

Petroleum Engineering Degree Requirements (2020-2021)

The minimum number of total credit hours required for a BS degree in Petroleum Engineering is **126**.

General Education Core Courses

46 credits

General Education Requirements are 44 semester credit hours as outlined in the U. T. Permian Basin *Undergraduate Catalog*. Students should meet the Mathematics requirement with the following courses: MATH2413, 2414. Students should meet the science requirements with: PHYS 2325, 2125, and CHEM 1311, 1111.

The general education core courses should include the following:

English Composition, 6 credits, ENGL 1301, 1302
U.S. History, 6 credits, HIST 1301, 1302
U.S. and State Government, 6 credits, PLSC 2305, 2306
Lab Sciences, 8 credits, PHYS 2325, 2125, and CHEM 1311, 1111
Mathematics, 8 credits, MATH 2413, 2414
Literature, 3 credits, ENGL 2322, 2323, 2327, or 2328
Communication, 3 credits
Arts, 3 credits
Social Sciences, 3 credits

Petroleum Engineering Program Description

Petroleum engineering is a broad-based discipline primarily concerned with the exploration, development, and conservation of oil and gas resources. Petroleum engineers plan and supervise drilling and well-completion programs, design and select drilling and production equipment, estimate reserves, and manage oil and gas properties. A petroleum engineering graduate may obtain a responsible position with an oil company, establish a consulting business, or become an independent oil producer. In general, a petroleum and natural gas engineer may find employment with any industry, state, or federal institution which requires a specialist in activities related to producing and injecting fluids by means of wellbores.

Non-Petroleum-Engineering Required Courses

28 Credits

MATH 3320 - Differential Equations, 3
MATH 2415 - Calculus III, 4
MATH 3301 – Introduction to Probability, 3
PHYS 2326 - University Physics II, 3
PHYS 2126 - University Physics II Laboratory, 1
GEOL 1301 - Physical Geology, 3
GEOL 1102 - Physical Geology lab, 1
GEOL 3212 - Sedimentary Rocks, 2
GEOL 3112 - Sedimentary Rocks Lab, 1
ENGR 2403 – Engineering Mechanics: Statics and Dynamics, 4
ENGR 3332 - Mechanics of Materials, 3

Petroleum Engineering Required Courses

46 Credits

PENG 2101 - Petroleum Fundamentals, 1
PENG 3302 - Reservoir Rock and Fluids Properties, 3
PENG 3301 - Drilling Engineering, 3
PENG 3101 - Drilling Fluids Lab, 1
PENG 3304 - Reservoir Engineering, 3
PENG 3104 - Reservoir Engineering Lab, 1
PENG 3305 - Well Design, 3
PENG 3307 - Formation Evaluation, 3
PENG 3326 - Petroleum Resource Economic and Valuation, 3
PENG 3354 – Petroleum Related Fluid Mechanics, 3
PENG 3375 – Petroleum Fluids and Thermodynamics, 3
PENG 4301 - Production Engineering, 3
PENG 4302 - Well Testing, 3
PENG 4303 - Reservoir Description, 3
PENG 4305 - Reservoir Engineering II, 3
PENG 4309 – Petroleum Data Analytics, 3
PENG 4410 - Senior Design, 4

Petroleum Engineering Elective Courses (Choose two)

6 Credits

Choose one:

PENG 4304 - Natural Gas Reservoir Engr., 3
PENG 4306 – Numerical Reservoir Simulation, 3

Choose one:

PENG 4307 - Advanced Drilling Engineering, 3
PENG 4308 – Introduction to Unconventional Resources, 3

Descriptions for Petroleum Engineering Courses

PENG 2101 - Petroleum Fundamentals: A basic overview of the petroleum industry, covering exploration, leasing, drilling, production, enhanced recovery, transportation, and refining.

PENG 3302 - Reservoir Rock and Fluids Properties: Reservoir rock and fluids properties, interaction between rock and fluids, flow behavior in a reservoir. Pre-requisites: PENG 2101 and MATH 2414.

PENG 3301 - Drilling Engineering: The study of the drilling process, including basic rotary drilling, drilling fluids and hydraulics, drill string design, directional drilling, and well control. Prerequisites: PENG 2101 and ENGR 2403 (or ENGR 2302) and Co-requisite: ENGR 3332.

PENG 3101 - Drilling fluids lab: Measurement and design of drilling fluids. Co-requisite: PENG 3301.

PENG 3304 - Reservoir Engineering: Properties of reservoir fluids and rocks, volumetric estimation, the material balance equation and applications, Secondary and tertiary oil recovery process. Prerequisites: PENG 3302 and MATH 3320.

