

Module designation	<i>AZL 225 Azerbaijani Language and Art of Speech</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Kamala Mehdiyeva</i>
Language	<i>Azerbaijani</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):36 Private study including examination preparation, specified in hours: 84</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Every person should always be aware of the richness and beauty of his speech, and his speech, along with his dress and manners, should be in line with today's high level. When talking about human beauty, speech culture is also considered as the most necessary factor in the complementarity of its inner and outer world. The concept of speech culture is quite broad in terms of its volume and scope. This includes the main factors determining cultural speech, literary language norms, speech ethics, the role of cultural speech in social and socio-economic development, ways and methods of acquiring speech culture, and other issues.</i>
Content	<i>Introduction to Speech Culture, Norms of Literary Language, Speech Ethics and Etiquette, Expressiveness in Speech, The Role of Language in Society, Public Speaking and Rhetoric, Improving Speech Culture, Azerbaijani Language in Modern Communication</i>
Examination forms	<i>Written and oral exams</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Nadir Abdullayev-Nitq Mədəniyyətinin Əsasları</i>

Module designation	<i>CHE 205 General Chemistry</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Ulviyya Jabiyeva</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Lecture, Tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:168 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 108</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>Understand and apply fundamental chemical concepts and terminology, including atomic structure, chemical bonding, stoichiometry, states of matter, and thermochemistry.</i></p> <p><i>Develop quantitative problem-solving skills for interpreting and predicting chemical behaviour using chemical equations, mole relationships, and concentration concepts.</i></p> <p><i>Demonstrate knowledge of atomic theory and periodic trends to explain the chemical and physical properties of elements and compounds.</i></p> <p><i>Use principles of chemical bonding and molecular geometry to predict the structure and properties of molecules.</i></p> <p><i>Analyse chemical reactions, including acid-base, redox, precipitation, and combustion reactions, and calculate the amounts of reactants and products involved.</i></p> <p><i>Understand the properties and behaviour of gases, liquids, and solids using kinetic molecular theory and intermolecular forces.</i></p> <p><i>Apply thermodynamic principles such as enthalpy, entropy, and Gibbs free energy to evaluate the feasibility and energy changes of chemical reactions.</i></p> <p><i>Recognize the role of chemistry in environmental, industrial, and everyday contexts, particularly its relevance to petroleum and chemical engineering.</i></p>

Content	<i>Introduction to chemistry</i> <i>Atomic structure and periodic table</i> <i>Chemical bonding</i> <i>Chemical reaction</i> <i>Quantities in chemical reactions, stoichiometry</i> <i>Molecules and compounds</i> <i>Quantitative composition of compounds</i> <i>Redox reactions</i> <i>Reaction rate and Equilibrium</i> <i>Solutions</i> <i>Acid and bases</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>"Introduction to General, Organic and Biochemistry" by Andy Wells.</i> <i>"Fundamentals of chemistry" by Brent Hamaoka Palomar College.</i>

Module designation	<i>CHE 582 Oil and Gas Processing</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Sanan Suleymanli</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Treatment of fluids from a hydrocarbon reservoir falls under the specialism of chemical and process engineers. This course is related to the main process operations and units associated with oil and gas production facilities, highlights the issues affecting the operation of process equipment. Course introduces Chemical Engineering students into reservoir properties, pressure maintenance and thermodynamic behavior, as well as flow assurance, gas hydrates, scale, asphaltenes and wax formation problems. Students will be familiarized with the treatment systems for oil and gas processing facilities, focusing on offshore installations, design and operation of equipment for two and three phase gas/oil/water separation, pipelines and infrastructure used for the transportation of oil and gas - subsea gathering and export lines.</i>
Content	<i>GAS HYDRATES, OILFIELD SCALE, WAX DEPOSITION, ASPHALTENES SURFACE PROCESSING: TREATMENT OVERVIEW, SURFACE PROCESSING; PRIMARY SEPARATORS, EMULSION TREATMENT, SURFACE PROCESSING; GAS TREATMENT, SURFACE PROCESSING; PRODUCED WATER TREATMENT, SURFACE PROCESSING; WATER INJECTION, OIL AND GAS PIPELINES</i>
Examination forms	<i>Witten Exam</i>

Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Oil and Gas Processing Handbook by HW Fundamentals of Natural Gas Processing – Arthur J. Kidnay, William R. Parrish Petroleum and Gas Field Processing – H.K. Abdel-Aal, M. Aggour & M. Fahim</i>

Module designation	<i>CHEPE 204 Petroleum Chemistry</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Ulviya Jabiyeva</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 90</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>This course introduces the essential concepts of crude oil composition, refining operations, and petrochemical processing. Students will gain a structured understanding of how crude oil is characterized and how major refining units convert it into useful fuels and chemical feedstocks.</i></p> <p><i>The first part of the course focuses on key refining techniques—including distillation, cracking, reforming, and hydrotreating—with emphasis on their principles, industrial applications, and factors affecting product quality. Students are expected to review related materials prior to lectures and be prepared for discussions.</i></p> <p><i>The second part covers petrochemical intermediates and end-products, outlining their production pathways and economic relevance. Environmental, safety, and sustainability considerations in modern petroleum operations will be highlighted through case studies. These elements form the core of the module, and active participation is expected throughout.</i></p>

