Bachelor of Science in Petroleum Engineering

Energy is a key component to people's everyday lives. Petroleum engineers are able to address and solve important technology challenges that will lead to energy security and societal prosperity, so the position is in high demand. This challenging and rewarding field of engineering requires creative application of a wide spectrum of knowledge, including, but not limited to mathematics, physics, geology, and chemistry.

Worldwide energy demand is growing, and experts agree that oil and gas will continue to play an important role in the world's energy supply. The decision making for complex projects falls to a great extent upon petroleum engineers, providing them with a high degree of responsibility. In addition, since hydrocarbon reserves are found in such diverse areas as Asia, South America, and Europe, petroleum engineers will have opportunities for exciting assignments all over the globe.

Petroleum engineers play a variety of roles within the energy business. They design and monitor the drilling of exploratory and development wells used to locate and produce the oil and gas from the subsurface. They work with technologies that can describe the characteristics of rocks deep beneath the surface and detect the type of fluids contained in those rocks. They install and maintain the equipment that lifts fluids from subsurface reservoirs to the surface, and they design surface collection and treatment facilities to prepare produced hydrocarbons for delivery to a refinery or pipeline. Hydraulic fracturing of shale gas and tight oil is the responsibility of a petroleum engineer, as is the development and implementation of enhanced oil recovery methods that capture stranded or bypassed hydrocarbons from old oilfields. In addition to these traditional petroleum engineering career choices, there are other emerging careers for petroleum engineering graduates in pollution clean up, underground waste disposal (including the subsurface injection of carbon dioxide to reduce atmospheric greenhouse gases), and hydrology.

The objective of the petroleum engineering program is to graduate practical, qualified engineers who can successfully pursue careers in the oil and gas production and services industries or similar areas. Graduates of the program are expected to understand the fundamental principles of science and engineering behind the technology of petroleum engineering to keep their education current and to give them the capability of self-instruction after graduation. They should be prepared to serve society by using the ideals of ethical behavior, professionalism, and environmentally responsible stewardship of natural resources.

The technical curriculum contains the following elements:

- A combination of college-level mathematics and basic sciences (some with experimental work) that includes mathematics through differential equations, probability and statistics, physics, chemistry, and geology
- Engineering topics that develop a working knowledge of fluid mechanics, strength of materials, transport phenomena, material properties, phase behavior, and thermodynamics
- Petroleum engineering topics that develop competence in (1) design and analysis of well systems and procedures for drilling and completing wells; (2) characterization and evaluation of subsurface geological formations and their resources using geoscientific and engineering methods; (3) design and analysis of systems for producing, injecting, and handling fluids; (4) application of reservoir engineering principles and practices to optimize resource development and management; and (5) use of project economics and resource valuation methods for design and decision making under conditions of risk and uncertainty
- A major capstone design experience that prepares students for engineering practice, based on the knowledge and skills acquired in earlier coursework and incorporating engineering standards and realistic constraints

ABET Student Outcomes:

a. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
b. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
c. an ability to communicate effectively with a range of audiences
d. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
e. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
f. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
g. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Portable Computing Devices

Students entering Petroleum Engineering are required to have access to a portable computing device capable of running programs suitable for use in the classroom and on the university wireless network. The use of this device will be necessary in many required courses, and individual instructors may require the device be brought to class or lab sessions. For a list of minimum system requirements see: http://www.pge.utexas.edu/future/undergraduate/program.

Curriculum

Course requirements include courses within the Cockrell School of Engineering and other required courses. In addition, each student must complete the University's Core Curriculum. In some cases, a course that fulfills one of the following requirements may also be counted toward core curriculum or flag requirements; these courses are identified below.

In the process of fulfilling engineering degree requirements, students must also complete coursework to satisfy the following flag requirements: one independent inquiry flag, one course with a quantitative reasoning flag, one ethics flag, one global cultures flag, one cultural diversity in the US flag, and two writing flags. The independent inquiry flag, the quantitative reasoning flag, the ethics flag, and both writing flags are carried by courses specifically required for the degree; these courses are identified below. Courses that may be used to fulfill flag requirements are identified in the Course Schedule.

Courses used to fulfill technical and nontechnical elective requirements must be approved by the petroleum and geosystems engineering undergraduate advisor before the student enrolls in them.

Requirements		Hours
Petroleum and Geosystems Engineering Courses		
PGE 301	Engineering, Energy, and the Environment	3
PGE 311	Numerical Methods and Programming	3
PGE 427	Properties of Petroleum Fluids	4
PGE 322K	Transport Phenomena in Geosystems	3
PGE 326	Thermodynamics and Phase Behavior	3
PGE 333T	Engineering Communication (writing flag and ethics flag)	3
PGE 323K	Reservoir Engineering I: Primary Recovery	3
PGE 323L	Reservoir Engineering II: Secondary and Tertiary Recovery	3
PGE 334	Reservoir Geomechanics	3
PGE 338	Geostatistics and Data Analysis	3
PGE 358	Principles of Formation Evaluation	3
PGE 362	Production Technology and Design	3
PGE 365	Resource Economics and Valuation	3
PGE 373L	Geosystems Engineering Design and Analysis	3
PGE 424	Petrophysics	4
PGE 430	Drilling and Well Completions	4
Chemistry		
CH 301	Principles of Chemistry I (part II science and technology)	3
CH 302	Principles of Chemistry II	3
Engineering Mechanics		
E M 306	Statics	3
E M 319	Mechanics of Solids	3
Geological Sciences		
GEO 303	Introduction to Geology	3
GEO 316P	Sedimentary Rocks	3
Mathematics		
M 408C	Differential and Integral Calculus (mathematics; quantitative reasoning flag)	4
M 408D	Sequences, Series, and Multivariable Calculus	4
M 427J	Differential Equations with Linear Algebra (quantitative reasoning flag)	4
Physics		
PHY 303K	Engineering Physics I (part I science and technology; quantitative reasoning flag)	3
PHY 303L	Engineering Physics II (part I science and technology; quantitative reasoning flag)	3
PHY 105M	Laboratory For Physics 302K, 303K, and 317K	1
PHY 105N	Laboratory For Physics 302L, 303L, and 317L	1
Rhetoric and Writing		
RHE 306	Rhetoric and Writing (English composition)	3
Other Required Courses		
Approved technical area electives		12
Remaining Core Curriculum Courses		
E 316L	British Literature [1]	3
or E 316M	American Literature	
or E 316N	World Literature	
or E 316P	Masterworks of Literature	
American and Texas government [2]		6
American history [2]		6
Visual and performing arts [3]		3
Social and behavioral sciences [3]		3
UGS 302	First-Year Signature Course [4]	3
or UGS 303	First-Year Signature Course	

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1. Some sections of the English humanities courses (E 316L, 316M, 316N, 316P) carry a global cultures or cultural diversity flag.

2. Some sections carry a cultural diversity flag.

3. Some sections carry a global cultures and/or cultural diversity flag.

4. In UGS 302, all sections carry a writing flag. In UGS 303, some sections carry a writing flag.

Total Hours	**128**