PETE - PETROLEUM ENGINEERING (PETE)

PETE 201 Introduction to Petroleum Engineering
Credit 1. 1 Lecture Hour.
Overview and history of the petroleum industry and petroleum engineering; nature of oil and gas reservoirs, exploration and drilling, formation evaluation, well completions and production, surface facilities, reservoir mechanics, improved oil recovery; impact of ethical, societal, environmental considerations; career development resources, including professional society.
Prerequisite: Approval of department head.

PETE 225 Introduction to Drilling Systems
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Introduction to petroleum drilling systems, including fundamental petroleum engineering concepts, quantities and unit systems, drilling rig components, drilling fluids, pressure loss calculations, casing, well cementing, and directional drilling.
Prerequisites: Grade of C or better in MATH 152, PHYS 206, and ENGR 216/PHYS 216 or PHYS 216/ENGR 216; grade of C or better in CHEM 107 and CHEM 117, or concurrent enrollment.

PETE 285 Directed Studies
Credits 1 to 4. 1 to 4 Other Hours.
Special problems in various areas of petroleum engineering assigned to individual students or to groups.
Prerequisites: Approval of department head.

PETE 289 Special Topics in...
Credits 1 to 4. 1 to 4 Lecture Hours.
Selected topics in an identified area of petroleum engineering. May be repeated for credit.
Prerequisite: Approval of instructor.

PETE 291 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member in petroleum engineering. May be taken two times for credit. Registration in multiple sections of this course is possible within a given semester.
Prerequisites: Freshman or sophomore classification and approval of instructor.

PETE 300 Summer Practice
Credits 0.
Required. No Credit. Industry practice to familiarize the petroleum engineering student with practices and equipment of the petroleum industry. Approval of advisor required.

PETE 301 Petroleum Engineering Numerical Methods
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Use of numerical methods in a variety of petroleum engineering problems; numerical differentiation and integration; root finding; numerical solution of differential equations; curve fitting and interpolation; computer applications; introduction to the principles of numerical simulation methods.
Prerequisites: Grade of C or better in MATH 308, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 310 Reservoir Fluids
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Thermodynamic behavior of naturally occurring hydrocarbon mixtures; evaluation and correlation of physical properties of petroleum reservoir fluids including laboratory and empirical methods.
Prerequisites: Grade of C or better in CHEM 107, CHEM 117, MATH 251, MEEN 315 and PETE 311; grade of C or better in MATH 308, or concurrent enrollment.

PETE 311 Reservoir Petrophysics
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Systematic theoretical and laboratory study of physical properties of petroleum reservoir rocks; lithology, porosity, elastic properties, strength, acoustic properties, electrical properties, relative and effective permeability, fluid saturations, capillary characteristics and rock-fluid interactions such as adsorption and absorption.
Prerequisites: Grade of C or better in MATH 251, PHYS 207, and ENGR 217/PHYS 217 or PHYS 217/ENGR 217; grade of C or better in CHEM 107, CHEM 117, and GEOL 104, or concurrent enrollment.

PETE 314 Transport Processes in Petroleum Production
Credits 3. 3 Lecture Hours.
Basics and applications of fluid mechanics (statics; mass, energy, momentum balances; laminar and turbulent flow, Reynolds number, Moody diagram; non-Newtonian fluid flow; multi-phase flow; flow in porous media, non-Darcy flow); heat transfer (heat conduction, convection, heat exchangers); emphasis on analogies and similarities within mass, energy and momentum transport.
Prerequisites: Grade of C or better in MEEN 315, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 321 Formation Evaluation
Credits 4. 3 Lecture Hours. 3 Lab Hours.
Well-log interpretation for formation evaluation of hydrocarbon-bearing reservoirs; basic rock physics principles; theory of tool operation; analysis of open hole logs and core measurements to estimate hydrocarbon reserves and petrophysical properties of the formation such as porosity, net pay thickness, water/hydrocarbon saturation, permeability and saturation-dependent capillary pressure; formation evaluation of clay-free and shaly-sand formations as well as basic introduction to formation evaluation of organic-shale formations.
Prerequisites: Grade of C or better in PETE 301, PETE 310, PETE 311, and GEOL 404, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 323 Fundamentals of Reservoir Engineering
Credits 3. 3 Lecture Hours.
Determination of reserves; material balance methods; aquifer models; fractional flow and frontal advance; displacement, pattern and vertical sweep efficiencies in waterfloods; enhanced oil recovery processes; design of optimal recovery processes; introduction and performance analysis of unconventional reservoirs.
Prerequisites: Grade of C or better in PETE 301, PETE 310, PETE 311, and GEOL 404, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 324 Well Testing
Credits 3. 3 Lecture Hours.
Analysis of well performance under varied reservoir conditions including evaluation of unsteady, pseudo-steady and steady state flow; well testing methods used to determine well and reservoir parameters; applications to conventional and unconventional wells producing gas and/or liquids; fundamentals of preparing and operating well test equipment to monitor, measure and gather samples for evaluating well performance.
Prerequisites: Grade of C or better in PETE 301, PETE 310, PETE 311, and GEOL 404, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 325 Petroleum Production Systems
Credits 3. 2 Lecture Hours. 3 Lab Hours.
Petroleum operation and oil field equipment including onshore and offshore production systems; wellbore inflow and outflow and backpressure analysis; downhole completion and sand control equipment; artificial lift equipment and design; stimulation, workover/completion nomenclature; flow assurance; produced fluids, fluid separation and metering, safety systems, pressure boosting and monitoring.
Prerequisites: Grade of C or better in PETE 301, PETE 310, and PETE 314, junior or senior classification, petroleum engineering majors only; or approval of instructor.

