

**Master of Engineering Program in Petroleum Engineering**  
**Department of Mining and Petroleum Engineering**  
**Faculty of Engineering, Chulalongkorn University**

**General Information**

Department of Mining and Petroleum Engineering offers a master's degree program in petroleum engineering. The program is specially designed for Thai and foreign students using English as a program language. It is designed for students who graduate with B.Eng. or B.S. in petroleum engineering or other related disciplines. This two-year program operates on a semester system. Master of Engineering degree will be awarded after the completion of the program requirements.

The curriculum provides an extensive study in petroleum engineering which emphasizes on upstream activities, oil and gas exploration and production. This program will serve industrial demand of highly competent petroleum engineers who are able to conduct both scientific and engineering investigations to solve various problems related to exploration and production of oil and natural gas.

The Department currently has 8 faculty members facilitating the Petroleum Engineering discipline. The numbers of graduate students are 30s. The Department also offers a bachelor's degree program in petroleum engineering (in Thai). However, the undergraduate program has 60s Thai student enrollments and is not an international program.

**Degree Requirements**

The program requires 24 credits of graduate course work and 12 credits of research work. In addition all students must take a compulsory graduate seminar. A student must present an acceptable thesis and pass an oral examination in the field of Petroleum Engineering. Students who have insufficient basic knowledge in Petroleum Engineering must take appropriate basic petroleum courses. These background courses will not be counted as graduate credits.

Students who have fulfilled the requirements of the program with the Cumulative Grade Point Average of at least 3.00 with a period of study of at least four semesters and no more than eight semesters will be awarded the degree of Master of Engineering in Petroleum Engineering.

**Program Curriculum**

A total of 36 credits which are required in the program consist of:

1. Required courses (15 credits)

- Advanced Reservoir Engineering
- Production System Analysis
- Advanced Drilling Engineering
- Advanced Natural Gas Engineering
- Integrated Reservoir Management (Capstone)
- Seminar in Petroleum Engineering (no credit)

2. Elective courses (9 credits)

- Numerical Applications in Petroleum Engineering
- Reservoir Simulation
- Reservoir Testing and Analysis
- Secondary Recovery

- Enhanced Oil Recovery
  - Advanced Petroleum Economics
  - Advanced Log Interpretation
  - and others (see Course Description)
3. Thesis (12 credits)
4. Required courses for non-petroleum engineering background (Compulsory)
- Petroleum Geology
  - Reservoir Engineering
  - Drilling Engineering and Well Logging
  - Production Engineering

### **Application**

An applicant holding a Bachelor's degree in Engineering, or Science in related disciplines is eligible for consideration.

Together with an application form each applicant must submit the following documents to the Department of Mining and Petroleum Engineering:

- TOEFL or CU-TEP (above 500 equated to TOEFL paper based test)
- A completed application form with statement of purpose
- A certified copy of transcript
- Three letters of recommendation
- A copy of identification card or passport
- Application fee of 600 baht

### **Admission:**

First semester (June – October) for students **without** bachelor degree in petroleum engineering

Application	Late-October until Late-February
Examination / Interview	Late-March
Notification of admission	Mid-April
Enrollment registration	Late-May

Second semester (November – March) for students having **outstanding academic record with** petroleum engineering background

Application	August
Examination / Interview	Mid-September
Notification of admission	Early October
Enrollment registration	Mid-October

### **Tuition and Fees:**

Academic tuition and fees for each semester enrolled are 58,500 Baht for Thai students and 114,000 Baht for foreign students.

### **Contact Address:**

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**Study Program (With Petroleum Engineering Background)**

**First Semester**

2106651	Advanced Reservoir Engineering	3	Credits
2106668	Advanced Drilling Engineering	3	Credits
2106671	Advanced Natural Gas Engineering	<u>3</u>	Credits
		9	

**Second Semester**

2106667	Production System Analysis	3	Credits
	Petroleum Engineering Electives	<u>6</u>	Credits
		9	

**Third Semester**

2106678	Integrated Reservoir Management (Capstone)	3	Credits
2106755	Seminar in Petroleum Engineering	1	Credit (S/U)
	Petroleum Engineering Elective	3	Credits
	Thesis	<u>3</u>	Credits
		10	

**Fourth Semester**

	Thesis	9	Credits
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**Study Program (Without Petroleum Engineering Background)**

**First Semester**

2106561	Petroleum Geology	3	Credits (S/U)
2106562	Reservoir Engineering	3	Credits (S/U)
2106563	Drilling Engineering and Well Logging	3	Credits (S/U)
	Petroleum Engineering Elective	<u>3</u>	Credits
		12	

**Second Semester**

2106564	Production Engineering	3	Credits (S/U)
2106651	Advanced Reservoir Engineering	3	Credits
2106668	Advanced Drilling Engineering	3	Credits
2106671	Advanced Natural Gas Engineering	<u>3</u>	Credits
		12	

**Third Semester**

2106667	Production System Analysis	3	Credits
	Petroleum Engineering Electives	6	Credits
	Thesis	<u>3</u>	Credits
		12	

**Fourth Semester**

2106755	Seminar in Petroleum Engineering	1	Credit (S/U)
2106678	Integrated Reservoir Management (Capstone)	3	Credits
	Thesis	<u>9</u>	Credits
		13	