Content	<ul style="list-style-type: none"> • <i>Introduction to petroleum chemistry</i> • <i>Composition of crude oil</i> • <i>Basic concepts of organic chemistry</i> • <i>Crude oil processing and production of hydrocarbon intermediates</i> • <i>Nonhydrocarbon intermediates</i> • <i>Crude distillation</i> • <i>Reforming and isomerization</i> • <i>Thermal cracking and coking</i> • <i>Basic petrochemicals</i> • <i>Polymerization</i> • <i>Environmental aspects in refining</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>"Petroleum Refining Technology and Economics" by James H. Gary and Glenn E. Handwerk.</i></p> <p><i>"Fundamentals of Petroleum Refining" by Mohamed A. Fahim, Taher A. Al-Sahhaf, and Amal Elkilani.</i></p>

Module designation	<i>PETE 517 Well Testing and Analysis</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Firudin Aliyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:150</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60</i></p> <p><i>Private study including examination preparation, specified in hours: 90</i></p>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>This course provides a systematic introduction to the principles, methods and applications of well testing used in petroleum engineering. The module builds on students' prior knowledge of reservoir behavior and fluid flow, expanding it into practical techniques for evaluating reservoir performance, diagnosing wellbore problems and supporting production decisions.</i></p> <p><i>The first part of the material focuses on the fundamentals of pressure transient analysis, including wellbore storage, skin, flow regimes and diagnostic interpretation. Students will become familiar with the theory behind diffusivity equations, type-curve matching and analytical solutions commonly used to characterize reservoirs. They will be required to review lecture notes prior to</i></p>

	<p><i>class discussions and to work through numerical examples that illustrate key concepts.</i></p> <p><i>The second part covers practical well testing operations, test design, surface and downhole measurements, data quality control and interpretation of real field tests. Transient behavior in oil, gas and water-injection wells will be studied, along with common issues such as formation damage, partial penetration, fractured wells, boundaries and heterogeneities. Case studies and data sets from actual field operations will be integrated throughout the course. These activities form an essential component of the learning outcomes, and students are expected to participate actively in all sessions.</i></p>
Content	<ul style="list-style-type: none"> • <i>Principles of pressure transient behavior</i> • <i>Wellbore storage and skin effects</i> • <i>Radial, linear and spherical flow regimes</i> • <i>Diffusivity equation and analytical solutions</i> • <i>Type-curve analysis and diagnostic plotting</i> • <i>Drill stem testing (DST) and surface well testing operations</i> • <i>Multiphase effects and practical limitations</i> • <i>Radius of investigation and boundary identification</i> • <i>Interpretation of buildup, drawdown and injection tests</i> • <i>Fractured wells, partial penetration and wellbore anomalies</i> • <i>Data acquisition systems and quality control</i> • <i>Application of well testing in reservoir characterization and production optimization</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Well Testing – John Lee</i> <i>Pressure Transient Testing – Michael J. Economides, A. Daniel Hill</i> <i>Well Test Design and Analysis – Dominique Bourdet</i></p>

Module designation	<i>PETE 517 Well Testing and Analysis</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Firudin Aliyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:150</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60</i></p> <p><i>Private study including examination preparation, specified in hours: 90</i></p>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>This course provides a systematic introduction to the principles, methods and applications of well testing used in petroleum engineering. The module builds on students' prior knowledge of reservoir behavior and fluid flow, expanding it into practical techniques for evaluating reservoir performance, diagnosing wellbore problems and supporting production decisions.</i></p> <p><i>The first part of the material focuses on the fundamentals of pressure transient analysis, including wellbore storage, skin, flow regimes and diagnostic interpretation. Students will become familiar with the theory behind diffusivity equations, type-curve</i></p>

	<p><i>matching and analytical solutions commonly used to characterize reservoirs. They will be required to review lecture notes prior to class discussions and to work through numerical examples that illustrate key concepts.</i></p> <p><i>The second part covers practical well testing operations, test design, surface and downhole measurements, data quality control and interpretation of real field tests. Transient behavior in oil, gas and water-injection wells will be studied, along with common issues such as formation damage, partial penetration, fractured wells, boundaries and heterogeneities. Case studies and data sets from actual field operations will be integrated throughout the course. These activities form an essential component of the learning outcomes, and students are expected to participate actively in all sessions.</i></p>
<p>Content</p>	<ul style="list-style-type: none"> • <i>Principles of pressure transient behavior</i> • <i>Wellbore storage and skin effects</i> • <i>Radial, linear and spherical flow regimes</i> • <i>Diffusivity equation and analytical solutions</i> • <i>Type-curve analysis and diagnostic plotting</i> • <i>Drill stem testing (DST) and surface well testing operations</i> • <i>Multiphase effects and practical limitations</i> • <i>Radius of investigation and boundary identification</i> • <i>Interpretation of buildup, drawdown and injection tests</i> • <i>Fractured wells, partial penetration and wellbore anomalies</i> • <i>Data acquisition systems and quality control</i> • <i>Application of well testing in reservoir characterization and production optimization</i>
<p>Examination forms</p>	<p><i>Witten Exam</i></p>
<p>Study and examination requirements</p>	<p><i>Total grade above 61</i></p>
<p>Reading list</p>	<p><i>Well Testing – John Lee</i> <i>Pressure Transient Testing – Michael J. Economides, A. Daniel Hill</i> <i>Well Test Design and Analysis – Dominique Bourdet</i></p>

Module designation	<i>PETE 527 Directional horizontal and multilateral drilling</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 90</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>This course introduces students to the principles, design and operational practices of directional, horizontal and multilateral drilling. The material builds on fundamental drilling engineering concepts and expands into advanced well placement technologies used in modern oil and gas development. Emphasis is placed on understanding how trajectory control, survey techniques and</i>

