

Course descriptions

It is reasonable to expect some changes in the program and courses description with an overall objective to improve the program. After the number, name and description of each course, there might be an indication of any prerequisite course that a student needs to attend successfully before registering to the course.

PET 501 Introduction to petroleum engineering (8 ECTS)

Energy outlook, oil and gas industry, basic fluid mechanics, petroleum origin and migration, nature of oil and gas reservoirs, petroleum exploration, drilling, formation evaluation, completion and production, reservoir engineering methods of oil resource estimation and optimization, surface facilities, enhanced oil recovery.

PET 502 Hydrocarbon law & economics (4 ECTS)

History and evolution of oil and gas law, Cyprus Hydrocarbon Law, regulatory agencies, production sharing agreements, joint operating agreements, unitization agreements, basics of contract law and marketing, case studies.

Fiscal systems, cash flow and economic indicators, upstream petroleum economics, midstream and downstream petroleum economics, managing and mitigating uncertainty and risk, sensitivities, simulations and decision analysis, valuing petroleum assets, portfolios and companies

PET 503 Health, Safety & Environmental assessment and control in petroleum operations (4 ECTS)

Impact of drilling, completion and production operations, environmental transport of petroleum wastes, planning for health, safety & environmental protection, waste treatment methods, waste disposal methods, remediation of contaminated sites, environmental regulations, sensitive habitats, emission control, Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA).

PET 511 Petroleum geology (8 ECTS)

Basics of petroleum geology, geological time, plate tectonics, structural types and stratigraphies, rock type characteristics and identification, age determination, paleontology, engineering geology. Basin analysis, prospect generation based on a model system, source rocks, oil generation and maturation, migration of fluids, trapped structures and seal. Seismic and log correlation, risk assessment, analysis, modeling and simulation.

PET 512 Applied geophysics: processing, imaging and interpretation (4 ECTS)

Principles of geophysics: Potential and imaging techniques, gravitational, electromagnetic and seismic data acquisition including instrumentation for land and marine surveys. Processing of seismic reflection data: Wave equation, Fourier analysis, deconvolution, velocity analysis and statics correction, stacking, migration. Advanced topics: full-waveform inversion and seismic anisotropy. Seismic interpretation: Stratigraphic and structural systems. Marine sedimentological systems, sedimentary sequences, and unconformities in time and space, time evolution of buried channels. Identification of faulting systems, faults reactivation. BSR and gas hydrates, sedimentary structure of continental margins, transform basins. Practical training in 2D and 3D seismic data.

PET 513 Formation evaluation (8 ECTS)

Essential formation evaluation measurements, Resistivity measurements, Nuclear measurements, Log Evaluation Procedure, Clean formation evaluation, Shaly sands , NMR Measurements, Sonic measurements, Carbonates, complex lithology, Probabilistic, evaluation, Geochemical Measurements, Wireline formation testing, Permeability evaluation, Dipmeter and imaging measurements, Fractured reservoirs evaluation.

PET 521 Drilling operations (8 ECTS)

Introduction to drilling engineering and operations, budgeting, equipment, rig design, drilling risers, wellheads and blow-out prevention (BOP), string design, drilling bits, drilling hydraulics, fluid systems, drilling fluids, casing design, pore pressure and fracture pressure prediction, mud-density, basic well control, horizontal drilling, multilateral drilling, drilling measurements. Deep water platforms, floating drilling vessels, types of motion, station keeping, motion compensation, special problems in floating drilling, shallow water flows, drilling deep water, high pressure risers, deep water casing design and running procedures, deep water cementing, deep water well control

PET 522 Well and subsea completions and production facilities (8 ECTS)

Well completions: inflow and outflow performance, production analysis of subsurface systems, well completion methods and procedures, perforating techniques, formation damage, flow restrictions, fracturing process, sand control methods, producing bottom hole pressure (BHP), tubing selection, design, and installation, single and multi-phase flow in piping, gas lift, electrical submersible pump (ESP), hydraulic pumping, cavity pumping (PCP), plunger lift.