## **Course Description for Master Degree in Petroleum Engineering**

- 2106551 Numerical Applications in Petroleum Engineering** **3 (3-0-9)**  
Numerical solution of ordinary differential equations; numerical differentiation; techniques for solving sets of linear equations; curve fitting; Monte Carlo simulation.
- 2106552 Computer Applications in Petroleum Engineering** **3 (3-0-9)**  
Computation algorithms for petroleum engineering applications; techniques of database management, pre-and post-processing of reservoir simulation; computer-based interpretation of well logs and well tests.
- 2106553 Applied Mathematics in Georesources Engineering** **3 (3-0-9)**  
Differential equations; Laplace transforms; vector calculus; matrices; solutions of linear equations; linear regression; optimization; statistical analysis.
- 2106561 Petroleum Geology** **3 (3-0-9)**  
Surface features of the earth's crust and the geological processes; deformation of the earth's crust, rock structures, dip and strike, faulting and folding; geological map; petroleum origin, migration, and accumulation; chemical composition of petroleum; stratigraphy; nature of source rocks; reservoirs and traps; geological field methods.
- 2106562 Reservoir Engineering** **3 (3-0-9)**  
Rock and fluid properties; phase behavior of hydrocarbon system; reserve calculation; material balance analysis and drive mechanisms; fluid flow in porous media.
- 2106563 Drilling Engineering and Well Logging** **3 (3-0-9)**  
Well planning; formation pressure and fracture gradient determination; mechanics of rotary drilling; hydraulics; drilling fluids; directional drilling. Principles, applications, and interpretation of electrical and radioactive well logs used in petroleum exploration and reservoir evaluation.
- 2106564 Production Engineering** **3 (3-0-9)**  
Well completion design; tubing and casing design; cementing; well head equipment and flow control devices; subsurface equipment; perforation; sand control; inflow performance; fluid flow in pipes; artificial lift methods; well stimulation; oil and gas separation, surface production processes and equipment.
- 2106651 Advanced Reservoir Engineering** **3 (3-0-9)**  
Incompressible and compressible fluid flow in porous media; reservoir testing and analysis; potential theory; water influx prediction; decline curve analysis.
- 2106652 Reservoir Simulation** **3 (3-0-9)**  
Principles of reservoir modeling; physical concepts and mathematical techniques used in development of reservoir simulation for multiphase, multidimensional flow in porous media; history matching techniques.

- 2106655 Reservoir Testing and Analysis** **3 (3-0-9)**  
Unsteady state flow in porous media; drawdown, buildup, fall-off, injection, drillstem, variable rate, and interference tests; conventional and type curve analysis techniques; faulted, fractured; unsteady state flow in gas reservoir and gas well test analysis; horizontal well testing.
- 2106661 Secondary Recovery** **3 (3-0-9)**  
Relative permeability; capillary pressures; fractional flow theory; Buckley-Leverett solutions; flooding patterns; water treatment for water flooding; gas injection.
- 2106662 Enhanced Oil Recovery** **3 (3-0-9)**  
The application of physical principles to increase the recovery from reservoirs; miscible flooding; in-situ combustion; cyclic steam injection and steam flooding; calculation of oil recovery and heat losses; selection of suitable reservoirs; operational problems.
- 2106666 Multiphase Flow in Pipes** **3 (3-0-9)**  
Basic energy balance for flow in pipe; multiphase fluid flow parameters, vertical flow correlations, horizontal flow correlations, gathering systems, design and operations of pipeline systems.
- 2106667 Production System Analysis** **3 (3-0-9)**  
Analysis of production system performance; inflow performance; horizontal and vertical multiphase flows; choke performance; surface flow lines and separators; artificial lift methods.
- 2106668 Advanced Drilling Engineering** **3 (3-0-9)**  
An advanced treatment of well drilling, planning, bit selection, hydraulics, well control, and mud problems; drilling fluid flow models and their analysis; hydraulics optimization; cutting transport in vertical and inclined holes; horizontal well drilling; underbalanced drilling and coiled tubing drilling.
- 2106671 Advanced Natural Gas Engineering** **3 (3-0-9)**  
Phase behavior of natural gas system; natural gas properties; gas flow in pipe; gas compression; flow measurements; field separation; dehydration; gas gathering and transportation; gas production and production problems.
- 2106672 Gas Processing** **3 (3-0-9)**  
Principles of processes in gas processing plant; design of gas processing plant equipment; gas and liquid sweetening.
- 2106675 Advanced Log Interpretation** **3 (3-0-9)**  
Advanced techniques of evaluating properties and content of rock formations such as shaly sands analysis, gamma ray spectrometry, and well mechanical logging.
- 2106676 Advanced Petroleum Economics** **3 (3-0-9)**  
Macroeconomics of petroleum industry; cash flow analysis, cost analysis, economic analysis and financing; decision, risk and uncertainty; project planning and control; strategic and corporate planning in petroleum industry.

<b>2106678 Integrated Reservoir Management (Capstone)</b>	<b>3 (2-3-7)</b>
Prerequisite: consent of faculty	
Integrated approaches to field development planning; production forecast and optimization; reservoir performance monitoring and evaluation.	
<b>2106751 Selected Topic in Petroleum Engineering I</b>	<b>3 (3-0-9)</b>
Prerequisite: consent of faculty	
Selected topics in petroleum engineering.	
<b>2106752 Selected Topic in Petroleum Engineering II</b>	<b>3 (3-0-9)</b>
Prerequisite: consent of faculty	
Selected topics in petroleum engineering.	
<b>2106753 Selected Problem in Petroleum Engineering I</b>	<b>3 (3-0-9)</b>
Prerequisite: consent of faculty	
Selected problems in petroleum engineering.	
<b>2106754 Selected Problem in Petroleum Engineering II</b>	<b>3 (3-0-9)</b>
Prerequisite: consent of faculty	
Selected problems in petroleum engineering.	
<b>2106755 Seminar in Petroleum Engineering</b>	<b>1 (1-0-3)</b>
Prerequisite: consent of faculty	
Department seminar on current research.	
<b>2106811 Thesis</b>	<b>12 credits</b>