



NEAR EAST UNIVERSITY

**DEPARTMENT OF Petroleum and
Natural Gas Engineering**

***Course Structure Diagram with Course
Credits***

2021-2022

Courses List with Near East University credits and ECTS

Please see the attached example of the diploma supplement which is given to all graduates of our university free of charge. It is arranged in English.

The diploma supplement is a document the purpose of which is to provide sufficient independent data to improve the international “transparency” and fair academic and professional recognition of qualifications (diplomas, degrees, certificates, etc.). It is designed to provide a description of the nature, level, context, content and the status of the studies that were pursued and successfully completed by the individual named on the original qualification to which this supplement is appended. It should be free from any value judgments, equivalence statements or suggestions about recognition

COURSE OBJECTIVES AND CONTENTS:

YEAR 1

Introduction to Computers and Programming (course type: required; course code: ECC 101)

Course objectives: The goal of this course is to help students know program language evolution and classification and basic computer architecture. Students will be able to solve basic numerical computation in binary, design and implement simple assembly language programs at the end of the course.

Course content: An introduction to fundamental concepts. Algorithms and flowcharts as tools of program design process. Basic program structure. Input/output statements. Control structures: Selection and repetition statements and arrays. Concept of modular programming: Procedures and Functions.

General Physics I (course type: required; course code: PHY 101)

Course objectives: The objective of this course is to provide students with a thorough understanding of the basic concepts of physics, rigorous description of physical phenomena and to improve students’ problem-solving abilities.

Course content: Measurement, vectors, kinematics, force, mass. Newton’s laws, applications of Newton’s laws. Work and kinetic energy. Conservation of linear momentum. Impulse, collisions, rotation, moments of inertia. Torque, angular momentum, conservation of angular momentum, static equilibrium.

General Chemistry I (course type: required; course code: CHM 101)

Course objective: By the end of this course, students should understand the fundamental concept of atomic theory, chemical equations, thermochemistry and hands-on laboratory works.

Course content: A basic course with emphasizing the metric system. Introduction to atomic theory, stoichiometry. The structural and physical properties of matter. Periodic relationship among elements and periodic table. Gaseous state. Thermochemistry. Energy and enthalpy. Electronic structure of atoms. Electrochemistry. Chemical bonding.

Calculus I (course type: required; course code: MTH 101)

Course objective: At the end of this course students are expected to have a clear understanding of the ideas of Calculus as a solid foundation for subsequent courses in mathematics and other disciplines as well as for direct application to real life situations.

Course content: Functions, limits and continuity. Derivatives. Mean value theorem. Sketching graphs. Definite integrals, infinite integrals (antiderivatives). Logarithmic, exponential, trigonometric and inverse trigonometric functions and their derivatives. L'Hospital's rule. Techniques of integration. Applications of the definite integral, improper integrals

English I (course type: required; course code: ENG 101)

Course objective: This course aims at enabling students to understand their lessons and to express themselves in English Language.

Course content: Within a thematic approach, reading, writing, speaking, and listening skills will be developed, with a language component in order to build onto the foundation established at the Department of English. In speaking and writing, students will be encouraged to use language forms that they learn through reading and listening. Under broad themes (or threads), the students will be exposed to extensive reading both in and outside the classroom. They'll be encouraged to read a variety of texts such as short stories, academic articles, research reports, reviews and journalistic texts as well as chapters from textbooks

Introduction to Petroleum Engineering course type: required; course code: PGE 101)

Course objectives: A course designed to acquaint the students with the basic concepts of petroleum industries. Historical background, sources, world supply and demand, chemical and physical properties of petroleum.

Course content: Introduction to petroleum exploration, reservoir types and engineering concepts, production methods, refining and transportation of natural hydrocarbons. Engineering ethics, health, safety and environmental aspects in petroleum engineering profession.

Technical Drawing (course type: required; course code: TDE 102)

Course objective: The aim of this course is to provide students with the basics of AutoCAD, be able to transform data into graphical drawings and also draw orthographic projections and sections, learn basic engineering drawing formats.

Course content: Introduction to technical drawing. Drawing instruments and their use, lettering, lines, geometry of straight lines, scale drawing. Dimensions. Development of surfaces, shape description, selection of views, projecting the views. Pictorial drawing, diametric trimetric projection. Isometric projection, oblique projection. Perspective drawing cross section.

General Physics II (course type: required; course code: PHY 102)

Course objectives: General Physics II is the second part of General Physics I. The aim of this course is to help students apply knowledge of physics everyday life activities and through problem solving exercises in the fields of Electrical and Electromagnetics point of view.

Course content: Electrical charges. Coulomb's law. Electrical fields. Gauss's law. Electrical potential. Capacitance and dielectrics. Current and resistance. Direct current circuits. Magnetic fields. Sources of the magnetic field. Faraday's law of induction. Inductance and inductors.