	<p><i>bottom-hole assembly design support efficient reservoir contact and optimized field development.</i></p> <p><i>The first part of the course focuses on directional drilling fundamentals, including surveying methods, well path planning, BHA configurations, and the mechanics of deflection tools such as motors and rotary steerable systems. Students will be expected to review lecture material before class sessions and to practice trajectory calculations and design workflows during tutorials.</i></p> <p><i>The second part covers horizontal and multilateral well concepts, including their applications, advantages, stability considerations, completion requirements, and operational challenges. Case studies will illustrate how these well types enhance reservoir drainage and improve project economics. Surface and downhole risks, wellbore placement accuracy, torque and drag, hole cleaning, and associated design considerations will also be examined. These exercises form an integral part of the course, and students are expected to participate fully in all activities.</i></p>
Content	<ul style="list-style-type: none"> • <i>Objectives and applications of directional drilling</i> • <i>Surveying methods and minimum curvature calculations</i> • <i>Well path design, planning and trajectory control</i> • <i>Deflection tools: downhole motors, rotary steerable systems</i> • <i>Bottom-hole assemblies for directional drilling</i> • <i>Torque, drag and hole cleaning in deviated wells</i> • <i>Horizontal well design and operational considerations</i> • <i>Multilateral well types, junction classifications and applications</i> • <i>Stability issues in high-angle wells</i> • <i>Completion options for horizontal and multilateral wells</i> • <i>Real field examples and industry case studies</i> • <i>Risk management and operational best practices</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Directional Drilling – Tom Inglis</i></p> <p><i>Applied Directional Drilling – Anil Kumar & J.J. Azar</i></p> <p><i>Directional, Horizontal, and Multilateral Wells – Society of Petroleum Engineers</i></p>

Module designation	<i>PETE 527 Directional horizontal and multilateral drilling</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:150</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60</i></p> <p><i>Private study including examination preparation, specified in hours: 90</i></p>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	

<p>Module objectives/intended learning outcomes</p>	<p><i>This course introduces students to the principles, design and operational practices of directional, horizontal and multilateral drilling. The material builds on fundamental drilling engineering concepts and expands into advanced well placement technologies used in modern oil and gas development. Emphasis is placed on understanding how trajectory control, survey techniques and bottom-hole assembly design support efficient reservoir contact and optimized field development.</i></p> <p><i>The first part of the course focuses on directional drilling fundamentals, including surveying methods, well path planning, BHA configurations, and the mechanics of deflection tools such as motors and rotary steerable systems. Students will be expected to review lecture material before class sessions and to practice trajectory calculations and design workflows during tutorials.</i></p> <p><i>The second part covers horizontal and multilateral well concepts, including their applications, advantages, stability considerations, completion requirements, and operational challenges. Case studies will illustrate how these well types enhance reservoir drainage and improve project economics. Surface and downhole risks, wellbore placement accuracy, torque and drag, hole cleaning, and associated design considerations will also be examined. These exercises form an integral part of the course, and students are expected to participate fully in all activities.</i></p>
<p>Content</p>	<ul style="list-style-type: none"> • Objectives and applications of directional drilling • Surveying methods and minimum curvature calculations • Well path design, planning and trajectory control • Deflection tools: downhole motors, rotary steerable systems • Bottom-hole assemblies for directional drilling • Torque, drag and hole cleaning in deviated wells • Horizontal well design and operational considerations • Multilateral well types, junction classifications and applications • Stability issues in high-angle wells • Completion options for horizontal and multilateral wells • Real field examples and industry case studies • Risk management and operational best practices
<p>Examination forms</p>	<p><i>Written Exam</i></p>
<p>Study and examination requirements</p>	<p><i>Total grade above 61</i></p>

Reading list	<i>Directional Drilling – Tom Inglis</i> <i>Applied Directional Drilling – Anil Kumar & J.J. Azar</i> <i>Directional, Horizontal, and Multilateral Wells – Society of Petroleum Engineers</i>
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Module designation	<i>GEOL 322 Oil and Gas Geology and Geophysics</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Assoc.Prof.Gasham Zeynalov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150</i> <i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):66</i> <i>Private study including examination preparation, specified in hours¹: 84</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Concept of petroleum play - Understand the difference between a lead and a prospect; description components of a petroleum play;</i>

	<p><i>understand the concept of maturity of source rocks; description primary and secondary oil migration; understand why timing of source rock generation and trap formation are important.</i></p> <p><i>Depositional Environments: Understand concept of facies and depositional environment; application Walther’s law in different depositional environments; understand general differences between the features of clastic versus carbonate depositional environments; understand how the depositional environment is related to the petroleum play</i></p> <p><i>Reservoir Description: Understand how the geometry and the architecture of the reservoir affect the description of the reservoir; the characteristics of a stratigraphic trap; identification name of the common types of structural features that affect the quality or connectivity of reservoir rocks; characteristics of a structural trap; understand the importance of fractures and other localized deformation in terms of their impact on fluid flow characteristics in reservoirs; identification structural features on cross sections, maps and interpreted seismic lines.</i></p> <p><i>Source rocks and Seals: Understand the basic concepts of source rocks, seals and petroleum traps; characterization of main depositional environments for source rocks and seals: description elements of a good source rock and maturity of source rocks; description main types of geochemical indices for source rocks; description the elements of an effective seal; understand how petroleum traps are affected by the timing of geological events.</i></p> <p><i>Introduction to the Geophysics: Understand the basic geophysical concepts as used in the petroleum industry; description main geophysical methods; understand the differences between P and S waves and fundamentals of the reflection seismic method; application seismic data in reservoir description.</i></p> <p><i>Calculating hydrocarbon volumes: understand correlation wells using lithostratigraphy, depositional environments interpretations and biostratigraphy; description correlation guidelines for wells; working with structure contour maps and do cross-sections from them; Estimation the GRV using the counting-squares method; calculation the STOIP using estimation of GRV.</i></p>
Content	Introduction To the Petroleum Play, Depositional Environments, Coastal And Shallow Marine Depositional Environments, Reservoir Description, Source Rocks And Seals, Introduction To Geophysics
Examination forms	Witten Exam
Study and examination requirements	Total grade above 61
Reading list	GEOSCIENCE B: Handbook by HW

