

**TEXAS A&M UNIVERSITY Harold Vance**  
**Department of Petroleum Engineering**

**CATALOG 131**  
**Course Descriptions**

**PETE 201. Introduction to Petroleum Engineering. (1-0). Credit 1. I** Overview of petroleum industry and petroleum engineering including nature of oil and gas reservoirs, petroleum exploration and drilling, formation evaluation, well completions and production, surface facilities, reservoir mechanics, and improved oil recovery. Prerequisites: Approval of department head.

**PETE 211. Petroleum Engineering Systems. (1-0). Credit 1. I, II** Introduction to petroleum engineering reservoir, drilling, formation evaluation, and production systems, including fundamental petroleum engineering concepts, quantities and unit systems. Prerequisites: ENGR 112; MATH 152; PHYS 218.

**PETE 225. Petroleum Drilling Systems. (1-3). Credit 2. I** 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: ENGR 112; MATH 152; PHYS 218.

**PETE 285. Directed Studies. Credit 1 to 4.** Special problems in various areas of petroleum engineering assigned to individual students or to groups. Prerequisites: Completion of engineering common body of knowledge courses; approval of department head.

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

**PETE 301. Petroleum Engineering Numerical Methods. (2-3). Credit 3. I** 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: PETE 311; CVEN 305; MATH 308; MEEN 315.

**PETE 310. Reservoir Fluids. (3-3). Credit 4. I** Thermodynamic behavior of naturally occurring hydrocarbon mixtures; evaluation and correlation of physical properties of petroleum reservoir fluids including laboratory and empirical methods. Prerequisites: PETE 311; CHEM 107; CVEN 305; MEEN 315; MATH 308.

**PETE 311. Reservoir Petrophysics. (3-3). Credit 4. I, II** Systematic theoretical and laboratory study of physical properties of petroleum reservoir rocks; lithology, porosity, relative and effective permeability; fluid saturations, capillary characteristics, compressibility, rock stress; and fluid-rock interaction. Prerequisites: PETE 225; GEOL 104; MEEN 221; MATH 308 or registration therein.

**PETE 314. Transport Processes in Petroleum Production. (3-0). Credit 3. I** Fluid Mechanics: fluid statics; mass, energy, momentum balances; friction losses, turbulent flow, Reynolds Number (Moody diagram); Newtonian/Non-Newtonian fluids; flow in porous media (Darcy's law and Non-Darcy flow). Heat Transfer: Heat conduction (steady-state/transient flow: flux components, slabs/cylinders, thermal conductivity, analogs, applications); Heat convection (heat transfer/pressure drop, heat exchangers, applications). Prerequisites: PETE 311; CVEN 305; MEEN 315; MATH 308.

**PETE 320. Drilling and Production Systems. (2-3). Credit 3. II** Introduction to drilling systems: components; drilling fluids, pressure loss calculations; well cementing; and directional drilling; theoretical and laboratory prediction of flowrates and pressure drops through conventional petroleum production networks; calculation of static and flowing bottomhole pressures in oil and gas wells; well deliverability via inflow (IPR)/outflow (VLP) methods; gas lift; pump lift; gas compression. Prerequisites: PETE 301 and 310; GEOL 404.

**PETE 321. Formation Evaluation. (3-3). Credit 4. II** Introduction to modern well logging methods, engineering, and core-log integration. Prerequisites: PETE 301 and 310; GEOL 404; or approval of instructor.

**PETE 322. Geostatistics. (3-0). Credit 3. II** Introduction to geostatistics; basic statistics concepts; univariate distributions and estimators; measures of heterogeneity; hypothesis testing, correlation, and regression; analysis of spatial relationships, modeling geological media, and use of statistics in reservoir modeling. Prerequisites: PETE 401, GEOL 404; or approval of instructor.

**PETE 323. Reservoir Models. (3-0). Credit 3. II** 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. Prerequisites: PETE 301 and 310; GEOL 404.