Calculus II (course type: required; course code: MTH 102)

Course objectives: This course aims at helping students further develop their problem solving and critical reasoning skills and to prepare them further study in mathematics, the physical sciences, or engineering.

Course content: Plane and polar co-ordinates, area in polar co-ordinates, arc length of curves. Limit, continuity and differentiability of function of several variables, extreme values, method of Lagrange multipliers. Double integral, triple integral with applications. Line integrals, Green's theorem. Sequences, infinite series, power series, Taylor's series. Complex numbers.

English II (course type: required; course code: ENG 102)

Course objective: This course aims to take students to intermediate advanced level of English.

Course content: This course will be a continuation of ENG 101, with greater emphasis on student autonomy, research skills and synthesizing ability. All the activities and tasks in ENG 101 will continue within a thematic approach. In Eng-102, the ability to evaluate, analyze and synthesize information in written discourse will be highlighted. Documentation in writing will be introduced at the beginning of the course, in order to solidly establish the skill by the end. Students will learn the discourse patterns and structures to be used in different essay types. Students will write two essays in ENG-102. 1. An academic essay with proper documentation. 2. A project report to be prepared throughout the course, including a literature review (displaying analysis/synthesis skills, and documentation), a definition/elaboration of a problem (using definition, description, cause/effect and comparison/contrast patterns) and suggestions for solution (including personal views and argumentation). Local and regional topics, personalizing the research and viewpoints will be recommended to prevent plagiarism. Instructors will have to keep in close contact with the students to guide them throughout the process

Physical Chemistry (course type: required; course code: CHM 102)

Course objectives: This course is designed as a one-semester course for petroleum and natural gas engineering students.

Course content: The properties of gases, Equations of state, The perfect gas law, Mixtures of gases, The real gas law, The principle of corresponding states, The virial equation, The van der Waals equation, Kinetics theory of gases, The state of thermodynamic systems, Thermodynamic quantities, Work, heat, and energy, The internal energy, Expansion work, Heat transactions, The First Law of thermodynamics, Enthalpy, Thermochemistry, Spontaneous change, non-spontaneous change, Entropy, The Second Law of thermodynamics, The Third Law of thermodynamics, Physical transformations of pure substances, Chemical equilibrium.

Career Planning (course type: required; course code: CAR100)

Course objectives: To help students to plan a career in line with their future goals by making them aware of their interests, personal characteristics and values. Learning career planning and career development models. Having knowledge about current labor market conditions. To have knowledge about interview techniques. Learning how to make an impressive job

interview. To have knowledge about CV preparation methods and cover letters. Preparing a CV to use in job applications.

Course Content: Career Concept and Career Stages. Expectations of the Business World from New Graduates. Career Management and Career Management Models in Organizations. Individual Career Planning and Goal Setting. Job Search Techniques. Individual Career Planning and Applications: Cover Letter and CV Writing. Basic Communication Skills. Individual Career Planning Practices: Preparing for the Interview. Interview Techniques. Orientation and Introduction to Working Life. Lifelong Learning.

Turkish for Foreign Students I (course type: required; course code: YIT101)

Course objective: To teach reading, writing, speaking, listening and comprehension skills in Turkish. Explaining / explaining the determined concept(s). Develop selected / determined skills. Examine selected topics in depth / detail. To improve the existing knowledge of students about the concepts / theories / topics.

Course content: Basic rules of Turkish, phonology (sounds, alphabet reading rules), vocabulary (Recognition of words as words, relations between words), sentence information (sentence organizations, general structure and sentence types), reading-writing (reading rules and writing techniques, spelling rules, comprehension of speaking and writing language, spelling rules. learning on the techniques of speaking, learning of specific forms of emphasis, intonation etc. Applying on appropriate texts, A1 has been started according to international language level.

Turkish Language I(course type: required; course code: TUR101)

Course objective: Explaining / explaining the determined concept(s). Developing and developing awareness about the related concept(s). Develop selected / determined skills. Students' knowledge of the concepts / theories / topics develop. Students learn about existing concepts / theories / topics renew. Developing critical thinking

Course content: Definition and importance of language; the relationship between language and culture; writing language and features, external structure and rules in written expression, spelling rules and punctuation signs; plan, theme, point of view, helpful ideas, paragraph writing; composition concept, composition writing rules and plans; composition, paragraph review, essay correction studies, general narration expressing disorders, thinking and thinking; various writing types, (memoirs, jokes, stories, criticism, novels etc.)(resume, petition, report, announcement, bibliography, official papers, scientific) introduction, development and conclusion sections of articles, articles, etc.) will be worked on.

Turkish for Foreign Students II (course type: required; course code: YIT102)

Course objectives: To teach reading, writing, speaking, listening and comprehension skills in Turkish. Explaining / explaining the determined concept(s). Develop selected / determined skills. Examine selected topics in depth / detail. To improve the existing knowledge of students about the concepts / theories / topics.