Module designation	<i>HIST 225 History of Azerbaijan</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Assoc. Prof. Alamdar Shahverdiyev</i>
Language	<i>Azerbaijani</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 102</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>This course will cover History of Azerbaijan since ancient periods till nowadays, focusing on political, economic, military, agrarian, ethnic, demographic processes which happened in the history of Azerbaijan nation. Delivering to students: problems of formation of Azerbaijan nation, historical stages of statehood of Azerbaijan, we will focus on acquiring by them the skills of objective assessment of historical issues. The course will be taught through the series of seminars and lectures grouped by topics.</i>

	<i>Academic Aims of the course: Over the course of the semester the students will learn the successes and failures that Azerbaijan nation has faced through the historical evolution process and will expand their knowledge of the history and historical analysis as well as provide them with the ability to critically read the sophisticated literature of the discipline and understand it.</i>
Content	<i>Introduction to Azerbaijani History, Ancient and Medieval Azerbaijan, Formation of the Azerbaijani Nation, Statehood in Azerbaijan, Economic and Agrarian Transformations, 20th Century and Soviet Period, Modern Azerbaijan, 44-Day Patriotic War (Second Karabakh War)</i>
Examination forms	<i>Written exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>History of Azerbaijan, Volume I (From Ancient Times to the 20th Century). Edited by Z. Bunyadov and Y. Yusifov. Baku, 1994, and other editions. Tofiq Nəcəfli, Bilal Dədəyev - History of Azerbaijan. Baku, 2015.</i>

Module designation	<i>MACD 513, Fundamentals of Civil Defense and Medical Aid</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Prof.Kanan Yusifzada</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:90 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):24 Private study including examination preparation, specified in hours: 66</i>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>In teaching of civil defense: classification of urgent and emergency circumstances in war and peaceful period, general questions of civil defense, impact of urgent and emergency circumstances are explained. In urgent and emergency circumstances protection methods of population, main objectives of civil defense medical aid, provision of pre-hospital medical aid in injuries, carrying out anti-epidemic and sanitary and hygienic measures, rules of providing treatment and preventive aid to population</i>

Content	<p><i>Role, Tasks And Organization Of Civil Defense</i></p> <p><i>Medical And Tactical Characteristics Of Damage Caused By Urgent And Exigent Cases</i></p> <p><i>Organizing Medical Support For Relocation Of People In Case Of Natural Disasters Or Military Threat</i></p> <p><i>Personal And Medical Protective Equipment</i></p> <p><i>Medical Evacuation Of Emergency Affected Persons</i></p> <p><i>First Aid Administration</i></p>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>The Civil Defence Handbook" by P. D. McDade</i></p> <p><i>Emergency Management: Principles and Practice for Local Government" by William L. Waugh Jr. and Kathleen Tierney</i></p>

Module designation	<i>MATH 214 Calculus 2</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Assoc. Prof. Khanum Jafarova</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 102</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	<i>MATH 215</i>
Module objectives/intended learning outcomes	<i>A course of Mathematics 2 studies the various concepts in pure and applied mathematics. The course consists of four chapters which include Introduction to Ordinary differential equations of the first order, Second order differential equations, Differentiation of functions of many variables, Integration of functions of many variables. Lectures will introduce the mathematical theory as well as worked examples taken from the fields of science, engineering and other numerate disciplines. Tutorials will support the students learning by providing a forum for practicing their mathematical skills. Students will gain a sound mathematical knowledge as well as an appreciation of mathematics as an important tool for a scientist or engineer.</i>

Content	Introduction to Ordinary Differential Equations, Homogenous, Linear, Constant-Coefficient, 2 nd Order ODEs, Inhomogeneous Linear, Partial Differentiation, Maxima and Minima, Taylor Series and Linear Approximation, Multiple Integrals, Double Integrals: Applications and Polar Coordinates
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Thomas' Calculus, 12th Edition, Mathematics for Engineers and Scientists 2 Handbook by HWU</i>

Module designation	<i>Calculus 1</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Assoc. Prof. Khanum Jafarova</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 132</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Develop a high level of understanding of using mathematical methods in solving different problems of engineering and science Work cooperatively to facilitate a collegial atmosphere conducive to learning for all students in the class. Prepare for and attend each class by reading the assigned sections before class, completing homework, and participating in class discussions and team activities.</i>
Content	<i>Functions. Domain and range of a function Limits, One Sided Limits Continuity</i>

