

Catalog Description

1. MAT11301 – Calculus 1

Credit(s): 3 (Math and Basic Science); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course covers the following topics: theory and application of the differential calculus of polynomial, exponential, logarithmic and trigonometric functions. Graphical, numerical and analytical solutions to applied problems involving derivatives. Introduction to the integral.

Prerequisites: None

2. MAT11302 – Calculus 2

Credit(s): 3 (Math and Basic Science); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course covers the following topics: definite and indefinite integrals of functions of a single variable. Improper integrals. Infinite series. Introduction to differential equations. Emphasis on applications of calculus and problem-solving using technology in addition to symbolic methods.

Prerequisites: Calculus 1

3. MAT12203 – Calculus 3

Credit(s): 2 (Math and Basic Science); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course covers the following topics: vector geometry, algebra and calculus. Partial and directional derivatives. Double and triple integrals. Vector fields. Line and surface integrals. Theorems of Green, Stokes and Gauss.

Prerequisites: Calculus 2

4. MAT12305– Differential Equations

Credit(s): 3 (Math and Basic Science); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course covers the following topics: First, second, and higher order equations. Systems of differential equations. Analytic methods of solution. Applications to science and engineering.

Prerequisites: MAT11301 - Calculus 1

5. PET13308 - Petroleum Engineering Numerical Methods

Credit(s): 3 (Math and Basic Science); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course provides student with the most basic knowledge of numerical methods used in petroleum engineering to solve complex problems that are not practical to solve by analytical methods. First, students will learn to use Excel spreadsheets and VBA (Visual Basic Application) so that they can work with numbers as well as become familiar with at least one programming language for the course. Students will then learn how to compute approximations using Taylor

expansions, series, and how to calculate errors in approximations. After that, students will learn to find roots of complex equations using bisection, Newton-Raphson, and secant method. Next, the course will provide students with methods to solve complex systems of equations, numerical integration, and numerical differential. Students will learn about interpolation and extrapolation methods. Finally, the course provides students with knowledge about solving ordinary and partial differential equations numerically. The course emphasizes the application of numerical methods in solving problems of petroleum engineering.

Prerequisites: MAT12305 - Differential Equations

6. CHE11301 - General Chemistry 1

Credit(s): 3 (Math and Basic Science); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course provides basic knowledge of chemistry with the content includes atomic structure, electromagnetic radiation, atomic spectroscopy, atomic structure according to quantum mechanics, atomic orbitals and energy levels; theories explaining about chemical binding (theory valence bond, hybridization theory); the molecular structures and shapes of the propulsion theory between electron pairs VSEPR and the molecular orbital theory MO; the state of substances.

Prerequisites: None

7. CHE11101LAB - General Chemistry Laboratory 1

Credit(s): 1

Contact hours: 3 (Lab: 1/week)

The General Chemistry Lab 1 in addition to helping students to review the knowledge learned in the theoretical module also helps students to classify tools, chemicals, equipment, skills and basic operations. The extent of the substances impact on the experimenters, the possible risks of incidents, from which to properly recognize and use personal protective equipment when working in the laboratory.

Prerequisites: None

8. PHY21201– General Physics 1

Credit(s): 2 (Math and Basic Sciences); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course is designed to meet the needs of student majoring in Petroleum Geology – Geophysics, Drilling and Production Technology, and Refinery and Petrochemical. It is introductory course in Newtonian mechanics with topics include: Vectors, motion in one dimension, motion in a plane, Newton's laws, work and energy, potential energy, momentum, Kinematics of rotational motion, dynamics of rotational motion, elasticity, and fluid mechanics

Prerequisites: Calculus 1

9. PHY21101LAB - General Physics Laboratory 1

Credit(s): 1 (Math and Basic Sciences); Required

Contact hours: 3 (Lab: 3/week/group)

Through practical work students should be able to carry out experimental and investigative work in which they plan procedures, use precise and systematic ways of making measurements and observations, analyze and evaluate evidence and relate this to scientific knowledge and

understanding. The syllabus is organized around the topics of General Physics 1 with 7 experiments. Each experiment has one laboratory manual with the typical structure: objects of the experiment, principles, carrying out the experiment and report form.

Prerequisites: None

10. PHY21202– General Physics 2

Credit(s): 2 (Math and Basic Sciences); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course is designed to meet the needs of student majoring in Petroleum Geology – Geophysics, Drilling and Production Technology, and Refinery and Petrochemical. It is an introduction to electricity and magnetism, light, geometrical and wave optics. Many concepts from General Physics 1 will be used in this course such as: position, velocity, acceleration, force, Newton’s laws of motion, work and energy. The course uses algebra, geometry and trigonometry, vectors and vector arithmetic, and some calculus. The course has lecture, homework and laboratory portions

Prerequisites: MAT11301, PHY21201

11. PHY21102LAB - General Physics Laboratory 2

Credit(s): 1 (Math and Basic Sciences); Required

Contact hours: 3 (Lab: 3/week/group)

Through practical work students should be able to carry out experimental and investigative work in which they plan procedures, use precise and systematic ways of making measurements and observations, analyze and evaluate evidence and relate this to scientific knowledge and understanding. The syllabus is organized around the topics of General Physics 2 with 7 experiments. Each experiment has one laboratory manual with the typical structure: objects of the experiment, principles, carrying out the experiment and report form.