Course content: Vocabulary of Turkish (Recognition of words as a structure, relations between words), sentence information (sentence organizations, general structure and sentence types), reading-writing (reading rules and writing techniques, spelling rules, comprehension of speech and writing language, spelling rules) , reading (reading comprehension techniques,

practices on the texts), listening (listening comprehension, listening to the necessary comments by taking note of the necessary comments on the students' own profession) applications, speaking (learning speech techniques, specific emphasis, learning shapes such as toning appropriate texts applications on the A1 level according to the international level.

Turkish Language II (course type: required; course code: TUR102)

Course objectives: Explaining / explaining the determined concept(s). Developing and developing awareness about the related concept(s). To discuss the validity of the determined concept(s).

Course content: In the lecture, the importance of speech, speech disorders, collective discussion types, body language and the successful use of speech are given to the students.

Principles of Atatürk and the History of Turkish Revolution I (course type: required; course code: AIT 101)

Course objective: Explaining / explaining the determined concept (s). Developing and developing awareness about the related concept (s). To discuss the validity of the determined concept (s). Develop selected / determined skills. Examine selected topics in depth / detail. To improve the existing knowledge of students about the concepts / theories / topics To improve students' ideas / knowledge / insights in the context of selected concepts Renewing existing knowledge with students about the concepts / theories / topics identified To promote critical thinking. To solve the political, economic, cultural and socio-psychological problems that arise as a result of the encounter between other Western cultures and Turkish culture;demolished reform movements and the transition from the Empire to the national state. As result of the national struggle, Mustafa Kemal Atatürk's leadership dealt with the political events of the founding of the Republic of Turkey.

Course content: Definition of Revolution and Turkish Revolution III. by starting the reform movement began with Selia Mustafa Kemal Pasha, October 29, 1923, the Republic of Turkey to the penny emerging political, social and economic events are examined.

Principles of Atatürk and the History of Turkish Revolution I (course type: required; course code: AIT 103)

Course Content: A Concise Political History of Ottoman Empire 1300-1914 Decline and the Ottoman Modernization Ottoman State and Society in Classical Period The organization of National Resistance Movement: The Circular of Amasya The Congresses of Erzurum and Sivas Invasions, Mustafa Kemal and National Resistance Movement Ottoman Empire in the First World War I Armistice of Mudros The Treaty of Sevres and the National Liberation War against the Armenians and Greeks I The Armistice of Mudanya and the Peace Treaty of Lausanne

YEAR 2

General Geology (course type: required; course code: PGE 201)

Course objectives: The aim of this course is to evaluate the fundamentals of geology and engineering and to examine the application fields of the Earth.

Course content: Structure of the Earth. Elements, minerals, and rocks of the Earth`s crust. Igneous and metamorphic processes. Weathering. Sedimentary processes. Geological external processes. Rock formation. Earth`s dynamic processes and rock deformation. Map studies.

Differential Equations (course type: required; course code: MTH 201)

Course Description: Ordinary and partial differential equations. Explicit solutions. First-order differential equations, separable, homogenous differential equations. Ordinary linear differential equations. Bernoulli differential equations. Cauchy-differential equations. High-order ordinary differential equations. Introduction to Laplace transforms. Introduction to series method for solving differential equations. Linear systems of differential equations

Petroleum Geology (course type: required; course code:PGE 202)

Course Description: The goal of this course is to obtain knowledge of the origins of petroleum and gas. An overview is given on the conditions that are needed for oil and gas to accumulate in reservoirs. Moreover, techniques to find and exploit these reservoirs are highlighted. The focus always is on the task of the petroleum geologist during the different phases of oil and gas exploration and production.

Thermodynamics (course type: required; course code: ECC 207)

Course objectives: Basic concepts and definitions of classical thermodynamics. Thermodynamic processes, work and heat interactions. First law for systems and for flow processes. Second law and entropy, irreversibility and availability.

Course content: The following topics will be covered: (1) properties of gases, (2) internal energy, enthalpy & the First Law, (3) entropy, free energy & the Second and Third Laws, (4) phase equilibrium, (5) simple mixtures, (6) chemical equilibrium.

Engineering Materials (course type: required; course code: ECC 211)

Course Description: Materials and properties. Atomic structure and interatomic bonding, crystal structure, crystal imperfections, solid solutions. Mechanical properties of materials, elastic and plastic deformation. Behavior of materials under tension, compression and shear. Hardness and hardness measurement. Dislocation and strengthening mechanism. Phase equilibria, phase diagrams, the iron –carbon system, solid reactions, and microstructures. Structure and properties of ceramics. Polymer structure.

MTH323-Numerical Analysis (3 Credits): Methods for numerical solution of mathematical problems. Roots, optimization, linear algebraic equations, matrices, curve fitting, differentiation, integration, ordinary differential equations.