	<p><i>Limits Involving Infinity</i></p> <p><i>Derivative of a function.</i></p> <p><i>Differentiation rules.</i></p> <p><i>Applications of derivatives. Equations of a tangent line and a normal line.</i></p> <p><i>Derivatives of Trigonometric Functions</i></p> <p><i>Derivatives of Exponential and Logarithmic Functions Implicit Differentiation</i></p> <p><i>Stationary points, increasing and decreasing functions, maxima and minima, points.</i></p> <p><i>Concave up and concave down functions, inflection points.</i></p> <p><i>Curve Sketching.</i></p> <p><i>Optimization problems.</i></p> <p><i>Antiderivative, the indefinite integral.</i></p> <p><i>Definition and Basic Properties. Methods of Calculation.</i></p> <p><i>Integration by substitution.</i></p> <p><i>Integration by parts.</i></p> <p><i>Integration by partial fractions.</i></p> <p><i>Integration of a rational, irrational and transcendental functions.</i></p> <p><i>Definite integrals.</i></p> <p><i>Applications of definite integrals: area under the curve, area between two curves, volumes. Improper integrals.</i></p>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Thomas' Calculus, 12th Edition, Mathematics for Engineers and Scientists 1 Handbook by HWU</i>

Module designation	<i>MATH 314 Linear Algebra</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Assoc. Prof. Khanum Jafarova</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 72</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Apply Laplace Transforms to solve differential equations. Perform vector operations and apply them in physics and engineering. Analyze 2D and 3D geometry, including lines, planes, and transformations. Work with matrices, solve linear systems, and compute eigenvalues/eigenvectors. Compute directional derivatives and apply them in optimization and physics.</i>
Content	<i>Laplace Transform Vectors 2D and 3D geometry Matrices Eigenvalues and Eigenvectors Directional Derivative</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>

Reading list

Thomas' Calculus, 12th Edition, Mathematics for Engineers and Scientists 4 Handbook by HWU

Module designation	MATH 315 Differential equations
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Assoc. Prof. Khanum Jafarova</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.): 48 Private study including examination preparation, specified in hours1: 132</i>
Credit points	6
Required and recommended prerequisites for joining the module	MATH 214
Module objectives/intended learning outcomes	<i>A course of Mathematics for Engineers and Scientists 2 studies the various concepts in pure and applied mathematics. The book is divided into 3 chapters where in the first of which present differentiation and integration. The next tackles complex numbers. Matrices are also encompassed in the book. Lectures will introduce the mathematical theory as well as worked examples taken from the fields of science, engineering and other numerate disciplines. Tutorials support the students learning by providing a forum for practicing their mathematical skills. Students gain a sound mathematical knowledge as well as an appreciation of mathematics as an important tool for a scientist or engineer.</i>
Content	<i>Functions, Fractions and Logs, Exponentials and Hyperbolic Functions, Applications of Linear and Log Functions, Differentiation, Integration, Statistics and Probability, Vectors-basics, Scalar product, Vector Product</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Thomas' Calculus, 12th Edition, Mathematics for Engineers and Scientists 3 Handbook by HWU</i>

Module designation	<i>MATH 421 Probability and Statistics</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Assoc.Prof.Khanum Jafarova</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 102</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>To develop students' understanding of fundamental concepts in probability and statistics, including random variables, probability distributions, estimation, hypothesis testing, regression, and data analysis. By the end of the module, students will be able to apply probabilistic reasoning, perform statistical evaluations, interpret data-driven results, and utilize statistical tools to support decision-making in engineering and scientific contexts.</i>
Content	<i>Introduction to Probability and Statistics; data types; descriptive statistics Probability concepts; sample space; events; rules of probability Conditional probability; Bayes' theorem; independence Random variables; discrete distributions (Bernoulli, Binomial, Poisson) Continuous distributions (Uniform, Exponential, Normal) Joint distributions; covariance and correlation Sampling theory; sampling distributions; Central Limit Theorem Point estimation; properties of estimators; confidence intervals Hypothesis testing fundamentals; z-tests and t-tests Chi-square tests; non-parametric tests Simple linear regression; correlation analysis Multiple regression; introduction to statistical software / course review</i>
Examination forms	<i>Written Exam</i>

Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Walpole, R. E., Myers, R. H., Myers, S. L., & Ye, K. (2017). Probability and Statistics for Engineers and Scientists (9th Edition). Pearson.</i>

Module designation	<i>PETE 201 Junior Student Paper Content</i>
Semester(s) in which the module is taught	<i>Fall</i>

Person responsible for the module	<i>PE Department</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, seminar</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:90 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):24 Private study including examination preparation, specified in hours: 66</i>
Credit points	<i>3</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>The objective of the Student Research Paper Competition module is to develop students' foundational research skills by engaging them in a small-scale research project assigned through a dedicated topic and supervisor. This module guides students in defining a technical problem, analysing relevant data, and presenting scientifically sound conclusions. It also aims to strengthen academic writing, critical thinking, and professional presentation abilities, while fostering independence, creativity, and discipline in engineering research.</i>
Content	
Examination forms	<i>Report, Poster</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	

Module designation	<i>PETE 204 Engineering Mechanics 1</i>
Semester(s) in which the module is taught	<i>Spring</i>

