2023-2024 Undergraduate Catalog Description

1. MAT11301 – Calculus 1

Credit(s): 3 (Math & Basic Sciences); Required

Contact hours: 4 (Lecture: 3/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. CHE11301 - General Chemistry 1

Credit(s): 3 (Math & Basic Sciences); Required.

***Contact hours*:** 4 (Lecture: 3/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

3. CHE11101LAB - General Chemistry Lab 1

2. Credit hour(s): 1 (Math & Basic Sciences); Required.

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.

Co-requisite: CHE11301

4. PHY21101LAB - General Physics Laboratory 1

Credit(s): 1 (Math & Basic Sciences)

Contact hours: 2/week

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 laboratoty manual with the typical structure: objects of the experiment, principles, carrying out the experiment and report form.

Prerequisites:

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

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

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

6. PET21201 – Introduction to Oil and Gas Industry

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

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

The course provides students the fundamental understand related to the history of petroleum industry development and its role. In terms of upstream, students will understand the basic of petroleum geology – geophysics, the definition of reservoir rock, drilling process, well completion and petroleum production, as well as petroleum transportation. Regarding the downstream, the course will bring the descriptions of the main processes in petroleum refining, gas conditioning and processing and describe block schemes of refinery and gas plant.

Prerequisites: None

7. MAT11302 – Calculus 2

Credit(s): 3 (Math & 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: MAT11301

8. PHY21202– General Physics 2

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

Contact hours: 5 (Lecture: 3/week, Lab: 2/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: PHY21201

9. PHY21102LAB - General Physics Laboratory 2

Credit(s): 1 (Math & Basic Sciences)

Contact hours: 2/week

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 laboratoty manual with the typical structure: objects of the experiment, principles, carrying out the experiment and report form.

Prerequisites:

10. 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: None

11. PET11105 – Career Orientation Field Trip

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

Contact hours: 2weeks

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

12. MAT12203 – Calculus 3

Credit(s): 2 (Math & 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: MAT11302

13. CHE12303 - General Chemistry 2 (+ Lab)

Credit(s): 3 (Basic science); Required

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

General Chemistry 2 present the main point that the student will achieve the knowledge to solve problems in fundamental chemistry such as: Energies and Rates of Chemical Reactions, aqua solution, electro-chemistry, chemical surface.

Prerequisites:

14. Thermodynamic (MEC 32301)

Credit(s): 3 (Engineering topic); 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

15. ELE32203 –Electric Circuit Analysis (+ Lab)

Credit(s): 2 (Engineering Topics), Required course

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

Basic components and electrical circuit models. Response analysis due to DC, AC circuits (Kirchhoff's Laws, RLC circuits, Power, Polyphase circuits). Solution of multi-node circuits using the Laplace transform and complex number method. Concepts of electrical machinesb.

Prerequisites:

16. GEO12302 – Physical Geology

Credit(s): 3 (Basic Sciences); Required course

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

17. GEO12303 – Mineralogy (+ Lab)

Credit(s): 3 (Basic Sciences); Requied course

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

The principal objective of this course is to enable you to identify and interpret the most common rockforming and economic minerals in hand sample. The study of minerals is important to geologists, because minerals compose rocks. The proper identification of a rock, be it sedimentary, igneous, or metamorphic, requires the ability to identify the constituent minerals. Naturally this identification is only the first step toward an interpretation of the rock, and eventually the history of the area from which it came (the intent of petrology). However, mineralogy is a subject that goes beyond mere mineral identification. A knowledge of symmetry, twinning, phase equilibria, crystal chemistry, etc. helps us interpret the conditions of formation of a mineral, as well as other events that a mineral has experienced. Thus Mineralogy gives you access to the information that minerals can provide about Earth processes and Earth history.