Objectives of the Course:

The course will be develop an understanding of the elements of error analysis for numerical methods and certain proofs. It also derive appropriate numerical methods to solve algebraic and transcendental equations.

Rock Properties (course type: required; course code: PGE 218)

Course Description: Petrophysical properties of reservoir rocks and measurement procedures: Coring and core handling; sandstone and carbonate reservoir rock and pore types; fundamental porosity, grain density, permeability and saturation properties; special core analysis such as mechanical, acoustic and electrical properties; multiphase rock and fluid interactions, interfacial tension, capillary pressure, wettability and relative permeability properties.

Fluid Properties (course type: required; course code: PGE 220)

Course Description: Properties of fluids encountered in petroleum engineering. Phase behavior, density, viscosity, interfacial tension, and composition of oil, gas and brine systems. PVT relationships of hydrocarbon gas and liquid systems. Thermodynamic behavior of naturally occurring hydrocarbon mixtures; evaluation and correlation of physical properties of petroleum reservoir fluids, including laboratory and empirical methods. Interpreting lab data for engineering applications. Flash calculations.

Engineering Mechanics (course type: required; course code: PGE 221)

Course Description: Introduction, Force Vectors, Force System Resultants, Equilibrium of Particles, Equilibrium of Rigid Bodies and Frames, analysis of Trusses, Analysis of Beams, Centroid and Moments of Inertia.

Strength of Materials (course type: required; course code: ECC 213)

Course Description: Introduction. Internal force diagrams. Analysis of stress and strain. Hooke's law. Yield criteria and plasticity. Axial force. Pure shear. Torsion of circular bars and thin walled tubes. Moment of inertia of cross-sections. Simple bending. Stress and strain, Mohr's circle. Bending with shear. The shear center. The shear center of thin walled sections. Elastic curve for symmetrical cross-sections. Study of elastic curve by various methods. Effect of shear on the elastic curve. Axial force with bending. Materials not resistant to tension. Bending with torsion. Energy methods. Theorem of virtual work. Theorems of Betti and Castigliano. Minimum principles. Elastic stability. Euler cases. Buckling beyond the elastic limit, method of omega multiplier, approximate methods, and Rayleigh ratio.

Principles of Atatürk and the History of Turkish Revolution II (course type: required; course code: AIT 102)

Course objective: Explaining / explaining the determined concept (s). Developing and developing awareness about the related concept (s). To discuss the validity of the determined concept (s). Develop selected / determined skills. Examine selected topics in depth / detail. Students' knowledge of the concepts / theories / topics develop. To improve students' ideas / knowledge / insights in the context of selected concepts. Renewing existing knowledge with students about the concepts / theories / topics identified. Promoting innovation. Developing critical thinking. In parallel with the Republic of Turkey on the organization of contemporary Turkish society the principles of Atatürk and As a result of the restructuring of the state and society within the framework of their revolution. political, social, economic and cultural development in our society and changes in domestic and foreign political events encountered in today's problems evaluation.

Course content: Mustafa Kemal Pasha penny from the Republic of Turkey on October 29, 1923 until his death policies and reforms carried out are assessed

Principles of Atatürk and the History of Turkish Revolution II (course type: required; course code: AIT 104)

Course Content: Discussion on "revolution", "Evolution" and the great revolutions in history. Transformation in the Political system: From a Sultanate to Republic Transformation in education and cultural life Transformation in Social and economical life. Unsuccessful attempts for multi-party system and consolidation of the Single Party Regime. Atatürkçülük/Kemalizm and the 6 principles of Atatürk, Nationalism, Secularism-Laicism, Populism. Sheikh Said Rebellion: Kurdish Nationalism or A Reaction to Secular policies of

the new regime Turkey During the Second World War. Turkey and the League of Nations Turkey in the Regional Organizations. Turkish Foreign Policy and the Foreign Policy Issues Statism, Republicanism, Revolutionism.

YEAR 3

Summer Practice I (course type: required; course code: PGE 300)

Course objective: The goal of this course is to familiarize students with the daily work of Petroleum and Natural Gas Engineering

Course content: Summer training

Introduction to Fluid Mechanics (course type: required; course code: PGE 301)

Course Description: Properties of fluids. Basic Concepts of Fluids in Fluid Mechanics. Classifications of Fluid Flow. Fluid Statics. Pressure Intensity, Pressure Heads, Buoyancy and Flotation. Hydrostatic Forces on a Submerged Surface. Fluid Kinematics. Fluid Mass under acceleration. Continuity Equation. Bernoulli Equation. Laminar and Turbulent Pipe Flow. One Dimensional Pipe Flow.