Person responsible for the module	<i>Prof. Fuad Valiyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):72 Private study including examination preparation, specified in hours: 78</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Analyze rectilinear and angular motion using fundamental kinematic equations. Apply Newton's laws to solve dynamic problems. Utilize work-energy principles and impulse-momentum concepts in motion analysis. Solve static-based problems related to strength and structural integrity. Develop problem-solving skills through traditional face-to-face learning.</i>
Content	<i>Rectilinear Motion, Projectiles and Relative Motion, Angular Motion, Newton's Law of Motion, Work and Energy, Impulse and Momentum, Introduction to Strengths, Stress and Strain, Constitutive Equations, Static Based Problems, Mechanical Properties, Case Studies</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>R.C. Hibbeler, Engineering Mechanics. Statics and Dynamics (14 Edition), 2015 R.C. Hibbeler, Mechanics of Materials (10th edition), 2016 For class presentations and discussions, the student should utilize internet materials. Moreover, the course does not limit the use of learning materials available at BHOS library.</i>

Module designation	<i>PETE 224 Introduction to Petroleum Engineering</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>

Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 60</i>
Credit points	4
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>Understand the fundamental principles of petroleum engineering and its role in the energy industry.</i></p> <p><i>Explain the basics of petroleum geology and the processes involved in hydrocarbon formation and accumulation.</i></p> <p><i>Describe reservoir fluid behavior and the physical properties of reservoir rocks and fluids.</i></p> <p><i>Apply geophysical methods for reservoir exploration and characterization.</i></p> <p><i>Interpret formation evaluation and well logging data to assess reservoir potential.</i></p> <p><i>Understand drilling engineering concepts, including well design, drilling operations, and challenges.</i></p> <p><i>Explain well completion techniques and their role in optimizing production.</i></p> <p><i>Gain an overview of production engineering methods and hydrocarbon recovery processes.</i></p> <p><i>Develop a broad understanding of the petroleum industry, from exploration to production.</i></p>
Content	<i>Introduction, Petroleum Geology, Reservoir Fluid Behavior, Reservoir Rock and Fluid Properties, Reservoir Geophysics, Formation Evaluation, Well Logging, Drilling, Completion and Production</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Introduction to Petroleum Engineering:John R. Fanchi, Richard L. Christiansen</i></p> <p><i>Petroleum Engineering Handbook Volume V, Larry W. Lake</i></p> <p><i>Reservoir Engineering Handbook by Tarek Ahmed, 4th Edition</i></p>

Module designation	<i>PETE 292 Summer Internship-1</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Company and University Supervisors Assigned</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Project and In-field experience</i>
Workload (incl. contact hours, self-study hours)	

Credit points	6
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>The Summer Internship Program aims to provide students with hands-on, practical experience in their field of study by applying theoretical knowledge to real-world industry challenges. Through direct engagement with professionals, students will develop technical skills, problem-solving abilities, and professional competencies necessary for career readiness. The internship will enhance their understanding of workplace dynamics, industry standards, and best practices while fostering teamwork, communication, and critical thinking. By the end of the program, students will have gained valuable insights into their profession, expanded their professional network, and improved their ability to analyze and address real-world problems effectively.</i>
Content	<i>Introduction to Workplace Safety & Industry Standards, Overview of the Oil & Gas Industry, Well Site & Facility Visits, Basic Drilling & Production Engineering Concepts, Data Collection & Reporting, Professional Development & Soft Skills</i>
Examination forms	<i>Report and presentation</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	

Module designation	<i>Fundamentals of fluid mechanics</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Prof. Fuad Valiyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180</i>

	<p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):72</i></p> <p><i>Private study including examination preparation, specified in hours: 108</i></p>
Credit points	6
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>Understand the fundamental principles of fluid mechanics and their applications in engineering.</i></p> <p><i>Analyze fluid statics and its role in pressure distribution within static fluids.</i></p> <p><i>Apply fluid dynamics principles to describe fluid motion and flow behavior.</i></p> <p><i>Evaluate frictional pressure losses in pipelines and flow systems.</i></p> <p><i>Understand flow measurement techniques and their applications in engineering practice.</i></p> <p><i>Design and analyze pumping systems, including pump selection and sizing.</i></p> <p><i>Differentiate between Newtonian and non-Newtonian fluids and their flow characteristics.</i></p> <p><i>Develop problem-solving skills in fluid mechanics for practical engineering applications.</i></p>
Content	<i>Introduction and Fluid Statics, Fluid Dynamics, Frictional Pressure Loss and Flow Measurement, Pumping Systems and Pump Sizing, Non-Newtonian Fluids</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>J.M. Coulson, J.F. Richardson, Chemical Engineering Volume 1 Pergamon Press</i></p> <p><i>J.F. Douglas, J.M. Gasiorek, J. A. Swaffield, Fluid Mechanics Pitman Publishing Ltd</i></p> <p><i>For class presentations and discussions, the student should utilize journal and internet materials. Moreover, the course does not limit the use of learning materials available at BHOS library.</i></p>

Module designation	PETE 318 Heat transfer processes
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Prof. Fuad Valiyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):72 Private study including examination preparation, specified in hours: 78</i>
Credit points	<i>5</i>

Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>Understand the fundamental principles of heat transfer and its significance in engineering applications.</i></p> <p><i>Analyze heat transfer mechanisms, including conduction, convection, and radiation.</i></p> <p><i>Apply heat transfer principles to real-world industrial processes.</i></p> <p><i>Evaluate the performance of heat transfer equipment used in process industries.</i></p> <p><i>Design and analyze heat exchangers for efficient thermal energy transfer.</i></p> <p><i>Understand the principles of boiling and condensation and their applications in heat transfer systems.</i></p> <p><i>Develop problem-solving skills in heat transfer for engineering applications.</i></p>
Content	<i>Introduction to Heat Transfer, Thermal Conduction, Convection and Radiation, Heat Transfer Equipment, Heat Exchanger Design, Boiling and Condensation</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>J.M. Coulson, J.F. Richardson, Chemical Engineering Volume 1</i></p> <p><i>J. M. Coulson, J.F. Richardson, Chemical Engineering Volume 6</i></p> <p><i>John H. Lienhard, A Heat Transfer Textbook: Fourth Edition, 4th Edition</i></p> <p><i>Process Engineering C – Textbook of Heriot Watt University</i></p>