Prerequisites:

18. GEO12204 – Fundamentals of Engineering Geology & Hydrogeology

Credit(s): 2 (Engineering Topics); Elective course

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

Introduce students to the laws of hydrogeology (DCTV), water circulation, soils, and DCTV environments; The law of engineering geology: the origin of the formation, the distribution law, the physical and chemical properties, dynamics and dynamics of groundwater in the history of the Earth; And equip students with basic knowledge when using geological materials to design and build the building.

Water in nature and groundwater sources; Physical properties and chemical composition of groundwater; Movement of groundwater; Physical and chemical properties of rocks and rocks; Natural geological and engineering geological phenomena; Methods of geological and hydrological geological research.

Prerequisites:

19. GEO12247– Introduction of GIS and RS

Credit(s): 2 (Enginering topics); Elective course

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

This course will provides an overview of GIS, GIS data model, how to set up and edit GIS database. In particular, this course introduces how to use GIS software and GIS applications. On the basis of those theoretical parts, students are required to perform large exercises including building GIS flowcharts and creating GIS maps. Remote sensing images today have become a huge source of data covering a large area. When combining remote sensing images and other GIS information layers, it will help mineral prospecting, resource management, environment and forecasting of hazards more accurately. Concepts and methods of GIS-RS complex in geological research. The main focus is on the method of managing geological data and remote sensing images using GIS information layers.

Prerequisites:

20. MAT12305– Differential Equations

Credit(s): 3 (Math & 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

21. MAT12206 - Probability and Statistics

Credit(s): 3 (Math & Basic Sciences), Required course

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

This course provides students with knowledge about Probability definition, rules for probability calculation, random quantities, probability distributions, conditional probability distribution, statistics, hypothesis testing, variance analysis, regression analysis.

Prerequisites: None

22. GEO12305 – Igneous and Metamorphic Petrology (+Lab)

Credit(s): 3 (Basic sciences); Required course

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

This course equips students with fundamental knowledge of igneous and metamorphic petrology, including: concepts, mineral composition, chemical composition, texture, structure; origin and controlling factors affecting the formation process. In addition, the course also provides description about igneous rocks (felsic group, intermediate group, mafic group and ultramafic group); and metamorphic rocks (quarzite, marble, schist, gneiss and amphibolite).

In particular, the course equips skills to identify common igneous and metamorphic rocks through observation and analysis of color, texture and minerals on rock hand samples in the lithology laboratory; as well as identify texuture types, mineral combinations on petrographic thin sections under polarized optical microscope.

Prerequisites:

23. GEO12306 - Structural Geology (+Lab)

Credit(s): 3 (Basic Sciences); Required course

Contact hours: 5 (Lecture: 4/week ; Lab: 2/week/ group)

The course provides a general coverage of the structures produced by brittle and ductile rock deformation at scales from the hand-specimen to plate boundaries, and an insight into the relationships between the deformational structures and plate tectonic settings. The emphasis will be on the description and interpretation of structures seen in the field, and the course includes:

- Introduce you the variety of structures and rock fabrics formed at range of scales, temperature/depth conditions, and tectonic settings;
- Provide a qualitative and quantitative understanding of the forces and stresses responsible for the development of geologic structures;
- Provide the background necessary for the kinematic interpretation of structures and strain observed in rocks;

Expand your knowledge gained about structures, strain, and stress to a larger scale and place it in framework of a range of plate tectonic settings.

Prerequisites: GEO12302

24. GEO12207 – Geological Field Camp

Credit(s): 2 (Enginering topics); Required course

Field Schedule: 5-8 days

This course provides students with an introduction into geologic relationships in the real world of nature. The course involves interpreting topographic and geologic maps, solving geologic problems using trigonometry and descriptive geometry, field mapping, and report writing, over a period of 7-10 days. Contents that students directly learn and practice include: how to use basic tools (such as compasses, GPS, geological hammers); read maps (topographic and geological); how to write a field diary; Measure basic parameters such as strike and dip, represent those parameters on the map; Practice identifying basic

rock types (magmatic, metamorphic and sedimentary rocks) at outcrops; Observe and recognize basic geological structures. In addition, students are also acquainted with detailed petrographic characterization, describing the position and structure of rock layers of some typical formations and complexes in the field.