PETE 335 Technical Presentations I
Credit 1. 1 Lecture Hour.
Preparation of a written technical paper proposal on a subject related to petroleum technology and an oral presentation of the proposal in a formal technical conference format.
Prerequisites: Grade of C or better in COMM 203, COMM 205, COMM 243, or ENGL 210; junior or senior classification.

PETE 336 Petroleum Technical Presentation I
Credit 1. 3 Lab Hours.
Preparation of a written technical paper on a subject related to petroleum technology.
Prerequisites: Grade of C or better in ENGL 210; junior or senior classification, petroleum engineering majors only or approval of department head; Qatar campus.

PETE 337 Junior Student Paper Contest
Credits 0.
No Credit. Presentation of a technical proposal on a subject related to petroleum technology judged by petroleum professionals at the junior level departmental student paper contest. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Grade of C or better in PETE 335.

PETE 353 Petroleum Project Evaluation
Credits 3. 3 Lecture Hours.
Economic analysis and investment decision methods in petroleum and mineral extraction industries; depletion, petroleum taxation regulations, and projects of the type found in the industry; mineral project evaluation case studies.
Prerequisites: Grade of C or better in PETE 301 and PETE 310, or concurrent enrollment.

PETE 355 Drilling Engineering
Credits 3. 3 Lecture Hours.
Design and evaluation of well drilling systems; identification and solution of drilling problems; wellbore hydraulics, well control, casing design; well cementing directional drilling, offshore drilling.
Prerequisites: Grade of C or better in CVEN 305, PETE 225, and PETE 314; grade of C or better in PETE 321 and PETE 325, or concurrent enrollment.

PETE 401 Reservoir Simulation
Credits 2. 1 Lecture Hour. 3 Lab Hours.
Solution of production and reservoir engineering problems using state-of-the-art commercial reservoir simulation software, using data commonly available in industry; emphasis on reservoir description, reservoir model design and calibration, production forecasting and optimization, economic analysis and decision making under uncertainty.
Prerequisites: Grade of C or better in PETE 310, PETE 321, PETE 323, PETE 324, and PETE 353.

PETE 402 Integrated Asset Development
Credits 3. 1 Lecture Hour. 6 Lab Hours.
Capstone design encompassing previously acquired skills; project teams formed to solve practical petroleum engineering problems using current tools; technical content of the projects may include any combination of drilling and completion, formation evaluation, inflow/outflow design and analysis, and application of reservoir engineering principles.
Prerequisites: Grade of C or better in PETE 355, PETE 401, PETE 404, and PETE 410.

PETE 404 Integrated Reservoir Modeling
Credits 3. 3 Lecture Hours.
Geophysical, geological, petrophysical and engineering data with geostatistical methods to create reservoir descriptions for dynamic reservoir modeling (simulation); geostatistical concepts such as variogram modeling, kriging and sequential Gaussian simulation; combines several techniques to quantify uncertainty in a realistic dynamic reservoir simulation.
Prerequisite: Grade of C or better in PETE 401, or concurrent enrollment.

PETE 406 High Performance Drilling Design and Operational Practices
Credits 3. 3 Lecture Hours.
Preparation in achieving differentiating drilling performance in the most complex wells; includes training in the underlying physics of each type of performance limiter and real time and engineering practices to address the limitation; performance management workflows and change models required to effectively change the way organizations conduct work essential in achieving higher performance.
Prerequisite: Grade of C or better in PETE 355.