Prerequisites: PHY21101LAB

12. MEC32303– Theoretical mechanics

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

Statics of particles and rigid bodies, equilibrium of rigid bodies, distributed forces, centroids, forces in beams and cables, friction, and moments of inertia

Kinematics and kinetics of particles, systems of particles, and rigid bodies in plane motion. Forces and acceleration analysis using Newton's second law and energy and momentum methods

Prerequisites: MAT11301, PHY21201

13. GEO12302 – Physical Geology

Credit(s): 3 (Math and Basic Science); Required

Contact hours: 5 (Lecture: 3/week; Lab: 2/week)

Physical Geology provides students with basic knowledge of geology, including structure (crust, mantle and core) and composition (rock-formation minerals and 3 main types of rocks (igneous, sedimentary and metamorphic)) of the Earth; internal geologic processes (earthquakes, volcanoes, tsunamis, faults, folds, etc.) and external geologic processes (weathering, erosion, etc ...). The

course also gives an overview of stratigraphy, geologic structure and plate tectonics which makes students understand more clearly about different types of geologic structures of lithosphere as well as the formation of such structures. Besides, students are provided with basic information of the related mineral resources.

Prerequisites: None

14. GEO13311 - Petroleum Geology

Credit(s): 03 (Basic Sciences); Required

Contact hours: 4 (Lecture: 3/week ; Discussion: 2/week)

This course provides basic knowledge of petroleum geology, including: processes and elements of formation of oil and gas accumulation. It focuses on the following contents: the origin of petroleum; physical and chemical properties of petroleum; source rock as well as oil generation and movement processes; reservoir rock, caprock and geological trap; unconventional hydrocarbon resources; and evaluation of petroleum reserves and prospects.

Prerequisites: Physical Geology (GEO12302)

15. ELE31201 – Foundations in Engineering 1 (+ Lab)

Credit(s): 2 (Engineering topics); Required

Contact hours: 3 (Lecture: 2/week, Lab: 1/week)

An introduction to computer-aided drafting. Emphasis is placed on drawing setup; creating and modifying geometry; adding text and dimensions, coordinate systems, and plot/print to scale. Technical drawing skills including freehand sketching, orthographic projection, dimensioning, sectional views, and other viewing conventions will be developed. Basic CAD commands, tools, multi-view drawing and dimensioning techniques.

Prerequisites: None

16. INC31301 –Foundations in Engineering 2 (+ Lab)

Credit(s): 3 (Engineering topic); Required

Contact hours: 5 (Lecture: 3/week, Lab: 2/week)

Computer programming for engineers, syntax, use of primitive types, control structures, vectors, strings, structs, classes, functions, file I/O, exceptions and other programming constructs, use of class libraries, practice in solving problems with computers, includes the execution of programs in C++ written by students

Prerequisites: ELE31201

17. MEC32301 - Thermodynamic

Credit(s): 3 (Engineering topics); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course introduces the fundamental laws of thermodynamics (the first and second laws) and their application to engineering power cycles such as Carnot cycle, Rankine cycle, refrigeration cycle, Otto cycle, and Diesel cycle

Prerequisites: PHY21202

18. MEC32304– Strength of Materials (+ Lab)

Credit(s): 3 (Engineering topic); Required

Contact hours: 5 (Lecture: 3/week, Lab: 2/week)

The course covers the following topics; stress and strain concepts, axial load, statically indeterminate axially loaded members, thermal stress, torsion, angle of twist, statically indeterminate torque-loaded members, bending, eccentric axial loading of beams, transverse shear, shear flow in built-up members, combined loadings, stress and strain transformation, deflection of beams and shafts, statically indeterminate beams and shafts. Conduct experiments related to tension-compression and torsion testing and report results in a formal technical report

Prerequisites: MAT12203, MEC32303

19. PET12306 - Transport Processes in Petroleum Production Systems

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course covers basics and applications of fluid mechanics (statics; mass, energy and momentum balances; laminar and turbulent flows; Reynolds number; Moody diagram; flows of non-Newtonian fluids; multi-phase flows; flows in porous media; non-Darcy flows); and of heat transfer (heat conduction, convection, heat exchangers). It also emphasizes analogies and similarities within mass, energy and momentum transport.

Prerequisites: MEC32301

20. ELE32202 – Electricity and Electronics (+ Lab)

Credit(s): 2 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

Electrical circuits: elements, circuit laws, energy, network reduction, nodal analysis, techniques of circuit analysis, circuit response and steady state analysis; Basic circuits used in electronic systems, operational amplifiers, transistor amplifier; introduction to electrical machine.

Prerequisites: MAT11301

21. PET13310 – Geomechanics

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course provides and presents basic concepts of geomechanics including terminologies, roles, applications and the importance of scale in the study of geomechanics; deformation problems of soil and rocks; mechanical properties of soil and rocks; earth stress components; mechanical data collection; establishment and building of a mechanical model of the earth; and geomechanical applications in the oil and gas industry and modern technologies related to geomechanics.