Production Engineering I ((course type: required; course code: PGE 303)

Course Description: Drill stem testing, well completion methods, completion fluids and sand control. Perforating, well head equipment and flow control devices, production packers, and oil and gas separators. Flowing well performance, sucker rod pumping, submersible electrical centrifugal pumping, well stimulation techniques; acidizing, hydraulic fracturing.

Production Engineering II (course type: required; course code: PGE 304)

Course Description: Drill stem testing, well completion methods, completion fluids and sand control. Perforating, well head equipment and flow control devices, production packers, and oil and gas separators. Flowing well performance, sucker rod pumping, submersible electrical centrifugal pumping, well stimulation techniques; acidizing, hydraulic fracturing.

Reservoir Engineering I (course type: required; course code:PGE 305)

Course Description: Estimation of hydrocarbon pore volume and recovery factor. Classification of oil reservoirs. Reservoir performance prediction for solution gas drive, water drive, gas-cap drive, drainage and combination drive reservoirs using material balance approach. Water influx theory. Water and gas coning in oil producing formations. Characterization of fractured reservoirs. Decline Curve Analysis.

Reservoir Engineering II (course type: required; course code: PGE 306)

Course Description: Steady and unsteady state single phase flow equations through porous media, steady and unsteady superposition. Multiphase flow through porous media. Reservoir characterization in homogeneous and heterogeneous reservoirs by pressure and tracer testing.

Drilling Engineering I (course type: required; course code: PGE 307)

Course Description: Drilling machinery: hole and equipment. Drilling fluids and hydraulics. Cementing and hydraulics. Drill off tests (bit performances). Pressure control.

Drilling Engineering II (course type: required; course code: PGE 308)

Course Description: Directional drilling (Tangential, ROC and Minimum Curvature Methods). Drill string design (neutral point of tension and compression, neutral point of bending, Lubinski's stresses, and margin of over pull). Casing design (biaxial, triaxial). Casing setting (buckling and well head loads).

Statistics and Probability (course type: required; course code: MTH 251)

Course Description: Complex numbers, Matrix algebra, Methods of solution of linear equation systems. Vectors in 2D-Space and 3D-Space, Eigenvalues, Eigenvectors, Diagonalizations, Fourier Series. Applied Probability and Statistics.

Oil and Gas Pipeline System (course type: required; course code: PGE 310)

Course Description: Importance of pipelines: pipelines as element of infrastructure, economical comparison of pipelines with other transportation systems, safety of pipelines, transportation tasks and dimensioning of pipelines, profitability investigation of pipelines. Planning and designing of pipelines: right of way, pipelines, stations, and execution of pipeline projects. Calculation of pipelines: pressure losses and flow rates, energy demand, pressure surge calculations, pipe strength calculations. Line pipes and fittings: line pipe materials, fabrication of line pipes, fittings, line pipe testing and inspection. Construction works and corrosion protection of pipelines.

Well Logging (course type: required; course code: PGE 312)

Course Description: Principles and operation of gamma ray, spontaneous potential, caliper, resistivity (micro and focused), density neutron, sonic, cement bond and variable density, dipmeter and production well logging tools. Interpretation of well log and their cross-plotting techniques. Determination of formation properties such as porosity, hydrocarbon saturation, lithology, zone thickness, shaliness, etc. Guidelines to select proper logs in given field conditions.

YEAR 4

Summer Practice II (course type: required; course code: PGE 400)

Course objective: A minimum of four weeks (20 working days) of summer practice is obligatory to fulfill the requirements for the B.Sc. degree. The second practice is for production and/or reservoir engineering after the third year of undergraduate education. The training is based on the content of the summer practice manual.

Course content: Summer training

Natural Gas Engineering (course type: required; course code: PGE 403)

Course Description: Properties of natural gases, hydrate formation. Estimation of gas reserves. Gas well testing. Estimation of gas deliverability. Gas flow measurement. Natural gas deliverability. Natural gas transmission, design of gathering systems. Field treating and processing of natural gas. Compressor horsepower requirement.

Petroleum Engineering Design (course type: required; course code: PGE 405)

Course Description: Development and use of design methodology, formulation of design problem statements and specifications, consideration of alternate solutions, feasibility, considerations. Development of student creativity by using open ended problems. Project engineering and management of engineering projects. Design of drilling projects.

Graduation Project (course type: required; course code: PGE 402)

Course Description: Application of Petroleum and Natural Gas Engineering theories and topics on paper for design. The graduation project is chosen by the students and taken up after the approval of the relevant lecturer.

Petroleum Property Valuation (course type: required; course code: PGE 411)

Course Description: The aim of our course is to study the profit analysis and to make feasibility studies for the valuation of oil and gas properties. In order to be able to make these kind of studies, we must know the amount of oil and gas producible from a field and this can be obtained through engineering analysis.