Prerequisites: GEO12302

25. GEO13437 - Geophysical Exploration Methods (+Lab)

Credit(s): 4 (Engineering Topics); Required Course: R

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

The application of geophysical field methods for delineating near-surface features and/or structures as applied to exploration, environmental, and engineering problems. Field design, ground positioning, instrumentation, practical field data acquisition with gravimeter, magnetometer, ground-penetrating radar, electrical resistivity, electromagnetic, and seismic equipment.

Prerequisites:

26. GEO13438 - Well Logging (+Lab)

Credit(s): 04 (Enginering Topics); Required course

Contact hours: 6 (Lecture: 4/week ; Lab: 2/week)

Introduction to physical theory of well-log methods (resistivity, spontaneous potential, sonic, temperature, radioactive, etc.), theory of tool operation and well-log data interpretation for formation evaluation of hydrocarbon-bearing reservoirs, well log correlation, well bore condition evaluation and production analysis.

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. Analysis of cased hole log for cement quality and production log interpretation..

Prerequisites: MAT12206

27. GEO13334 - Sedimentology

Credit(s): 3 (Basic Sciences); Required course

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:

28. MAT13207 – Linear Algebra and Matrix Theory

Credit(s): 2 (Basic science); Require course

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

The course covers the following topics:Systems of linear equations. Eigen values and eigen vectors. Finite dimensional vector spaces. Linear transformations with applications. Numerical solutions of systems of linear equations

Prerequisites: None

29. GEO13311 - Petroleum Geology

Credit(s): 3 (Basic Sciences); Required course

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: GEO12306

30. PET13310 - Geomechanics

Credit(s): 3 (Basic Sciences); Required course

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

31. PET14233 - Renewable Energy

Credit(s): 2 (Basic Sciences); Elective course

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:

32. MAT13208– Introduction to Partial Differential Equations

Credit(s): 2 (Math & Basic Sciences), Required course

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

The course covers the following topics:Fourier series. Sturm-Liouville problems. The heat, Laplace, and wave equations. Separation of variables. Eigen function expansion. Fourier and Laplace transformations. Green's functions. Canonical forms of second-order linear equations. Method of characteristics. Asymptotic expansion techniques.

Prerequisites:

33. PET13244 – Fundamentals of Reservoir Engineering

Credit(s): 2 (Enineering Topics); Required course

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

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: PET13310

34. GEO13424LAB - Seismic Data Processing and Interpretation

Credit(s): 4 (Engineering Topics); Required Course: R

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

This course is designed to give students theoretical background and experience in seismic data processing (reflection, refraction, VSP etc.) which is used in exploration geophysics/seismology and engineering. Throughout this course, students will learn the fundamental of seismic data processing and master the problem-solving ability. The students will also learn the interaction between seismic data processing and data interpretation. In addition, the students will know how to use software in seismic data processing.

Prerequisites: GEO13437

35. GEO13439 - Petroleum Seismology

Credit(s): 4 (Engineering Topics); Required Course: R

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

This course will examine concepts and methods in exploration seismology applied to hydrocarbon exploration and development. Primary focus will be on seismic reflection methods and related technologies (borehole seismic, elastic logs and microseismic). Physical principles and practical aspects of seismic data acquisition, digital signal processing, inversion for elastic rock properties and data interpretation techniques will be covered.

Prerequisites: MAT13207, GEO13437

36. GEO14241 – Petroleum Reservoir Geology

Credit(s): 2 (Basic Sciences); Elective course

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

This course aims to develop a fundamental knowledge of the basic geological and petrophysical concepts and apply this knowledge to understand reservoir geology.