Prerequisites: MEC32304

22. ECO13301 –Petroleum Economics

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course consists of 16 chapters to provide students with basic knowledge of microeconomics, macroeconomics, and petroleum economics. Microeconomic issues include the basic laws and concepts of economics and the economy; market mechanism of action, supply and demand rule and market balance; consumer and producer decision-making models; models of market structures and the actions of the parties involved in such market structures. In the macroeconomics section, the module will discuss National Income Accounting; total supply and demand model; Macroeconomic stability: inflation and unemployment; aggregate supply and fiscal policy, financial systems, monetary, banking, and monetary policies of the government. The Petroleum Economics section will give an overview of the world oil and gas industry, the world oil and gas market; update information on laws related to the oil and gas industry; Basic oil and gas contracts; and Vietnam's oil and gas industry.

Prerequisites: None

23. PET14321– Field Development Project

Credit(s): 3 (Engineering topic); Required

Contact hours: 3 (Discussion: 3/week)

In this course, students will be assigned to implement a project that integrates knowledge in the areas of geology, drilling, production and reservoir engineering proposed by faculty members(1) or supervisors at production operating units(2). They will have 10 weeks to prepare a report. In the report, based on the knowledge integrated from the courses of geology, drilling, production, and reservoir engineering, students need to show the results of research, design and evaluation of a field development project with consideration of safety, economic, environmental, health, cultural and global factors. Students work on the project in groups and will be assessed by the instructors(1,2), the reviewer, and members of the course evaluation committee.

Prerequisites: ECO13301

24. PET21201 – Introduction to Oil and Gas Industry

Credit(s): 2 (Engineering topic); Required

Contact hours: 3 (Lecture: 2/weeks, Discussion: 1)

Origin and accumulation of hydrocarbon fluids. Exploration for oil and gas. Basic concepts of hydrocarbon traps. Introduction to various Petroleum Engineering disciplines. Formulation of physical concepts into mathematical equations. Application of engineering methods to problem solving in Oil and Gas Industry.

Prerequisites: None

25. PET11105 – Career Orientation Field Trip

Credit(s): 1 (Engineering topics); Required

Contact hours: 2 weeks

In the summer of first year, students participate in a 2-week training program in oil and gas companies - operating in area related to PVU's training majors from the upstream to downstream such as Vietsovpetro, PTSC, PVD, PVFCCo, Dinh Co Gas Processing Plant, Petroleum Institute... and foreign oil and gas technical service companies like Schlumberger, Baker Hughes.

Prerequisites: PET21201

26. PET12443– Petroleum Drilling systems (+ Lab)

Credit(s): 4 (Engineering topic); Required

Contact hours: 6 (Lecture: 4/week, Discussion: 2/week)

This course equips students with basic knowledge of oil and gas drilling systems including terminologies and definitions, field applications, units used to calculate a variety of pressure columns in drilling (hydrostatic pressure, pore pressure, fracture pressure, overburden pressure), and oil and gas field development stages. It also provides knowledge of classification of drilling rigs and equipment systems, classification of drill bits and their rock failure mechanisms, functions and components of drill strings, functions and classifications of drilling fluids, functions of oil well cement and classification of cement by well depth, basic calculations for steel grade selection following oil and gas industry standards, wellbore trajectories and basic calculations as well as terminologies used on site, well control methods and applications, and drilling problems. The course also introduces health, safety and environment issues in oil and gas drilling operations. Students will experience practical learning of drilling on a drilling simulator.

Prerequisites: MAT11302, PHY21202

27. PET12304 – Reservoir petrophysics (+ Lab)

Credit(s): 3 (Engineering topic); Required

Contact hours: 5 (Lecture: 3/week; Lab: 2/week)

The course provides knowledge that allows production monitoring and analysis; fluid analysis in reservoir conditions; and monitoring and inspection of oil and gas production and enhanced oil recovery (water flooding, gas injection...). The course systematizes the theory and experimental studies on the physical properties of oil and gas reservoirs, including: lithology, porosity, elasticity, strength, transit time properties, electrical properties, relative and absolute permeability, fluid saturation, capillary, and rock-fluid relationships such as absorbance and absorption.

Prerequisites: PHY21202

28. PET12207 – Summer Internship 1

Credit(s): 2 (Engineering topic); Required

Contact hours: 4 weeks

The course provides an opportunity for students to learn about companies or production operating units in petroleum drilling and choose specific topics during the learning process. In the first summer internship, students can choose a topic to work with a supervisor at the production operating unit for a period of 4 weeks, such as pore pressure prediction, wellbore stability analysis, casing design, drilling hydraulic calculation, and other issues related to drilling engineering. At the end of the internship, students need to make a report that integrates the knowledge that they have learned, using the actual data provided and/or the related software to implement the selected topic.

Prerequisites: None

29. PET13309 – Reservoir Fluids

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The module will provide fundamental concepts in petroleum reservoir fluids. Topics include: introduction to organic chemistry; properties of elements; virtual, safe experiments and vapor pressure determination; classification and identification of reservoirs by types of fluids; ideal and

real gases; mine-technological properties of gases; definition and evaluation of Black Oil properties from mine data; study of reservoir fluids; evaluation of Black Oil properties from correlations; virtual test evaluation of air compression coefficient z and leak analysis; bubble point of live oil sample and phase envelopes; surface phase separation calculation and equilibrium ratio correlation equations; assessment of reservoir water properties; evaluation from testing of viscosity and surface tension of oil, gas and water samples; hydrate formation conditions and the anti-hydrate process; cubic equations of state; calculation with equations of state; virtual experiments – DL and separator experiments of live oil samples; hydrate formation and anti-hydrate techniques.

