKPP 2513 - Petroleum Production Engineering**

This course covers principles and methodology for oil & gas wells productivity, encompassing wide range of petroleum production fundamentals, pertinent to modern petroleum industry. The content includes vapour/liquid mixture behavior & related calculation, well productivity & performance analysis & evaluation, downhole and surface production system installation & operation. Students will also learn well performance prediction & optimization, artificial lift system, surface facilities, and stimulation work.

### **MKPP 3804 - Field Development Project**

Field Development Project exposes students to the process and methods in developing an optimum plan for a particular petroleum field. It covers all aspects of field development planning, commencing with screening studies, after discovering hydrocarbons, to project sanction. Analysis of this field data results in an assessment of the respective reservoir and leads to the design of an appropriate production system. Students are required to work in small groups, submit written plans, and present their proposals to a panel.

### **MKPP 3904 - Master Project 1**

The first part of Master Project requires students to prepare a research proposal. This might involve practical activities such as literature review and gantt chart preparation. At the end of the course, students should be able to defense and prepare a research proposal according to the UTM thesis-writing format. In addition, students will have the opportunity to gain important generic skills such as communication, team working, problem-solving and creative and critical thinking.

### **MKPP 3906 - Master Project 2**

This course is the continuation of the Master Project 1 (MKPP 3904). The second part of Master Project requires students to execute 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 Master Project, and subsequently present their research findings. Finally, students must submit a bound thesis according to the UTM thesis-writing format. In addition, students will have the opportunity to gain important generic skills such as communication, team working, problem-solving and creative and critical thinking.

## **ELECTIVE COURSES**

### **MKPP 2323 - Reservoir Simulation**

This course covers the fundamental of numerical reservoir simulation which include the development of simple governing equations, partial differential flow model, finite difference approximation, and error & stability analysis. Students will be involved with simple programming and the use of commercial simulator. The course is conducted by normal lectures and student individual /group project, based on development of simple reservoir simulator.

### **MKPP 2333 - Enhanced Oil Recovery**

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

### **MKPP 2433 - Water Flooding**

This course covers the waterflooding technique as a secondary recovery method to increase the oil recovery normally implemented after primary recovery stage. The displacement and the entrapment of oil by water will be discussed, followed by prediction of the waterflood performance using various published methods. The selection of water for waterflooding, and the water injection system will be elaborated as well.

### **MKPP 2523 – Well Diagnosis and Treatment**

This course covers topics on the causes of low well productivity of problem wells, where the diagnosis of problem wells information were obtained from the analysis of well data and production log. The treatment of problem wells such as formation damage and sand production are discussed. Control methods to remedy the problems are analysed, such as workover method and planning, gravel pack for sand control, and formation stimulation.