Subsea completions and production facilities: offshore production, design and building blocks of subsea engineering, different types of subsea completions, flow assurance, subsea production systems and equipment, production control systems, costs of subsea equipment, operations, maintenance and integrity of subsea systems, advanced and new subsea technologies, Most Efficient Rate (MER), choke design, productions systems, gas and oil measurement, control systems, safety systems, production systems, optimization of operations. Design and codes, construction, corrosion, maintenance, regulations, decommissioning

PET 531 Reservoir engineering (8 ECTS)

Material balance concepts, phase behavior, fluid saturations, compressibility, wettability and capillary, permeability and relative permeability, porosity, Darcy's law, pressure drop, diffusivity, flow regimes, steady-state, pseudo-steady-state and transient flow, radial flow, well models, skin factors

Reservoir types, reservoir drive mechanisms, reserves determination, deterministic (volumetric & material balance) and probabilistic techniques, production forecast using decline analysis empirical methods, non-conventional gas reservoirs, well test design, planning and analysis, reservoir damage, fluid coning and water influx, secondary and tertiary recovery, schemes. Planning, predicting oil recovery and performance, reservoir monitoring, horizontal well application, enhanced oil recovery, water-flooding

PET 532 Natural gas production engineering (8 ECTS)

Gas reservoirs, properties of natural gases, PVT modeling, gas-wellbore performance, gas well test, gas-wellhead choke performance, deliverability of gas wells, horizontal wells, smart wells. Gas condensates, liquid separation process of natural gases, vertical lift, separation equipment, gas processing and treatment, CO₂ and H₂S removal, fractionation and adsorption, dehydration processes of natural gases, gas-metering techniques. Transportation and storage of natural gases, pipelines and compressed natural gas (CNG), compression and cooling of natural gases, thermodynamics of LNG processes, heat transfer, pumps, refrigeration, fractionation/ distillation, LNG liquefaction technologies. Gas to liquids (GTL), economics analysis of production.

PET 541 Petroleum geomechanics (4 ECTS)

Elasticity and plasticity theories and rock failure mechanisms, acoustic wave propagations in rocks, mechanical properties from laboratory tests and field data, stresses around wellbore and failure mechanisms. Applications: wellbore stability, sand prediction, fracturing, reservoir compaction, casing collapse, subsidence, CO₂ geological storage.

PET 551 Project in hydrocarbon exploration and production (16 ECTS)

The objective of the project is to integrate the topics studied in the courses. Groups of about 8-10 students are provided with field data available to the contractor before the field development decision. The team will describe the exploration and development of the prospect, followed by a production plan. The team must create the plan of the infrastructure to produce, transport and market the hydrocarbons.

During the project period students will attend a series of technical lectures on major work processes and technical decisions involved in exploration, development and operation of hydrocarbon fields. The lectures will review the life cycle of a field from prospect identification, exploration and production access rights and license, discovery, appraisal, commerciality decision, planning and design, project development, commissioning and production startup, production plateau period, production decline, production shutdown, field abandonment and facilities decommissioning.

The project students will have access to state-of-the-art computer hardware and industry standard software. The total project deliverables will include a written report with references to the geology, field development engineering, production processes and project economic. The student will be exposed to a range of transferable skills such as teamwork, presentation and negotiation. The assessment will be based on the written report and to group presentation.

PET 561 Fall semester seminars in petroleum engineering (1 ECTS)

The students register in the program must attend a number of seminars given by academic and professional experts in the field related to exploration and exploitation of hydrocarbons in the fall semester

PET 562 Spring semester seminar in petroleum engineering (1 ECTS)

The students registered in the program must attend a number of seminars given by academic and professional experts in the field related to exploration and exploitation of hydrocarbons in the spring semester.