PENG 3104 - Reservoir Engineering Lab: Measurement of fluid/rock properties, computer reservoir modeling. Co-requisite: PENG 3304.

PENG 3305 - Well Design: Well planning, drill string, casing, cementing and completions. Prerequisite: PENG 3301.

PENG 3307 - Formation Evaluation: Open hole and cased hole log analyses. Prerequisites: Math 2414 and PENG 2101 and Co-requisite: PENG 3302.

PENG 3326 – Petroleum Resource Economic and Valuation: Economic aspects of hydrocarbon assets development and valuation under budgetary and time constraints. Application of engineering economics to the valuation of hydrocarbon assets, involving time value of money and risk analysis, to choose the most economical alternative while recognizing the impact of engineering solutions in a global, economic, environmental, and societal context. Prerequisite: MATH 3301

PENG 3354 – Petroleum Fluid Mechanics: Introduction to the basic concepts of fluid mechanics including the fundamental properties of fluids, fluid statics, and kinematics of fluid motion. Introducing flow in pipelines, surface facilities and oil and gas wells. The conservation of mass, energy, and momentum are introduced with applications to compressible and incompressible fluids. Theory and applications of Dimensional Analysis, Newtonian and non-Newtonian fluids, Laminar and Turbulent flow and two-phase flow. Prerequisite: ENGR 2403

PENG 3375 – Petroleum Fluids and Thermodynamics: Fundamental principles of classical engineering thermodynamics. Application of mass and energy balances. Entropy generation and the second law of thermodynamics. Fluid properties, phase behavior, and equilibrium of single and multi-component hydrocarbon systems. Gas-liquid equilibria and other thermodynamic topics. Prerequisites: Math 2414, Physics 2325 and PENG 3304.

PENG 4301 - Production Engineering: Single and multi-phase flow, inflow performance, choke performance, artificial lift, and nodal analysis. Prerequisite: PENG 3301 and ENGR 3354.

PENG 4302 – Well Testing: Steady-state, pseudosteady-state, and transient well testing methods to determine well and reservoir parameters used in formation evaluation. Prerequisite: PENG 3304 and PENG 3307.

PENG 4303 - Reservoir Description: Integration of reservoir, production and geological data for well performance optimization (senior project class). Prerequisites: senior standing, MATH 3301 and PENG 4302.

PENG 4304 - Natural Gas Reservoir Engineering: Estimation of gas reserves for dry and gas condensate reservoirs. Evaluation of deliverability tests and subsequent development of flow equations. Prerequisite: PENG 3304.

PENG 4305 – Reservoir Engineering II: Secondary and tertiary oil recovery processes. Displacement theory as it applies to design and or behavior of flooding. Prerequisites: PENG 3304 and ENGR 3375, Co-requisite: PENG 4302.

PENG 4306 – Numerical Reservoir Simulation: Introduction to the theory and application of numerical simulation of hydrocarbon reservoirs. Formulation of equations and finite difference methods of approximation, models initialization, history matching and predictions. Prerequisite: PENG 3304 and/or and/or consent of instructor.

PENG 4307 – Advanced Drilling Engineering: Casing and drill string design; wellbore hydraulics and optimization; directional and horizontal wellbores; torque and drag calculations; underbalance drilling operations; emerging drilling technologies. Prerequisite: PENG 3301 and/or consent of instructor.

PENG 4308 – Introduction to Unconventional Recourses: Aspects of unconventional gas and oil reservoirs; economic significance; geologic occurrences and description; drilling, completion, and production practices; and reservoir management. Prerequisite: PENG 3304 and/or consent of instructor.

PENG 4309 – Petroleum Data Analytics: Introduction to analytics aspect of hydrocarbon assets development and field measurements handling in the digital hydrocarbon world. Application of analytics in exploration, drilling and production areas of the oil and gas industry. Carry out reservoir modeling using Big Data. Choose the optimum alternative while recognizing the impact of data analysis in a global, economic, environmental, and societal context. Provide tools to extract patterns and trends that lead to the construction of prediction. Pre-Requisites: Senior standing and/or instructor permission

PENG 4410 - Senior Design: Work on an extensive petroleum engineering project covering many areas. Prerequisite: senior standing, PENG 4301 and PENG 3326.

