

# PETROLEUM ENGINEERING (PETE)

## PETE 4303 Petroleum Rocks and Fluids

**Prerequisites:** CHEM 1314 or CHEM 1414; MATH 2144 or MATH 2123; PHYS 2014 or PHYS 1114; Co-requisite(s): GEOL 3413 or GEOL 4023.

**Description:** Topics include rock properties, flow through porous media, principles of organic chemistry; properties of hydrocarbon liquids and gases; multicomponent mixtures; phase behavior; and gas-liquid equilibrium concepts. Previously offered as ENGR 4303.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 4313 Drilling and Well Completions

**Prerequisites:** GEOL 3413; ENSC 3233 or MET 3313.

**Description:** Topics include drilling systems; drilling fluids, drilling hydraulics, cuttings transport, drill bits, oilfield pipe, cements and cementing operations, perforating, acidizing, hydraulic fracturing, and oilfield tools. Previously offered as ENGR 4313. May not be used for degree credit with PETE 5013.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 4333 Production Engineering

**Prerequisites:** PETE 4303; ENSC 3233 or MET 3313.

**Description:** Topics include a review of artificial lift technologies, multi-phase flow, well stimulation, facilities engineering, gas treating, troubleshooting well production, advanced production strategies, industrial special topics and production equipment selection. Previously offered as ENGR 4333. May not be used for degree credit with PETE 5023.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 4343 Reservoir Engineering and Well Testing

**Prerequisites:** PETE 4303.

**Description:** Topics include reservoir fluid flow, well performance, gas and water coning, water influx, oil recovery mechanisms, oil and gas reservoirs, water flooding, type curve matching, well testing, and buildup and drawdown tests. Previously offered as ENGR 4343.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 4990 Special Problems in Petroleum Engineering

**Prerequisites:** Consent of instructor.

**Description:** Independent study on specific topics in drilling, production and reservoir engineering. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.

**Credit hours:** 1-5

**Contact hours:** Lecture: 1-5 Contact: 1-5

**Levels:** Undergraduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 5000 Master's Thesis

**Prerequisites:** Consent of major professor.

**Description:** Research and thesis writing. Offered for variable credit, 1-6 credit hours, maximum of 6 credit hours.

**Credit hours:** 1-6

**Contact hours:** Lecture: 1-6 Contact: 1-6

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 5013 Drilling and Well Completions

**Description:** Topics include drilling systems; drilling fluids, drilling hydraulics, cutting transport, drill bits, oilfield pipe, cements and cementing operations, perforating, acidizing, hydraulic fracturing, and oilfield tools. Previously offered as ENGR 4313. May not be used for degree credit with PETE 4313.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 5023 Production Engineering

**Description:** Topics include a review of artificial lift technologies, multi-phase flow, well stimulation, facilities engineering, gas treating, troubleshooting well production, advanced production strategies, industrial special topics and production equipment selection. Previously offered as ENGR 4333. May not be used for degree credit with PETE 4333.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

## PETE 5110 Special Topics in Petroleum Engineering

**Prerequisites:** Graduate standing and consent of instructor.

**Description:** Specialized course addressing specific topics in drilling, production, or reservoir engineering. May be repeated for credit if subject matter varies. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.