Economics for Engineers (course type: required; course code: ECC 426)

Course Description: Principles and economic analysis of engineering decision making. Cost concept. Economic environment. Price and demand relations. Competition. Make-versus-purchase studies. Principles and applications of money-time relations. Depreciation. Money and banking. Price changes and inflation. Business and company finance.

ELECTIVE COURSES

Reservoir Characterization (course type: elective; course code: PGE 407)

Course Description: Definition of petroleum reservoir heterogeneity using conventional methods and possible improvements to these methods. Review of basic statistical concepts and methods. Reservoir Rock and Fluid Property Evaluation by Statistical Methods. Scale-up and Simulator Data Preparation. Emerging Methods in Petroleum Reservoir Characterization. Case studies from oil industry.

Geophysical Analysis (course type: elective; course code: PGE 408)

Course Description: This module is an introduction to geophysical signal analysis which is concerned with the construction, analysis, and interpretation of mathematical and statistical models. In general, it is intended to provide material of interest to upper undergraduate students in mathematics, science, and engineering.

Process Control and Instrumentation (course type: elective; course code: PGE 409)

Course Description: Introduction to Process Measurement, Pressure Measurement, Level Measurement, Temperature Measurement, Flow Measurement, Control Valves, Process Considerations, Transmission of Measurement Signals, Basic Control Concepts, Complex Control Systems, Computer Control Systems, Networks

Special Topics in Petroleum and Natural Gas Engineering: Gaseous Fuels from Resource to the End User (course type: elective; course code: PGE 410)

Course Description: Chemical and physical properties of propane, butane and propane-butane mixtures, industrial uses of LPG in automotive and in energy sector, quality and quality control in industrial establishments, safety. Laboratory testing, concepts of standards, measurement uncertainty, measurement quality. Invited lecturers from industry and visits to industrial sites.

Reservoir Rock and Fluid Properties (course type: elective; course code: PGE 412)

Course Description: Fundamental properties of fluid-permeated rocks; porosity, permeability, saturation and electrical properties; properties of porous media with multiple fluid saturations; wettability, capillarity and relative permeability. PVT relationships of hydrocarbon gas and liquid systems. Reservoir fluid characteristics of hydrocarbons and formation waters.

Globalization and Petroleum Politics (course type: elective; course code: PGE 413)

Course Description: As global energy demand increases, sources of oil and gas are becoming incredibly important to nations whose citizens continue to grow more dependent on them. This dependence has led to a more robust international petroleum industry, as a result of globalization, underlined by an increase in stakeholders and complicated contractual frameworks.

Transport Phenomena in Geosystems (course type: elective; course code: PGE 414)

Course Description: Applications of mass, heat and momentum balances to fluid flow problems. Shell balances. Non-Newtonian fluids. Transport processes in porous media.

Pipeline Transportation Systems (course type: elective; course code: PGE 415)

Course Description: Importance of pipelines: pipelines as element of infrastructure, economical comparison of pipelines with other transportation systems, safety of pipelines, transportation tasks and dimensioning of pipelines, profitability investigation of pipelines. Planning and designing of pipelines: right of way, pipelines, stations, and execution of pipeline projects. Calculation of pipelines: pressure losses and flow rates, energy demand, pressure surge calculations, pipe strength calculations. Line pipes and fittings: line pipe materials, fabrication of line pipes, fittings, line pipe testing and inspection. Construction works and corrosion protection of pipelines.

Environmental Control in Petroleum Engineering Operations (course type: elective; course code: PGE 416)

Course Description: Principles of environmental control in petroleum engineering. The impact of drilling and production operations. Environmental transport of petroleum wastes. Planning for environmental protection. Waste treatment methods. Remediation of contaminated sites.

Petroleum and Refining Processes (course type: elective; course code: PGE 417)

Course Description: This module highlights contemporary approaches to resource utilization and provides comprehensive coverage of technological advances in residuum conversion. It illustrates state-of-the-art engineering methods for the refinement of heavy oils, bitumen, and other high-Sulphur feedstocks.

Oil Transportation and Storage (course type: elective; course code: PGE 418)

Course Description: Waterborne Transportation, Oil Spills, Storage Facilities, Oil Pipelines, World Oil Transit Checkpoints, Marine Tankers and Barges, Super tankers, Oil tankers, Barges, Marine vessels for transporting LPG and LNG, Aboveground Tank Storage of Liquid Petroleum Products, Storage Tanks, Tank Farm.

Health & Safety and Risk Management (course type: elective; course code: PGE 419)

Course Description: This course develops a foundation of Health & Safety concepts and stakeholders, Risk assessment of engineering developments, Hazard identification and protection methods, Business Continuity Planning (BCP) and Management of health and safety in oil and gas industry.