Prerequisites: PET12304, MEC32301

30. PET13411 – Petroleum Production systems (+ Lab)

Credit(s): 4 (Engineering topic); Required

Contact hours: 6 (Lecture: 4/week, Discussion: 2/week)

The course indicates basic concepts of onshore and offshore oil production operations and equipment; components in an oil production system; analysis of flow performance in reservoirs and wells; analysis of wellbore inflow and outflow performance as well as back pressure; analysis of the whole oil production system; well completion equipment; sand control equipment; artificial lift equipment and design; well stimulation; well workover/completion; separation and preliminary treatment systems. It also introduces the nature of cracks and models of crack development, as well as parameters in hydraulic fracturing.

Prerequisites: PET12306

31. PET13312 – Drilling Engineering

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course presents types and functions of drilling rigs and drilling equipment; rock mechanics problems in well drilling and stabilization; formulation and analysis of drilling fluid systems as well as the related environmental, safety and health issues; cementing work; calculations, analysis and solutions of drilling hydraulic problems; casing design against the standards of burst, collapse and tensile strength; problems in directional drilling techniques and well trajectory monitoring; drillstring design and contemporary issues in drilling.

Prerequisites: PET12443 - Petroleum Drilling Systems (+ Lab)

32. PET13313 – Formation Evaluation

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 1/week, Discussion: 1/week)

The course provides knowledge of well-log interpretation for formation evaluation of hydrocarbon-bearing reservoirs; basic physical properties of rocks; operation procedures of measuring devices; analysis of open hole logs; determination of core properties for estimating hydrocarbon reserves; determination of geophysical properties of a formation such as porosity, net pay thickness, water/hydrocarbon saturation, permeability and saturation-dependent capillary pressure; evaluation of clay-free and shaly-sand formations..

Prerequisites: PET12304, GEO13311.

33. PET13314 – Reservoir Engineering (+ Lab)

Credit(s): 4 (Engineering topic); Required

Class/Laboratory Schedule: 180-min (total) lecture and 60 min (total) lab per week

The course introduces methods to determine reservoir reserves; material balance equations; models of aquifers and flows in reservoirs; water flooding models; water injection methods; enhanced oil recovery; optimization processes for enhanced oil recovery; and analysis of non-conventional reservoirs. It also derives the Buckley- Leverett equation; investigates the correlation between the frontal advanced, fractional flow and water saturation; and calculates to determine parameters in 5-spot water injection models.

Prerequisites: PET12304, PET13309.

34. PET13315- Well Testing

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

This course introduces knowledge of well testing, including: properties of reservoir rock and fluids; derivation and solutions of the diffusivity equation; application of the superposition principle to pressure recovery well testing; different types of transient pressure analysis (radial flow semilog analysis, log-log type curve analysis) used for oi and gas production wells; identification of reservoir-well flow regimes to select illustration models; and graph analysis for determining well and reservoir parameters (skin factor, wellbore storage, permeability).

Prerequisites: PET12304, PET13309

35. PET13116 – Senior Project 1

Credit(s): 1 (Engineering topic); Required

Contact hours: 1 (Discussion: 1/week)

In this course, students received topics in drilling engineering (either of Faculty members or industrial partner) and study the problems so that a plan for technical solution is developed such as: specification, design, implementation, evaluation, and testing with given realistic constraints. Students are working in groups so that their technical communication and team skills are enriched.

Prerequisites: PET13312

36. PET13117 – Summer Internship 2

Credit(s): 2 (Engineering topic); Required

Contact hours: 4 weeks

The course provides an opportunity for students to learn about companies or production operating units in petroleum production and reservoir engineering and choose specific topics during the learning process. In the second summer internship, students can choose a topic to work with a supervisor at the production operating unit for a period of 4 weeks, such as well completion, artificial lift, near-wellbore treatment, maintaining reservoir pressure by water flooding, reservoir simulation, enhanced oil recovery (EOR), and other issues related to petroleum production and reservoir engineering. At the end of the internship, students need to make a report that integrates the knowledge that they have learned, using the actual data provided and/or the related software to implement the selected topic.

Prerequisites: None

37. PET14318 - Reservoir Simulation

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

The course provides an overview of oil and gas reservoir modeling and simulation as well as steps of reservoir simulation, from reservoir modeling to well history matching. Students will learn how to construct differential equations for fluid flows in oil and gas reservoirs for fields ranging from simple to complex (single-phase, two-phase and multi-phase fields); use the finite difference method to calculate the simulation of a single-phase reservoir in one- and two-dimensional space; learn how to simulate two-phase fields without phase transition (black oil model) and simulate fields with phase transition (compositional model). Students will practise simulating oil and gas reservoirs by specialized software using well geophysical measurement data, based on which establish a reservoir model, then perform reservoir production simulation, well history matching and production forecast.

Prerequisites: PET13308, PET13313, PET13314

38. PET14319 – Integrated Reservoir Modeling

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

This course is designed to help students understand geophysical, geological, petrophysical and engineering data. Students will learn geostatistical methods to create reservoir models which will be developed into dynamic reservoir models (simulation), which will be the basis for reservoir simulation and reservoir history matching. They will also be provided with geostatistical concepts such as Variogram, Kriging and sequential Gaussian models combined with other statistical calculations to quantify uncertain factors in simulation of a realistic dynamic reservoir.