Prerequisites:

37. 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

38. PSE13201 - Health, Safety and Environment

Credit(s): 2 (Others); Required course

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

Description of hazards in the workplace and hazards of flammable and combustible liquids; description of methods for preventing fire and explosion; calculation of noise levels and noise exposure; identification of major characteristics of US standards for process safety management and OHSAS 18001; distinguishment of accident causes, losses and accident causation models; description of hazard, cause, control and consequence measurements; recognition of necessary requirements and methods for risk assessment, environmental impact assessment (EIA) and environmental monitoring and simple application of risk assessment and EIA to hypothesis activities/projects; explanation of oil weathering processes and discussion of oil spill response approaches.

Prerequisites: None

39. GEO13117 - Senior project 1

Credit(s): 1 (Engineering Topics); Required Course

Contact hours: 1 (Discussion: 1/ week)

Project 1 is the first module where students have the opportunity to apply specialized knowledge to solve a specific geological engineering problem, focusing on petroleum geology or petroleum geophysics. Under the guidance of instructors, students will learn about the topic, choose a solution method, develop

a process for implementation, and finally defend the results of the project before the evaluation board. The selected topic for implementation includes topics related to the application of geology - geophysics in Oil and Gas exploration in particular or geological issues in general. Students can choose topics such as: depositional environment, assessment of reservoir characteristics, processing and interpretation of well-log data... to carry out the project..

Prerequisites: GEO13311, GEO13334, GEO13438, GEO13437

40. GEO13223 – Summer Internship

Credit(s): 2 (Engineering Topics); Required Course

Contact hours: 4 weeks

This course gives students the opportunity to get in touch with a real-world work setting, allowing them know about the organizational structure, functions, tasks as well as scientific research and production activities of a specific internship unit. During the intership, students can apply classroom theory and skills in an approved and supervised practical experience for academic credit. The content of the internship is related to the fields of Petroleum Geology - Geophysics, such as assessment of reservoir rock properties, estimation of oil and gas reserves, processing and interpretation of geophysical data, assessment of oil and gas potential, research petrographic characteristics, stratigraphy, structure of oil fields... At the end of the internship, students complete the report and present it to the GE department; The report must fully show the activities and results obtained after the internship. Internship results of students are also assessed by the internship unit based on criteria of expertise, skills and attitudes.

Prerequisites:

41. PET12244 – Reservoir Petrophysics

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

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

The course provides knowledge that allows monitoring, production analysis, fluid analysis in reservoir conditions, 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; lithology, porosity, elasticity, strength, transit time properties, electrical properties, relative and absolute permeability, fluid saturation, capillary, rock-fluid relationships such as absorbance and absorption.

Prerequisites:

42. GEO14428 - Applied Geophysics

Credit(s): 4 (Engineering Topics); Required Course: R

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

How electric, electromagnetic, gravitational, magnetic, and seismic data can be used to describe the physical characteristics of the subsurface; how these geophysical methods are applied in mineral exploration, oil and gas exploration, engineering and environmental applications; define the scope and limitations of the geophysical interpretation methods.

Prerequisites:

43. GEO14245 -Introduction of AI in Petroleum Exploration

Credit(s): 2 (Enginering Topics); Elective course

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

Currently oil and gas reserves declining, geology of the remaining prospects very complicated, as the new technology, AI with outstanding capabilities in mining large amounts of data to find hidden relationships between layers of geophysical and petroleum information is urgently needed. The application of AI system to synthetic processing and interpretation of geological - geophysical data will be a new method to improve the accuracy of oil and gas prospection. The course will help students understand the basics of AI as well as the trend of AI application in the oil and gas industry. The main focus is on a>integration of geological-geophysical databases using GIS information layers and b>application of machine learning and deep learning models to forecast and localize the composition of oil and gas prospects.

Prerequisites:

44. GEO13236- Petroleum Geochemistry

Credit(s): 2 (Enginering Topics); Elective course

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

Petroleum Geochemistry provides readers the principle concepts and applications of petroleum geochemistry used in finding, evaluating, and producing petroleum deposits. Specific topical include the origin of petroleum, deposition of source rock, hydrocarbon generation, and oil and gas migrations that lead to petroleum accumulations. Also included are descriptions on how these concepts are applied to source rock evaluation, oil-to-oil, and oil-to-source rock correlations, and ways of interpreting natural gas data in exploration work. A thorough description on the way petroleum geochemistry can assist in development and production work, including reservoir continuity, surface and unconventional resource is presented. Finally, Using the depth age, and lithologic description of a stratigraphic sequence, cross section, or an entire basin in conjunction with information about the thermal history of the basin setting simulate its geologic history and predict petroleum generation, expulsion, migration, and accumulation.