**PETE 324. Well Performance. (3-0). Credit 3. II** Steady-state, pseudosteady-state, and transient well testing methods to determine well and reservoir parameters used in formation evaluation; applications to wells that produce gas and liquid petroleum; rate forecasting; deliverability testing. Prerequisites: PETE 301 and 310; GEOL 404.

**PETE 325. Petroleum Production Systems. (1-3). Credit 2. II** Introduction to production operations and oil field equipment: multiphase flow in pipes, bottomhole pressure prediction, inflow/outflow performance, production systems and backpressure analysis, hydraulic fracturing fluids and equipment; downhole and artificial lift equipment, tubulars, workover/completion nomenclature and procedures; produced fluids, fluid separation and metering, safety systems, pressure boosting and monitoring. Prerequisites: PETE 301, 310 and 314; GEOL 404.

**PETE 335. Technical Presentations I. (1-0). Credit 1. I.** 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; oral presentations judged by petroleum industry professionals at the departmental student paper contest held during the same academic year. Prerequisites: COMM 205; junior classification in petroleum engineering.

**PETE 400. Reservoir Description. (2-3). Credit 3. II** An integrated reservoir description experience for senior students in petroleum engineering, geology and geophysics; includes using geophysical, geological, petrophysical, and engineering data; emphasis on reservoir description (reservoir and well data analysis and interpretation), reservoir modeling (simulation), reservoir management (production optimization), and economic analysis (property evaluation). Prerequisite: approval of instructor. Cross-listed with GEOL 400.

**PETE 401. Reservoir Development (2-3). Credit 3. I** An integrated reservoir development experience for senior students in petroleum engineering; emphasis on reservoir description (reservoir and well evaluation), reservoir modeling (simulation), production optimization (nodal analysis, stimulation, artificial lift, facilities), reservoir management (surveillance and reservoir optimization), and economic analysis (property evaluation and risk analysis). Prerequisite: PETE 321, 323, 324, 325, 403.

**PETE 403. Petroleum Project Evaluation. (3-0). Credit 3. II** Analysis of investments 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: PETE 301, 310, 314.

**PETE 405. Drilling Engineering. (3-0). Credit 3. I** The design and evaluation of well drilling systems; identification and solution of drilling problems; wellbore hydraulics; well control; casing design; well cementing; wellbore surveying. Prerequisites: PETE 321, 323, 324, 325, 403.

**PETE 406. Advanced Drilling Engineering. (3-0). Credit 3. II** Well control; underbalanced drilling; offshore drilling; horizontal, extended reach, multi-lateral drilling; fishing operations. Prerequisite: PETE 405.

**PETE 410. Production Engineering. (3-0). Credit 3. I** Fundamental production engineering design, evaluation and optimization for oil and gas wells, including well deliverability, formation damage and skin analysis, completion performance, and technologies that improve oil and gas well performance (artificial lift and well stimulation). Prerequisites: PETE 321, 323, 324, 325, 403.

**PETE 411. Well Drilling. (3-0). Credit 3. I** The design and evaluation of well drilling systems; identification and solution of drilling problems; wellbore hydraulics; casing design; well cementing; drilling of directional and horizontal wells; wellbore surveying methods; pore and fracture pressures; well control. Prerequisites: PETE 320, 321, 322, 323, 324.

**PETE 416. Production Enhancement. (3-0). Credit 3. II** Design, problem diagnosis and solving, and performance optimization of the technologies that increase oil and gas well production. Methods include artificial lift, acid stimulation and hydraulic fracturing. Prerequisite: PETE 410.

**PETE 435. Technical Presentations II. (1-0). Credit 1. I** 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; oral presentations are judged by petroleum industry professionals at the departmental student paper contest held during the same academic year. Prerequisites: PETE 335; senior classification in petroleum engineering.

**PETE 485. Directed Studies. Credit 1 to 5.** 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.