Project Management (course type: elective; course code: PGE 420)

Course Description: This course develops a foundation of concepts and solutions that supports the planning, scheduling, controlling, resource allocation, and performance measurement activities and leadership traits required for successful completion of oil and gas

Introduction to Geothermal Reservoir Engineering (course type: elective; course code: PGE 421)

Course Description : Classification of geothermal reservoirs, distribution and characteristics of geothermal resources. Physical aspects of hydrothermal systems. Assessment of geothermal resources. Well completion and warm-up, measurements during drilling; temperature log, the completion tests, pressure log. Flow testing. Well performance.

Enhanced Oil Recovery (course type: elective; course code: PGE 422)

Course Description : Enhanced oil recovery methods and limitations improved oil recovery, Fractured Reservoirs, Shale Gas., Coal Gas Methane, Buckley Leveret Displacement Mechanism Miscible and immiscible gas drives. Steam and steam drive applications. In-situ Combustion. Chemical EOR. Polymer and surfactant flooding, microbial flooding.

Pressure Control (course type: elective; course code: PGE 423)

Course Description : Origin and detection of abnormal formation pressures. Principles of pressure control: behavior of gas in drilling fluids, mechanics of bubble rise. Pressure control methods: driller, engineer, cementation and low choke pressure methods. Prediction methods for fracture pressure gradient. Drilling and completion concepts in over pressured formations. Pressure control equipment. Special problems.

Physical and Engineering Properties of (course type: elective; course code: PGE 424)

Course Description : Rock as an engineering material, rock and rock mass classifications. Physical properties of rock, weathering and slaking. Petrophysical properties of reservoir rocks and measurement procedures: Coring and core handling; sandstone and carbonate reservoir rock and pore types; fundamental porosity, grain density, permeability and saturation properties; special core analysis such as mechanical, acoustic and electrical properties; multiphase rock and fluid interactions, interfacial tension, capillary pressure, wettability and relative permeability properties. Oral presentation on a specific topic of rock properties.

Directional Drilling (course type: elective; course code: PGE 425)

Course Description : Directional drilling applications and limitations. Terminology, the best way to better planning objectives and targets: Calculations and data collection. MWD (Measurements While Drilling). Bottom Hole Assembly drilling equipment: drilling tools and methods of kick off. Drilling motors, drill bits, and BHAs (Bottom Hole Assembly). Well head operations. Reservoir considerations during the design aspects of directional drilling. Drilling and surface locations requirements. Torque and drag (torque and drag) models. Types of horizontal wells and plans. Logging, coring, and completion techniques. Well-stability (wellbore stability) issues and well cleaning requirements.

Petroleum Geochemistry (course type: elective; course code: PGE 426)

Course Description : The course involves in basic organic chemistry, origin, generation, migration and accumulation of oil and gas. Alteration of hydrocarbons in the reservoir. Application correlation studies to production allocation problems which petroleum engineers are met.

Well Stimulation (course type: elective; course code: PGE 427)

Course Description : In this course, participants will first learn the fundamental science related to geosciences, rock mechanics, and fluid mechanics, and then gain know-how knowledge on the principles of well stimulations followed by practical skills related to design and evaluation of stimulation treatments. At the end of this course, participants will gain the ability and confidence in solving real-world problems by integrating physics, geology, rock mechanics, formation evaluation, production and reservoir engineering. Examples, case studies, and leading software demonstration/practices will further enhance participants' knowledge and skills acquired in this course.

Transportation and Storage of Natural Gas (course type: elective; course code: PGE 428)

Course Description : Transportation of natural gas, Design and construction of natural gas pipelines, Liquefied Natural Gas (LNG).Compressed Natural Gas (CNG) Underground Storage of Natural Gas

Well Design Control (course type: elective; course code: PGE 429)

Course Description : Well Design and Control are very important for a successful drilling operation. The well design concepts are very important to be comprehended by the engineer in charge of the operation. The Well Control measures are determined in place taking into consideration the policy requirements of the organizations. Well Control fundamentals are in place being used by the industry since the early 1960s. Accident statistics show that the merits of training, and most individuals involved in drilling or other well operations do receive well control training, topics of which are based on the subjects determined by forums recognized by the main drivers of the industry. This course is aiming the determination of the basic well design requirements and main aspects of the well control procedures.

Hydrocarbon Geophysics (course type: elective; course code: PGE 430)

Course Description : Description of Hydrocarbons (Fossil Fuels), A brief history of hydrocarbon exploration, Passive Geophysical methods for hydrocarbon explorations (Gravity, Magnetic and EM methods., Theory and Principles), Student presentations-I (first project topics- coal, oil and natural gas explorations with passive geophysical methods), Active geophysical methods for hydrocarbon explorations (Seismic methods, Theory and Principles), Introduction to seismic amplitude-versus-offset (AVO) Analysis, Seismic modeling of hydrocarbon bearing structural traps (geometrical and resolutional aspects), A new energy source, Gas Hydrates, Exploration of gas hydrates and their economic and environmental importance, Student presentations-II (second project topics- Oil, natural gas and gas hydrate explorations with active geophysical methods), Overall evaluation of the methods in hydrocarbon exploration.