Prerequisites:

45. GEO14241 - Petroleum Reservoir Geology

Credit(s): 2 (Enginering Topics); Elective course

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

To provide of basic geological and geophysical knowledge on geology of oil and gas fields. The main contents of this module are: Concept and classification of oil and gas fields; Pressure and temperature of oil and gas fields; Oil and gas mines in sedimentary rocks; Oil and gas field in carbonate; Oil and gas exploration in magmatic rocks, metamorphosed fractures and burrows; Calculate petroleum reserves and introduce oil and gas deposits in shale.

Prerequisites:

46. GEO14244 - Fundamental of transport in porous media

Credit(s): 2 (Enginering Topics); Elective course

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

This course provides students with fundamental background on transport in porous media, especially the flow toward vertical wellbore. First, the course reviews the basic knowledge of fluid and porous media,

the main focus is on the transport properties of fluids (water, oil and gas) and rock formation, namely porosity, saturation, permeability, density, viscosity, isothermal-compressibility, and wettability. Then, students will learn to formulate the equation for single phase flow in porous media. After that, students will learn to apply the single phase flow equation to solve some fundamental problems related to the single flow of underground water and oil toward production wells to be able to determine the pressure distribution around wellbore as well as production rate. Finally, the course also supplies students with the primary knowledge of multi-phase flow in petroleum reservoirs.

Prerequisites)

47. PET13203 - Fundamental of Reservoir simulation

Credit(s): 2 (Enginering Topics); Elective course

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

This course provides students with a fundamental background of reservoir simulation, specially focusing on practical reservoir simulation using commercial softwares. The main objective of the course is to enable student to perform reservoir simulation studies when working for upstream companies. The first part of the course provides students with the procedure and related data used in reservoir simulation. In this first part, student will learn to derive the solution of the single phase flow equation in one dimensional reservoir to gain some fundamental of how commercial softwares simulate the flow in the reservoir. In the second part of the course, students will learn every step to conduct a reservoir simulation project using commercial softwares. Students will build a reservoir model from scratch starting from log data and conduct a reservoir simulation to forecast well production

Prerequisites:

48. 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

49. MEC22207 - Fluid Mechanics

Credit(s): 2 (Others); Required

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

Basic principles of fluid mechanics. Properties of fluids, fluid statics, concepts of control volume and transport theorem, equations of continuity and motion, Bernoulli's equation, incompressible flow in pipes and over submerged bodies, fluid measurements.

Prerequisites: None

50. GEO12343 - Geological Data Science

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

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

The course provides students with basic knowledge of geological database management through geographic information system (GIS). GIS will become an effective tool as geological and other data expands and is used in digital geographic databases. GIS will well support data manipulation, display and synthesis, save time and effort, and be able to use new concepts to learn and solve spatial problems.

The course also equips students with basic knowledge of GIS, methods of data collection, database construction and management, calculations and modeling in GIS environment, application of GIS techniques in natural resources and environment management to research and manage the environment.

Students will understand spatial data models and structures, display data-graphics, introduce data transformation problems, tools for analyzing maps. By this way, the course guides students to design specific application problems in geological data analysis and modeling.

Prerequisites: MAT12203

51. GEO13222– Basin Modeling

Credit(s): 2 (Enginering Topics); Elective course

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

The course provides students with a foundation in analyzing the mechanism of formation of sedimentary basins under different tectonic settings; classification of sedimentary basins; tectonic characteristics, structure, stratigraphy of each type of sedimentary basin. At the same time, the course also includes modules related to the assessment of sedinemtary basins that are high potential of oil and gas.The course continues to provide students with the contents, methods and workflow related to stratigraphic characterization, tectonic structure analysis as well as the petroleum system within that sedimentary basin.