**Credit hours:** 1-3

**Contact hours:** Lecture: 1-3 Contact: 1-3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

**PETE 5210 Special Topics in Petroleum Engineering****Prerequisites:** Graduate standing and consent of instructor.**Description:** Specialized course addressing specific topics in drilling, production, or reservoir engineering. May be repeated for credit if subject matter varies. Offered for variable credit, 1-3 credit hours, maximum of 6 credit hours.**Credit hours:** 1-3**Contact hours:** Lecture: 1-3 Contact: 1-3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5243 Enhanced Hydrocarbon Recovery****Prerequisites:** PETE 4343 or instructor permission.**Description:** This course focuses on the background and necessity for enhanced hydrocarbon recovery, and the working principles (physicochemical aspects) of various conventional and state-of-the-art enhanced hydrocarbon recovery technologies.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5303 Petroleum Geomechanics****Prerequisites:** PETE 4303 or consent of instructor.**Description:** Fundamentals of deformation and failure of sedimentary rocks; application of geomechanics in wellbore stability, solids productions, hydraulic fracturing and reservoir geomechanics.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5313 Advanced Drilling Modeling and Simulation****Prerequisites:** PETE 4313 or consent of instructor.**Description:** Advanced coverage of petroleum drilling operations with an emphasis on real-time drilling optimization; rate of penetration (ROP) modeling and simulation; drilling hydraulics with fluid design optimization; use of a simulator to predict ROP for different drills bits through different formations. Previously offered as ENGR 5323.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5333 Advanced Production and Flow Assurance****Prerequisites:** PETE 4333 or consent of instructor.**Description:** This course covers petroleum production systems and methods used to assure flow through the system. Topics include downhole and surface equipment, transport through pipelines, inflow performance, phase behavior in oilfield equipment, downhole and surface separation, field treating of natural gas, and production enhancement.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5343 Advanced Reservoir Engineering****Prerequisites:** PETE 4343 or consent of instructor.**Description:** Topics include reservoir drive mechanisms, material balance approach to predict oil and gas reservoir properties, fluid flow in porous media, principles of secondary and tertiary recovery methods, analytical and numerical solutions for fluid flow in reservoirs, and well test analysis.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5363 Petroleum Economics and Investments****Prerequisites:** (PETE 5333 and PETE 5343) or consent of instructor.**Description:** Evaluation techniques for oil and gas properties focusing on economic analyses, reserves estimations and decision making. Evaluate three independent investment opportunities as class projects. Previously offered as ENGR 5363.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5373 Advanced Well Stimulation****Prerequisites:** Permission of instructor.**Description:** Hydraulic fracturing simulation and design. Unconventional resource rock mechanics and hydraulic fracturing concepts. Multistage hydraulic fracturing and fracture treatment analysis. Matrix acidizing and evaluation of treatments through methods of pumping pressure analysis. Previously offered as ENGR 5373.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5413 Advanced Well Design and Operational Analysis****Prerequisites:** PETE 4313 or consent of instructor.**Description:** Topics include information needed to plan oil or gas wells; planning the authorization for expenditures (AFE) budget; use of offset data analysis from logging and drilling for planning; pore and fracture pressure prediction; casing design; wellbore stability, drilling hydraulics, wellbore strengthening considerations in designing the mud weight window; drilling fluids and cements laboratory exercises using latest technologies/materials; completion/stimulation and real time drilling analysis.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering**PETE 5513 Directional Drilling****Prerequisites:** PETE 4313 or PETE 5313 or consent of instructor.**Description:** Study of directional well planning and drilling; tools and operational techniques used in directional drilling; limiting factors of reaching a predetermined subsurface target.**Credit hours:** 3**Contact hours:** Lecture: 3 Contact: 3**Levels:** Graduate**Schedule types:** Lecture**Department/School:** Chemical Engineering

**PETE 5613 Advanced Well Completions**

**Prerequisites:** Consent of instructor.

**Description:** Topics include selection of well completion type, pipe design, well cementing, perforating, selection of surface and downhole equipment, corrosion mitigation, and well stimulation.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

**PETE 5713 Wellbore Cement Chemistry and Microstructure**

**Prerequisites:** Consent of instructor.

**Description:** This course will focus on application of Portland cement-based cement systems in construction of wellbores for the following: conventional & unconventional oil & gas reservoirs; conventional and engineered geothermal systems; injection of brine and/or CO<sub>2</sub>.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

**PETE 5813 Barrier Materials**

**Description:** This course will examine how we can use geomimicry of shales to design and produce effective long-lasting engineered barrier materials, starting with improving cements. Previously offered as PETE 5110.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

**PETE 5990 Special Problems in Petroleum Engineering**

**Prerequisites:** Graduate standing and consent of instructor.

**Description:** Independent study on specific topics in drilling, production and reservoir engineering. Offered for variable credit, 1-5 credit hours, maximum of 5 credit hours.

**Credit hours:** 1-5

**Contact hours:** Contact: 1-5 Other: 1-5

**Levels:** Graduate

**Schedule types:** Independent Study

**Department/School:** Chemical Engineering

**PETE 6000 Doctoral Thesis**

**Prerequisites:** Consent of major professor.

**Description:** The doctoral candidate registers for 1-15 semester credit hours each semester during which laboratory work is in process. Methods used in research and thesis writing. An original investigation of a problem in Petroleum Engineering and its report in a dissertation. Offered for variable credit, 1-15 credit hours, maximum of 54 credit hours.

**Credit hours:** 1-15

**Contact hours:** Contact: 1-15 Other: 1-15

**Levels:** Graduate

**Schedule types:** Independent Study

**Department/School:** Chemical Engineering

**PETE 6010 Petroleum Engineering Seminar**

**Description:** This seminar course will expose Petroleum Engineering graduate students and members of the OSU academic community to a broad range of current research topics in petroleum engineering and related fields. Offered for variable credit, maximum of 10 credit hours.

**Credit hours:** 1

**Contact hours:** Lecture: 1 Contact: 1

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

**PETE 6110 Advanced Topics in Petroleum Engineering**

**Prerequisites:** Consent of major professor.

**Description:** Specialized course addressing advanced topics in drilling, production, or reservoir engineering. May be repeated for credit if subject matter varies. Offered for fixed credit, 3 credit hours.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering

**PETE 6813 Research Methods in Petroleum Engineering**

**Prerequisites:** M.S. or Ph.D. candidacy in petroleum engineering or consent of instructor.

**Description:** The course covers the required topics to prepare, conduct, document, and communicate an independent research project in Petroleum Engineering. May not be used for degree credit with CHE 5303.

**Credit hours:** 3

**Contact hours:** Lecture: 3 Contact: 3

**Levels:** Graduate

**Schedule types:** Lecture

**Department/School:** Chemical Engineering