PETE 408 Probabilistic Reserves Evaluation
Credits 3. 3 Lecture Hours.
Oil and gas reserves definitions and reporting regulations; probabilistic reserves estimation methods; unconventional resources characterization; reserves valuation techniques.
Prerequisite: Grade of C or better in PETE 353 or approval of instructor.

PETE 409 Enhanced Oil Recovery
Credits 3. 3 Lecture Hours.
Fundamentals and theory of enhanced oil recovery; polymer flooding, surfactant flooding, miscible gas flooding and steam flooding; application of fractional flow theory; strategies and displacement performance calculations.
Prerequisites: Grade of C or better in PETE 310 or approval of instructor.

PETE 410 Production Engineering
Credits 3. 3 Lecture Hours.
Fundamental production engineering design, evaluation and optimization for oil and gas producing well; well deliverability; formation damage and skin analysis; well completion selection; technologies that improve oil and gas well performance including artificial lift and well stimulation.
Prerequisites: Grade of C or better in PETE 321, PETE 323, PETE 324 and PETE 325.

PETE 412 Surface Production Facilities
Credits 3. 3 Lecture Hours.
Overview of separation and treatment of production fluid; fundamentals of gas-liquid separation; design and performance analysis of two- and three-phase separators; oil desalting, sweetening and stabilization; water treatment; overview of gas separation, dehydration and sweetening.
Prerequisite: Senior classification or approval of instructor; Qatar campus.

PETE 413 Natural Gas Engineering
Credits 3. 3 Lecture Hours.
Flow of natural gas in reservoirs and wellbores and gathering systems; deliverability testing; production surveillance and monitoring; production forecasting; flow measurement; and compressor sizing.
Prerequisites: Grade of C or better in PETE 323, PETE 324, and PETE 325.

PETE 416 Solving Common Production Engineering Problems
Credits 3. 3 Lecture Hours.
Application of petroleum engineering tools, methods and techniques to solve real problems that petroleum engineers encounter in producing individual wells; focus primarily on problems associated with single-phase gas wells and uses Microsoft Excel to solve many of these problems.
Prerequisite: Grade of C or better in PETE 410.

PETE 418 Deterministic Reserves Evaluation
Credits 3. 3 Lecture Hours.
Oil and gas reserves definitions and reporting regulations; deterministic estimation methods; unconventional resources characterization; reserves valuation techniques.
Prerequisite: Grade of C or better in PETE 353 or approval of instructor.

PETE 435 Technical Presentations II
Credit 1. 1 Lecture Hour.
Preparation of a written technical paper on a subject related to petroleum technology and an oral presentation of the paper in a formal technical conference format.
Prerequisites: PETE 337.

PETE 436 Petroleum Technical Presentation II
Credit 1. 3 Lab Hours.
Preparation of a written technical paper on a subject related to petroleum technology and an oral presentation of the paper in a formal technical conference format.
Prerequisites: Grade of C or better in PETE 336; senior classification, petroleum engineering majors only or approval of department head; Qatar campus.

PETE 437 Senior Student Paper Contest
Credits 0.
No credit. Presentation of a technical petroleum engineering topic judged by petroleum professionals at the senior level departmental student paper contest. Must be taken on a satisfactory/unsatisfactory basis.
Prerequisite: Grade of C or better in PETE 435.

PETE 453 Petroleum Entrepreneurship
Credits 3. 3 Lecture Hours.
Exploration of the various aspects of entrepreneurship with a focus on petroleum asset valuation and prospect analysis in the energy sector; exposure to all aspects of the journey including business idea generation, raising early stage capital, staffing the enterprise, developing the business plan and selling the concept to investors.
Prerequisites: Grade of C or better in PETE 353.

PETE 485 Directed Studies
Credits 1 to 5. 1 to 5 Other Hours.
Special problems in various phases of petroleum engineering assigned to individual students or to groups.
Prerequisites: Junior or senior classification and approval of department head.

PETE 489 Special Topics in...
Credits 1 to 4. 1 to 4 Other Hours.
Selected topics in an identified field of petroleum engineering. Approval of instructor. May be repeated for credit.

PETE 491 Research
Credits 1 to 4. 1 to 4 Other Hours.
Research conducted under the direction of a faculty member in petroleum engineering. May be taken two times for credit. Registration in multiple sections of this course is possible within a given semester.
Prerequisites: Junior or senior classification and approval of instructor.