Module designation	<i>PETE 404 Fundamentals of engineering thermodynamics</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Prof. Siyavush Azakov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 90</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	

<p>Module objectives/intended learning outcomes</p>	<p><i>Understand the principles of closed and open systems and their relevance in thermodynamic analysis.</i></p> <p><i>Analyze thermodynamic processes in open systems, including steady-state and transient operations.</i></p> <p><i>Explain throttling processes and multi-stage compression in engineering applications.</i></p> <p><i>Apply the Second Law of Thermodynamics to evaluate energy efficiency and irreversibility in processes.</i></p> <p><i>Understand the concept of entropy and its role in thermodynamic systems.</i></p> <p><i>Analyze the thermodynamics of chemical reactions, including energy changes and equilibrium considerations.</i></p> <p><i>Develop problem-solving skills for applying thermodynamic principles to real-world engineering problems.</i></p>
<p>Content</p>	<p><i>Closed Systems & Processes, Open Systems, Throttling & Multi-stage Compression, The Second Law of Thermodynamics, Entropy, Chemical Reactions</i></p>
<p>Examination forms</p>	<p><i>Written Exam</i></p>
<p>Study and examination requirements</p>	<p><i>Total grade above 61</i></p>
<p>Reading list</p>	<p><i>Process Engineering B Handbook by HWU</i></p>

Module designation	<i>PETE 407 Reservoir Engineering 1</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Firudin Aliyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	

<p>Module objectives/intended learning outcomes</p>	<p><i>Introduction to reservoir engineering – understanding the location, formation, fluid content of a hydrocarbon reservoir; understand the definitions of reserves; be aware of the role of reservoir engineering in exploration and development.</i></p> <p><i>Reservoir pressure and temperature - Formation fluid density and pressure gradient in the reservoir; location of water/oil/gas contacts; use of contacts and pressure gradients to delineate reservoir units; measurement of fluid gradients</i></p> <p><i>Reservoir fluids composition - Understanding composition of hydrocarbon fluids; classification systems based on density; simple models of fluid behavior</i></p> <p><i>Phase behavior of hydrocarbon systems - Define: system, components, phases, equilibrium, intensive and extensive properties; understand relationship between pressure and temperature and phase for single and multi- component systems; define the expected phase changes in a reservoir fluid as it is produced to surface.</i></p> <p><i>Behavior of gasses - Define equation of state wrt a reservoir gas; modify $pV=nRT$ to account for compressibility factor z ($pV=znRT$); use of pseudo critical values to account for gas mixtures; calculation of gas volumes and gas formation factor; use of equations of state in volume calculations.</i></p> <p><i>Properties of reservoir liquids - Definition of black oil and compositional models of reservoir fluid; use of flash and differential liberation to obtain black oil parameters; definition of B_o, R_s, B_g; define gas formation volume factor for a gas condensate; calculation of reservoir fluid viscosity.</i></p> <p><i>Fundamental properties of reservoir rocks - Definition of porosity and permeability; use of Darcy's Law to calculate permeability of single phase; definition of interfacial tension; use of capillary pressure to determine saturation changes in reservoir; definition of effective and relative permeability; use of drainage/imbibition curves to characterize reservoir relative permeability; understanding pore doublet model in relation to recovery factors in reservoir fluid systems</i></p>
<p>Content</p>	<p>Introduction To Reservoir Engineering, Reservoir Engineering Techniques, Reserve Estimating, Probabilistic Representation Of Reserves, Volume In – Place Calculations, Phases Of Development</p>
<p>Examination forms</p>	<p><i>Written Exam</i></p>
<p>Study and examination requirements</p>	<p><i>Total grade above 61</i></p>
<p>Reading list</p>	<p><i>Reservoir Engineering Handbook by Tarek Ahmed, 4th Edition</i> <i>Reservoir Engineering 1 Handbook by HW</i></p>

Module designation	<i>PETE 415 Petrophysics and Well Log Analysis</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Assoc.Prof.Javid Shiriyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:210 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 150</i>
Credit points	<i>7</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>A major role of petrophysicists is to measure and evaluate rock properties by acquiring well log measurements, in which a string of measurement tools is inserted in the borehole, core measurements, in which rock samples are retrieved from subsurface for the laboratory</i>

	<i>measurements, and seismic measurements, in which reflected seismic waves are recorded to image subsurface structures. These studies are then combined with geological and geophysical research, and reservoir engineers utilize this knowledge to describe the dynamic behavioural the reservoir. In this course, we will focus on the first way of acquiring data from underground formations and will look at the specific methodologies used in current field applications.</i>
Content	<i>Introduction to Formation Evaluation, Borehole Environment, Routine Core Analysis, Well Logging, Interpretation Techniques, Spontaneous Potential, Formation Water Resistivity, Acoustic Logging, Nuclear Family Tools, LithoPorosity Determination, Saturation Determination</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Formation Evaluation- Handbook by HW Openhole Log Analysis and Formation Evaluation by Richard M. Bateman, 2nd Edition</i>