Geological Maps and Cartography (course type: elective; course code: PGE 431)

Course Description : Importance of geological maps in engineering projects. Properties of the linear and planar structures. Properties of topographic maps and contouring. Surface geology and relationships between surface and subsurface planar structures. Structure contours and their importance. Preparation and interpretation of geological maps based on structure contours. Map pattern and cross sections of undeformed areas. Map pattern and cross sections of folded beds. Map pattern and cross sections of unconformities. Map pattern and cross sections of faulted regions. Map pattern and cross sections of non-bedded units. Interpretation of geological maps.

Safety & Environmental Protection (course type: elective; course code: PGE 432)

Course Description : Wide variety of subjects in health, safety and environmental protection in the activities and facilities of oil, gas, and geothermal industries are covered in the course. A term project is assigned to groups of students who are required to present their work to other groups, and group projects are required to be reported.

Well Design (course type: elective; course code: PGE 433)

Course Description : Describing operational sequences, Well Design presents a unified approach to well design process and an overview from spudding the well through drilling and completion to startup and production. The information is then applied to fracture gradient curve design, which serves as input to the well design process. Following designs shall mainly be covered in the course; Casing Design, Mud Design, Drill String Design, Sucker Rod Pumping Unit Design, Gas Lift Design. Discussions regarding the potential for optimization will conclude the course.

Individual Study (course type: elective; course code: PGE 434)

Course Description : Literature search in area of interest (in the area of Petroleum and Natural Gas Engineering), in class discussions and paper presentations in the area of interest, preparation of final report and final report presentation.

Petroleum Fuels Market & Segment (course type: elective; course code: PGE 435)

Course Description : This course aims to get basic products derived from petroleum and their market perspectives and that of segmenting the products namely fuels. This course is primarily designed for the students from 5 th semester and upwards. It is highly recommended for 7 and 8 semester students before they leave the department as young professionals. This course will provide these young engineers with the basic understanding of what they would deal with as they begin their professional life in working environment. Further, the fields dealt with professional institutions and International market tools i.e. Platt's, EPDK and relevant terminologies and their applications in business are discussed.

Simulating of Geosystems (course type: elective; course code: PGE 436)

Course Description : Simulation in general (incentives for simulation, planning a simulation

study). Equations for mass/heat flow in permeable/porous media. Modeling concepts (finite differences, 1D, 2D and 3D mass/heat flow domains). Selecting reservoir-rock and fluid-properties data. Selecting grid block and time steps. Placement of wells in grid blocks. History matching and predicting future performance of geosystems by numerical simulation. Applications of simulation to oil and gas reservoirs as well as geothermal reservoirs.

Well Test Analysis (course type: elective; course code: PGE 437)

Course Description : Fundamentals of well testing and analysis; Injection/falloff, drawdown/buildup tests; Derivations of flow equations describing unsteady flow of fluids (single, multi-phase fluid flow) in porous media; Solutions of diffusivity equations with different initial and boundary conditions; Interference testing; Modelling of wellbore storage and skin effects; Conventional analysis techniques (manual type-curve matching and straight line methods); Modern analysis techniques (pressure-derivative and pressure-integral methods, computer aided automated type-curve matching); Superposition in space and time (modelling interference effects between wells, boundary and variable flow rate effects); Flow regimes observed in vertical wells producing in infinite and bounded homogeneous systems; Convolution and Deconvolution; Well test analysis in gas wells; Drill stem testing (DST); An overview of pressure transient analyses in complex well/reservoir systems (horizontal wells, naturally fractured reservoirs).

Eastern Mediterranean Hydrocarbon Geopolitics (course type: elective; course code: PGE 438)

Course Description: Course starts with geographical introduction of the Mediterranean Basin and its importance for world human life. Brief geology of the Eastern Mediterranean region, hydrocarbon basins and reserves are discussed. Significance of pipeline and marine transportation of hydrocarbons in the area is elaborated. Continental shelf and Exclusive Economic Zone (EEZ) concepts as defined by United Nations Convention on Law of Seas (UNCLOS) are elaborated. Status of delimitation of EEZ, conflicts and security issues are brought into attention of attendees. Ongoing exploration activities by littoral states in the region are also included.

LPG Technology and Sector (course type: elective; course code: PGE 439)

Course Description : History of LPG (liquefied petroleum gas) utilization and trade in Turkey and in the world. LPG properties, phase behavior, production, storage and bottling facilities, land and sea born transport. LPG consumption as bottled, bulk and fuel in motor vehicles. Safety measures for LPG fires and hazards. LPG sector and market in Turkey. Laws, legislation, and standards for LPG operations, facilities, and consumption. Technical trip to LPG storage facility and filling station.