Prerequisites: PET13242

39. PET14320– Production Engineering

Credit(s): 3 (Engineering topic); Required

Contact hours: 4 (Lecture: 3/week, Discussion: 1/week)

This course introduces basic knowledge of petroleum production engineering; procedures in design and selection of surface and wellbore equipment; evaluation and optimization of oil and gas production, well deliverability, formation contamination, and skin analysis; well completion selection; and enhanced oil and gas recovery technologies. Students will learn to construct IPR and VLP curves, predict future production, design acid treatment and hydraulic fracturing projects, and design artificial lift, using actual data collected from a production operating unit.

Prerequisites: PET13411, PET13314

40. PET14222 Enhanced Oil Recovery

Credit(s): 2 (Engineering topic); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course introduces basic concepts and theoretical basis of enhanced oil recovery (EOR), including: macroscopic and microscopic displacement processes; basic properties of reservoir rock, rock wettability, phase behavior and phase mixing; factors affecting oil and gas displacement in the reservoir; control of fluid mobility; miscibility process; polymer, CO₂ and WAG injection methods as well as EOR thermal methods; basis for selecting an EOR method in particular cases; and typical examples for illustration.

Prerequisites: PET13314

41. PET14123 – Senior Project 2

Credit(s): 1 (Engineering topic); Required

Contact hours: 1 (Discussion: 1/week)

In this course, students will be assigned topics in drilling proposed by faculty members or supervisors at production operating units and will have 10 weeks to prepare a report. In the report, based on the knowledge integrated from drilling-related courses, students need to show the results of research, design, evaluation of a system/equipment and a drilling problem with consideration of safety, economic, environmental, health, cultural and global factors. Students carry out the project in groups and will be assessed by the instructors, examiners, and members of the course evaluation committee.

Prerequisites: PET13314, PET13411

42. PET14324 – Graduation Internship

Credit(s): 3 (Engineering topic); Required

Contact hours: 6 weeks

The course provides an opportunity for students to learn about companies or production operating units in petroleum drilling, production, reservoir engineering and renewable energy, and choose specific topics during the learning process. During the graduation internship, students can choose a topic in drilling, production, reservoir engineering or renewable energy to work with a supervisor at the production unit for 10 weeks. At the end of the internship, students need to make a report that integrates the knowledge that they have learned, using the actual data provided and/or the related software to implement the selected topic.

Prerequisites: None

43. PET14825 – Graduation Thesis

Credit(s): 8 (Engineering topic); Required

Contact hours: 15 weeks

Based on the outcomes of the graduation internship and systematization of all the knowledge gained from the Petroleum Engineering Program, students choose a specific topic in drilling, production, reservoir engineering and renewable energy for implementing the graduation thesis under the instruction of the faculty members or in collaboration with supervisors at production operating units. The thesis results should include a design to solve a technical problem in Vietnam or the world, with consideration of safety, economic, environmental, health, cultural and global factors. Such factors can be integrated into the design or sometimes only considered in the general scale.

Prerequisites: PET13116, PET14123

44. MEC32205 – Hydraulic Equipments

Credit(s): 2 (Math and Basic Sciences); Elective

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course covers fundamental theory of pumps, compressors and fan using in petroleum industry. The course including topics: overview, classification and technical parameters, is placement pumps (volumetric efficiency, power, system design), centrifugal and axial pumps, high vacuum pump and fan.

Prerequisites: None

Prerequisites: ELE32202

45. GEO12235 – General Geophysics

Credit(s): 2 (Math and Basic Science); Elective

Contact hours: 4 (Lecture: 3/week; Discussion: 2/week)

Introduce the scientific basis of exploration geophysical methods, including the physical, and geological basis of each method, on the basis of which the methods of survey, Being, transmitters, receivers with specific transceiver principles, application of each method.

Prerequisites: PHY21201, PHY21202 MAT12203

46. PET13242 - Geostatistics

Credit(s): 2 (Math and Basic Science); Required

Contact hours: 3 (Lecture: 2/weeks, Discussion: 1)

The course introduces geostatistics and applications in oil and gas reservoir modeling. Students are equipped with basic knowledge of probabilities such as how to calculate the probability and probability distribution of random variables, the characteristics of random quantities, and common probability distributions used in petroleum reservoir modeling. The knowledge of statistics with random samples and probabilistic estimation is used in practical applications in petroleum engineering. The interpolation methods are used in geostatistical calculations and upscaling methods utilize well geophysical data to establish reservoir models.

Prerequisites: MAT12203

47. GEO12234 - Sedimentology

Credit(s): 02 (Basic Sciences); Elective

Contact hours: 4 (Lecture: 3/week; Discussion: 1/week)

Sedimentology and stratigraphy can be considered together as a continuum of processes and products, both in space and time. Sedimentology is concerned primarily with the formation of sedimentary rocks but as soon as these beds of rock are looked at in terms of their temporal and spatial relationships the study has become stratigraphic. Similarly if the stratigrapher wishes to interpret layers of rock in terms of environments of the past the research is sedimentological. It is therefore appropriate to consider sedimentology and stratigraphy together at an introductory level.

Sedimentology is the study of the processes of formation, transport and deposition of material that accumulates as sediment in continental and marine environments and eventually forms sedimentary rocks. Stratigraphy is the study of rocks to determine the order and timing of events in Earth history: it provides the time frame that allows us to interpret sedimentary rocks in terms of dynamic evolving environments. The stratigraphic record of sedimentary rocks is the fundamental database for understanding the evolution of life, plate tectonics through time and global climate change.