Prerequisites:

52. GEO14222– Production Geology

Credit(s): 2 (Enginering Topics); Elective course

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

Equip students with knowledge about geological factors that determine the quality of the reservoir, the change of pressure affecting the phase state of the fluid during production, geology and methodology for identifying reservoirs and arranging exploitation wells, about methods of exploitation testing and management of oil, gas and condensate fields.

Prerequisites:

53. GEO14327 – Geology and Mineral Resources in Vietnam

Credit(s): 3 (Engineering Topics); Required course

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

Introduce the most basic information on the issues of stratigraphy, magma, tectonics and geological resources of the territory of Vietnam as well as their significance for many fields of science and socio-economic of the country.

Prerequisites:

54. GEO14342 - Petroleum Exploration Project Design

Credit(s): 3 (Engineering Topics); Required course

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

This is a multi-disciplinary design course that integrates fundamentals and design concepts in geology, geophysics, and petroleum exploration. Students work both individually and in teams on multiple open-ended design problems in oil and gas exploration, including integration of well and seismic reflection databases, seismic interpretation in different tectonostratigraphic settings, the development of a prospects in a variety of exploration plays, and economic analysis and risk management

Prerequisites: PSE13201, ECO13301, GEO13424LAB

55. GEO14126- Senior Project 2

Credit(s): 1 (Engineering Topics); Required Course

Contact hours: 1 (Discussion: 1/ week)

Project 2 continues to require students to solve a specific geological engineering problem, focusing on geology or geophysics. Under the guidance of instructors, students will apply the professional knowledge they have learned such as petrology, sedimentology, processing and interpretation of seismic data, well-log, petroleum geology... as well as practical knowledge gained through fieldwork and professional internships to analyze and solve a specific problem which is appropriate to the major of geology or geophysics. Finally, students will defend the results of their project before the Evaluation Council. This is the premise to prepare for their graduate internship and graduation thesis.

Prerequisites: GEO13117, GEO13424LAB

56. GEO14331 – Graduation Internship

Credit(s): 3 (Engineering Topics); Required Course

Contact hours: 6 weeks

This course provides students with the opportunity to re-systematize and apply all the knowledge they have learned in the Geological Engineering program to engage in specific work in the field of research, exploration at the production unit. At the same time, through this course, students collect data and select projects suitable for their expertise as well as optimal methods to solve the problem that students choose to make a Graduation Project. The content of the internship is related to the fields of Petroleum Geology - Geophysics, such as assessment of reservoir rock properties, estimation of oil and gas reserves, processing and interpretation of geophysical data, assessmesnt of the oil and gas potential, research petrographic characteristics, stratigraphy, structure of oil fields... At the end of the graduation internship, students complete the report and present it to the GE department; Internship results of students are also assessed by the internship unit based on criteria of expertise, skills and attitudes.

Prerequisites:

57. GEO14832 – Graduation Thesis

Credit(s): 8 (Engineering Topics); Required Course

Contact hours: 15 weeks

This module requires students to conduct research on a specific geological engineering problem such as assessing reservoir characteristics, determine oil and gas reserves, processing and interpreting of

geophysical data, and evaluating potential oil and gas structures, research petrographic characteristics, geochemistry, depositional environment... for a specific subject and area after completing the graduation internship. The content students need to complete includes: introducing general geological characteristics of the research area, generalizing research methods and arguing for selected methods in the graduation project; Present research results, give conclusions and recommendations. The results of the graduation project will be defended by the student before the Evaluation Council.

Prerequisites: GEO14331, GEO14126

58. 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..

59. 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

60. 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

61. 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

62. 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

63. 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

64. 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

65. 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

66. 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

67. 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

68. 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

69. 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

70. 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.

71. 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.

Credit(s): 1 (Others); Required