Petroleum Engineering

Freshman Year

<u>Fall</u>		<u>Hours</u>	<u>Spring</u>		<u>Hours</u>
ENGL 1301	Composition I	3	ENGL 1302	Composition II	3
MATH 2413	Calculus I	4	MATH 2414	Calculus II	4
CHEM 1311	General Chemistry I	3	PHYS 2325	University Physics I	3
CHEM 1111	Gen Chemistry Lab I	1	PHYS 2125	University Physics I Lab	1
GEOL 1301	Physical Geology	3	PLSC 2305	American National Politics	3
GEOL 1101	Physical Geology Lab	1	COMM	Communication elective	3
		15			17
					32

Sophomore Year

<u>Fall</u>		<u>Hours</u>	<u>Spring</u>		<u>Hours</u>
PHYS 2326	University Physics II	3	MATH 2415	Calculus III	4
PHYS 2126	University Physics II Lab	1	MATH 3301	Intro. To Probability	3
ENGR 2403	Statics and Dynamics	4	GEOL 3212	Sedimentary Rocks	2
MATH 3320	Differential Equations	3	GEOL 3112	Sedimentary Rocks Lab	1
PENG 2101	Petroleum Fundamentals	1	PENG 3302	Res. Rock and Fluids Prop.	3
	Lang/Phil/Cult.	3	PENG 3307	Formation Evaluation	3
		15			16
					31

Junior Year

<u>Fall</u>		<u>Hours</u>	<u>Spring</u>		<u>Hours</u>
HIST 1301	US History to 1877	3	ARTS	Arts Elective	3
PENG 3354	Pet. Fluid Mechanics	3	PENG 3375	Pet. Fl. & Thermodynamics	3
ENGR 3332	Mechanics of Materials	3	PENG 3305	Well Design	3
PENG 3301	Drilling Engineering	3	PENG 3326	Pet. Res. Econ. & Val.	3
PENG 3101	Drilling Fluids Lab	1	PENG 4301	Production Engineering	3
PENG 3304	Reservoir Engineering	3			
PENG 3104	Res. Engineering Lab	1			
		17			15
					32

Senior Year

<u>Fall</u>		<u>Hours</u>	<u>Spring</u>		<u>Hours</u>
PLSC 2306	State and Local Politics	3		Soc/Behv Sci.	3
PENG 4309	Pet. Data Analytics	3	HIST 1302	US History since 1877	3
PENG 4302	Well Testing	3	PENG 4303	Reservoir Description	3
PENG 4305	Reservoir Engineering II	3	PENG 43xx	PENG Elective	3
PENG 43xx	PENG Elective	3	PENG 4410	Senior Design	4
		15			16
					31

UNIVERSITY OF TEXAS - PERMIAN BASIN
DEGREE PLAN - BS in PETROLEUM ENGINEERING 2020-2021

NAME: _____

U.I.D.: _____

ADDRESS: _____

PHONE: _____

EMAIL: _____

GENERAL INFORMATION

1. Must accumulate 126 hours.
2. At least 54 hours upper level.
3. Grade minimum of "C" in:
 - a. Upper level courses.
 - b. Any transfer course.
4. Cumulative G.P.A. of 2.0 in:
 - a. Gen Ed coursework.
 - b. Total course work.
5. Complete all courses below.
6. Complete 50% of upper level hours at UTPB.

LOWER LEVEL COURSES (63)			UPPER LEVEL COURSES (63)					
GENERAL EDUCATION (42)			BASIC ENGINEERING CORE (9)			MAJOR REQUIREMENTS (47)		
COURSE	SEM	GRD	COURSE	SEM	GRD	COURSE	SEM	GRD
ENGL 1301			MATH 3320			PENG 3302		
ENGL 1302			MATH 3301			PENG 3307		
Lang/Phil/Cult (3 hrs)			ENGR 3332			PENG 3301 / 3101		
HIST 1301			SENIOR DESIGN (7)			PENG 3304 / 3104		
HIST 1302						PENG 4303		
PLSC 2305						PENG 3326		
PLSC 2306						PENG 3354		
CHEM 1311 / 1111						PENG 3375		
PHYS 2325 / 2125						PENG 4301		
Soc/Behv Sci (3 hrs)						PENG 4302		
PERF. ART (3)						PENG 4305		
MATH 2413						PENG 4309		
COMM 1315						GEOL 3212/3112		
LOWER LEVEL CORE (21)						ELECTIVES (Choose two)		
MATH 2414						PENG 4304		
MATH 2415						PENG 4306		
PHYS 2326 / 2126						PENG 4307		
GEOL 1301/1101						PENG 4308		
ENGR 2403								
PENG 2101								

Choose one	PENG 4304		
	PENG 4306		
Choose one	PENG 4307		
	PENG 4308		

Advisor: _____

Office: _____ Phone: _____

Email: _____

STUDENT SIGNATURE: _____ Date: _____

OFFICE OF THE DEAN: _____ Date: _____