Prerequisites: Physical Geology (GEO 12302), Mineralogy (GEO12303).

48. PET13226– Drilling Fluids (+ Lab)

Credit(s): 2 (Engineering topic); Elective

Contact hours: 3 (Lecture: 2/week, Lab: 1/week)

This course equips students with a variety of knowledge, including: drilling fluid functions and recommendations for adjustment of drilling fluid properties, classification of drilling fluids and additives, circulation system and standards for selecting a drilling fluid cleaning system, rheological properties (Newtonian fluids, and non-Newtonian fluids) and basic parameters of drilling fluids (mud weight, mud gravity, mud density, Gel strength, yield point, plastic viscosity, apparent viscosity, funnel viscosity, sand content, clay content). Students will practise measuring basic parameters of drilling fluids, drilling fluids under complex conditions (total loss, partial loss), and drilling fluids commonly used in Vietnam (KCl/Polymer, Ultradril, etc.).

Prerequisites: PET12443

49. PET13232 – Cement (+ Lab)

Credit(s): 2 (Engineering topic); Elective

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

This course provides the knowledge and skills needed to design a cementing program. Conduct experiments related to measure cement properties and report results in a formal technical report

Prerequisites: None

50. PET13227– Well completion and Stimulation

Credit(s): 2 (Engineering topic); Elective

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

This course equips students with a variety of knowledge, including: cement production, chemical composition of cement, classification of well cement, API classification of cement, special cement and Portland cement, properties of cement slurry and cement stone, additives in cement slurry (fast and slow coagulants, low and high density additives, fluid loss additives, special additives), cementing equipment and accessories, well cementing methods (liner cementing, primary cementing, squeeze cementing). Students will practise measuring parameters of cement slurry.

Prerequisites: PET12443, PET13411

51. PET13228 – Processing and transportation of oil and gas

Credit(s): 2 (Engineering topic); Elective

Contact hours: 3 (Lecture: 2/weeks, Discussion: 1)

Methods of crude oil and gas transportation. Types of storage tanks and pressure vessels. Design and selection of storage tanks according to API standards. Maintenance of storage tanks.

Prerequisites: None

52. PET13229 – Drilling and Production facilities and operation

Credit(s): 2 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

This course provides knowledge of bottomhole assembly (BHA) structure, types of drill strings and drilling bits, forces on drill strings, casing structure, types of casings, stress on casings, classification of current drilling rigs in the world, hoisting system, circulation system and drilling fluid cleaning equipment. It also introduces knowledge of downhole and surface equipment in artificial lift production such as gaslift and pumping.

Prerequisites: None

53. PET14330 – High performance drilling design and operational practices

Credit(s): 3 (Engineering topic); Elective

Contact hours: 4 (Lecture: 3/weeks, Discussion: 1)

This course provides students with a variety of knowledge, including: rock fracture mechanism of drilling bits, models of calculating uniaxial compressive strength, drilling bit efficiency, penetration models, bit balling problems, management of wellbore stability, measures of improving drilling efficiency (hole cleaning, optimization of drilling parameters and loss circulation)..

Prerequisites: None

54. PET14331 – Solving common production engineering problems

Credit(s): 3 (Engineering topic); Elective

Contact hours: 4 (Lecture: 3/weeks, Discussion: 1)

This course equips students with methods for solving common production engineering problems. Some problems solved in this course include: determination of bottomhole pressure based on the values of surface pressure and flowrate; production prediction for oil and gas wells based on flow mechanisms such as steady state, pseudo steady state and transient flow; prediction of flowrate reduction in production wells; and oil production by gaslift.

Prerequisites: None

55. PET14233 – Renewable Energy

Credit(s): 2 (Engineering topic); Elective

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

This course aims to introduce students to general information of energy and necessary knowledge of renewable energy. The course will mention environmental impacts related to the use, extraction and production of fossil fuels; benefits of renewable energy and the trend of energy transition in the world. The course will take a deep look into some renewables such as solar energy, bioenergy, wind energy, hydropower, wave and tidal energy, geothermal energy and hydrogen energy. Major contents about renewable energy include: the applications, production and consumption, operating mechanism, storage and transportation, advantages and disadvantages, potential and costs, and environmental impacts. After successful participation in this course, students will be able to assess common energy policies in the world and have the foundation for research on energy transition.

Prerequisites: None

56. PET14134 – Drilling technology in complicated conditions

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

This course provides students with the following knowledge: overview of well drilling in complicated conditions; offshore deep water drilling (introduction of deep water drilling, types of deep water drilling rigs, deepwater field development planning, selection of deepwater drilling rigs, drilling technologies and challenges); drilling in permafrost regions, pressure-controlled

drilling (introduction and benefits of pressure-controlled drilling); health, safety and environment (HSE) issues; and lessons learned from pressure-controlled drilling.

Prerequisites: None

57. PET14135 – Directional and extensional drilling

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

This course provides students with knowledge of: applications of directional wells and extended directional wells (hard-to-reach locations, field development, side tracking, relief well and core sample drilling, geothermal well drilling, and horizontal well drilling); types of directional wellbore trajectories (J-shaped, modified J, S-shaped and modified S) and their applications; classification of horizontal wells; directional well drilling techniques; calculation methods for monitoring wellbore trajectories; selection of technological drilling parameters (optimum RPM of bottomhole assemblies, optimum WOB of drill strings, and optimal pump flow rate (Q)).

Prerequisites: None

58. PET14136 – Oil and gas production technology at Vietnam Continental Shelf

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

This course provides students with the following knowledge: overview of the potential and activities of oil and gas development on Vietnam's continental shelf, offshore oil and gas production technologies, oil and gas production technologies that have been used on Vietnam's continental shelf, analysis of technology advantages and disadvantages, practical lessons and new technologies. The topics covered in the course include offshore oil and gas production technologies, overview of oil and gas activities on Vietnam's continental shelf, characteristics of oil and gas production technologies on Vietnam's continental shelf, and challenges and development trends of Vietnam's oil and gas industry.

Prerequisites: None

59. PET14137 – Oilfield Projects Development

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

Successful petroleum operations need a blend of technology, business savvy, and people skills. If you have a firm grasp of exploration or production technology, boost its impact by applying project management techniques. Running a staged program that integrates reservoir modelling, production estimating, drilling, and facility design is challenging. The tools and techniques covered in this course will help you meet that challenge.

Prerequisites: None

60. PET14138 – Heavy oil production

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

The course offers an insight on heavy oils and current production techniques. It introduces the definitions, classification, properties, development potential, and global distribution and reserves

of heavy oil. Heavy oil production techniques such as steam injection, steam huff and puff, hot water injection, in-situ combustion, as well as Steam-Assisted Gravity Drainage are introduced, analysed and assessed in terms of advantages and disadvantages.

Prerequisites: None

61. PET14139 – Natural gas production and Processing engineering

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/weeks, Discussion: 1)

This course provides students with an overview of natural gas resources: the formation, distribution and reserves of natural gas in Vietnam, the region and the world. It also discusses the physicochemical characteristics, chemical composition, physical properties, calorific value, and the equation of state of natural gas; technologies for natural gas exploration, production, processing and transportation; and technical problems with gas extraction and transportation including liquid loading and hydrates. In addition, the course introduces technologies and processes of natural gas processing as well as conventional natural gas sources\

Prerequisites: None

62. PET14140 – Sand production and control

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

This course will identify the parameters that must be considered when selecting the sand control technique to be used. Examples, problems, and case histories will be examined to illustrate key points. Sand control failures will be used to illustrate the types of problems that can lead to early well failures. The course will also students how to perform quality control checks during the sand control application to help insure successful wells. Several new promising sand control technologies have been introduced in the last few years, such as expandable screens of several different types. The proper application of these new technologies will also be covered.

Prerequisites: None

63. PET14141 – Field decommissioning

Credit(s): 1 (Engineering topic); Elective

Contact hours: 2 (Lecture: 1/week, Discussion: 1/week)

This course integrates basic knowledge of oil and gas decommissioning techniques, requirements and conditions. It focuses on main decommissioning activities, including well abandonment, pipeline decommissioning and platform decommissioning.

Prerequisites: None

64. SOC02206 – Professional Skills for Engineers

Credit(s): 2 (Others); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

Occupational skills refer to skills that are not related to professional knowledge, including communication skills, teamwork skills, problem-solving skills, negotiating skills, etc. Occupational skills provide students with the system of knowledge, rules and practices to help students form the soft skills needed to help students promote social behavior, self-management,

and leadership. Such skills direct students to build and maintain good social interactions and solve problems at work and in life.

Prerequisites: None

65. PSE13201 - Health, Safety and Environment

Credit(s): 2 (Others); Required

Contact hours: 3 (Lecture: 2/week; Discussion: 1/week)

This course provides a number of basic knowledge about health, safety and environmental management and techniques that are commonly used in the oil and gas industry. By the end of the course, students can describe hazards in the workplace and hazards of flammable and combustible liquids; describe methods for preventing fire and explosion; calculate noise levels and noise exposure; identify major characteristics of US standards for process safety management and OHSAS 18001; distinguish accident causes, losses and accident causation models; describe hazard measurement, cause measurement, control measurement and consequence measurement; recognise methods and necessary requirements for risk assessment, environmental impact assessment (EIA) and environmental monitoring; apply risk assessment and EIA simply to hypothesis activities/projects; explain oil weathering processes and discuss oil spill response approaches.

Prerequisites: None

66. ENG41000 - English preparation (120 hrs.*)

This is the first course of the English language training program at PetroVietnam University. It is intended for students whose current level of English proficiency is A1 (2). It primarily aims at preparing students with necessary skills and competence relevant to IELTS attributes..

67. ENG41301 –English 1

Credit(s): 3 (Others); Required

Contact hours: 6 (Lecture: 4/week, Discussion: 2/week)

This is the first course of the English language training program at PetroVietnam University. It is intended for students whose current level of English proficiency is A2 (1). It primarily aims at preparing students with necessary skills and competence relevant to IELTS attributes. This course adopts the learner-centered approach and learning-by-doing theories. Assessment is continuous, which allows for a comprehensive view of the extent to which students have met the course objectives and outcomes.

Prerequisites: None

68. ENG42302 –English 2

Credit(s): 3 (Others); Required

Contact hours: 6 (Lecture: 4/week, Discussion: 2/week)

This is the second course of the English language training program at PetroVietnam University. It is intended for students whose current level of English proficiency is A2 (2). It primarily aims at preparing students with necessary oral skills and competence relevant to IELTS attributes. This course adopts the learner-centered approach and learning-by-doing theories. Assessment is continuous, which allows for a comprehensive view of the extent to which students have met the course objectives and outcomes.

Prerequisites: ENG41301

69. ENG42303 –English 3

Credit(s): 3 (Others); Required

Contact hours: 6 (Lecture: 4/week, Discussion: 2/week)

This is the third course of the English language training program at PetroVietnam University. It is intended for students whose current level of English proficiency is B1.1. It primarily aims at preparing students with necessary oral skills and competence relevant to IELTS attributes. This course adopts the learner-centered approach and learning-by-doing theories. Assessment is continuous, which allows for a comprehensive view of the extent to which students have met the course objectives and outcomes.

Prerequisites: ENG42302

70. ENG43304–English 4

Credit(s): 3 (Others); Required

Contact hours: 6 (Lecture: 4/week, Discussion: 2/week)

This is the second course of the English language training program at PetroVietnam University. It is intended for students whose current level of English proficiency is B1 (2). It primarily aims at preparing students with necessary oral skills and competence relevant to IELTS attributes. This course adopts the learner-centered approach and learning-by-doing theories. Assessment is continuous, which allows for a comprehensive view of the extent to which students have met the course objectives and outcomes.

Prerequisites: ENG42303

71. SOC01204 - Ho Chi Minh's Ideology

Credit(s): 2 (Others); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The content of the course covers the basic issues of Ho Chi Minh's Ideology on the national issue and the national liberation revolution; the transition to socialism in Vietnam; Communist Party of Vietnam; great national and international solidarity; democracy and building a State of the people, by the people, for the people; culture, ethics and building new people.

Prerequisites: None

72. SOC01301 –Philosophy of Marxism and Leninism

Credit(s): 3 (Others); Required

Contact hours: 5 (Lecture: 3/week, Discussion: 2/week)

The subject consists of three main contents: studying the nature and the most general laws of movement and development of the world. From there, it will help build scientific worldview and dialectical methodology for cognitive and practical activities of learners; study the economic laws of society, especially the basic economic laws of the Capitalist mode of production; provide learners with regular problems in the process of socialist revolution.

Prerequisites: None

73. SOC01205 –History of Vietnamese communist party

Credit(s): 2 (General Education and Others); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

This subject aims to raise awareness and understanding of the Communist Party of Vietnam - which has led the Vietnamese revolution to victories and achievements of great historical significance in the development of the nation's history. Through studying and researching the Party's history to educate the Party and nation's ideals and traditions of revolutionary struggle, strengthen and cultivate faith in the Party's leadership, and be proud of the Party and the young generation. join the Party, participate in building a stronger and stronger Party, continue to carry out the Party's mission of leading to firmly defend the Fatherland and successfully build socialism in Vietnam.

Prerequisites: None

74. SOC01202 –Political economics of Marxism and Leninism

Credit(s): 2 (General Education and Others); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course content includes: objects, research methods and functions of Marxist-Leninist political economy; core content of Marxism-Leninism on goods, markets and the role of actors in the market economy; Surplus value in the market economy; Competition and monopoly in the market economy; the main issues of the socialist-oriented market economy and economic interest relations in Vietnam; Vietnam's industrialization, modernization and international economic integration.

Prerequisites: None

75. SOC01203 - Scientific socialism

Credit(s): 2 (General Education and Others); Required

Contact hours: 3 (Lecture: 2/week, Discussion: 1/week)

The course includes theoretical knowledge on scientific socialism and the path to socialism in Vietnam; provide learners with: objects, purposes, requirements, learning methods, subject research; the process of formation and development of scientific socialism; historical mission of the working class; social, class, ethnic and religious issues during the transition to socialism; After completing the course, learners have the ability to have practical understanding and the ability to apply knowledge about socialism to consider and evaluate the country's socio-political issues related to socialism. society and the road to socialism in our country. Learners explain and have the right attitude towards the path to socialism in Vietnam.

Prerequisites: None

76. PED11101–Physical education 1

Credit(s): 1 (Others); Required

Contact hours: 2/week

The course content consists of two parts: theory and practice In theory: Equip students with basic knowledge of volleyball, how to organize a volleyball tournament to develop the ability to practice self-improvement. About practice: Equip the basic techniques in Volleyball.

Prerequisites: None

77. PED11102–Physical education 2

Credit(s): 1 (Others); Required

Contact hours: 2/week

The course content consists of two parts: theory and practice In theory: Equip students with basic knowledge of football, how to organize a football tournament to develop the ability to practice self-improvement. About practice: Equip the basic techniques in football.

Prerequisites: None

78. PED12103–Physical education 3

Credit(s): 1 (Others); Required

Contact hours: 2/week

The course content consists of two parts: theory and practice In theory: Equip students with basic knowledge of athletics, how to organize a movement athletics tournament to develop the ability to practice self-improvement. About practice: Equipping basic techniques in athletics.

Prerequisites: None

79. MIE01101- Military Education (165 hrs)

Credit(s): 0 (Others); Required

The course content consists of two parts: theory and practice In theory: Equip students with basic knowledge of athletics, how to organize a movement athletics tournament to develop the ability to practice self-improvement. About practice: Equipping basic techniques in athletics.

Prerequisites: None