Module designation	<i>PETE 422 Well Completion</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Provide a clear understanding of well completion principles, components, and functions. Equip students to evaluate reservoir conditions and select suitable completion types for optimal productivity and well integrity.</i>

	<p><i>Develop competence in key completion technologies, including perforating, sand control, packers, tubing, and safety systems.</i></p> <p><i>Enable students to design basic completion configurations and assess inflow/outflow performance.</i></p> <p><i>Introduce common completion challenges—formation damage, zonal isolation, sand production—and methods to mitigate them.</i></p> <p><i>Strengthen students’ ability to interpret completion diagrams, programs, and field data for practical decision-making.</i></p>
Content	<p><i>Introduction to Well Completion: objectives, types, and selection criteria</i></p> <p><i>Wellbore and reservoir evaluation for completion design</i></p> <p><i>Casing, tubing, and wellhead systems</i></p> <p><i>Packers: selection, types, and installation</i></p> <p><i>Perforating systems and techniques</i></p> <p><i>Sand control methods: gravel packing, screens, and frac packs</i></p> <p><i>Completion fluids and stimulation basics</i></p> <p><i>Production logging and well performance evaluation</i></p> <p><i>Zonal isolation and intelligent completion systems</i></p> <p><i>Safety considerations and well integrity management</i></p> <p><i>Completion design case studies and optimization</i></p> <p><i>Troubleshooting, field practices, and course review</i></p>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Well Completion Design, Jonathan Bellarby, 2009</i></p> <p><i>Economides, M. J., Nolte, K. G., & Hill, A. D. (2019). Reservoir and Production Well Engineering (2nd Edition). Wiley.</i></p>

Module designation	<i>PETE 425 Production Technology 1</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Production Technology 1 course studies field development concepts for oil and gas fields, facilities components and functions, upper and lower completion types and techniques for conventional oil and gas wells, completion string components and their specifications, functionalities and operational principles, areas of applications, wireline servicing of completion accessories, reservoir inflow performance, productivity of the well, vertical lift (tubing) performance, multiphase flow parameters and correlations, introduction to Nodal Analysis, selection and design of Artificial Lift (Gas lift, ESP, Rod pump etc)</i>
Content	<i>FIELD DEVELOPMENT CONCEPTS, CONVENTIONAL COMPLETIONS, RESERVOIR AND TUBING PERFORMANCE, SELECTION AND DESIGN OF ARTIFICIAL LIFT</i>
Examination forms	<i>Written Exam</i>

Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Well Performance by Michael Golan and Curtis H. Whitson Production Technology - 1 Handbook by HW</i>

Module designation	<i>PETE 432 Energy Engineering</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Prof. Siyavush Azakov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Provide students with a comprehensive understanding of energy resources, including fossil fuels, renewables, and emerging energy technologies. Develop the ability to analyze energy systems, their efficiency, and environmental impact. Equip students with tools to evaluate energy conversion, storage, and utilization methods for industrial and societal applications. Foster understanding of sustainable energy practices and strategies for reducing carbon footprint. Introduce students to energy policy, economics, and management principles affecting energy production and consumption. Enable students to apply engineering principles to optimize energy systems and propose innovative solutions for energy challenges.</i>
Content	<i>Introduction to Energy Engineering: scope, importance, and global energy landscape Energy resources: fossil fuels (coal, oil, natural gas)</i>

	<p><i>Renewable energy sources: solar, wind, hydro, and geothermal</i></p> <p><i>Nuclear energy: principles, reactor types, and safety considerations</i></p> <p><i>Energy conversion technologies: thermodynamics and power cycles</i></p> <p><i>Energy storage systems: batteries, thermal storage, and pumped hydro</i></p> <p><i>Energy efficiency in industrial and building systems</i></p> <p><i>Environmental impact of energy production and utilization</i></p> <p><i>Sustainable energy systems and smart grids</i></p> <p><i>Energy economics and policy frameworks</i></p> <p><i>Emerging technologies: hydrogen, bioenergy, and carbon capture</i></p> <p><i>Case studies, project work, and course review</i></p>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Kothari, D. P., Singal, K. C., & Ranjan, R. (2010). Renewable Energy Sources and Emerging Technologies (2nd Edition). Prentice Hall.</i></p> <p><i>Boyle, G. (2012). Renewable Energy: Power for a Sustainable Future (3rd Edition). Oxford University Press.</i></p> <p><i>Gomez, T., & Bansal, R. C. (2017). Energy Engineering: Fundamentals and Applications. CRC Press.</i></p>

Module designation	<i>PETE 435 Drilling</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):66 Private study including examination preparation, specified in hours: 114</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Course is aimed for bachelor and master students. It addresses in depth review of the Drilling Operations, Rig Components, The Drill string, Drilling Bits, Formation Pressures, Well Control, Casing, Cementing, Drilling Fluids, Hydraulics, Directional Drilling, Directional Surveying, Measurement While Drilling and Subsea Drilling.</i>
Content	<i>Overview Of Drilling Operations, Rig Components, The Drillstring, Drilling Bits, Formation Pore Pressures And Fracture Pressures ,Drilling Fluids And Fluid Mechanics, Well Control, Casing, Cementing , Directional Drilling & Surveying</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<ul style="list-style-type: none"> • <i>Drilling Engineering: Author Dr. John Ford, Heriot-Watt University, Department of Petroleum Engineering, Edinburgh, UK</i> • <i>Well Engineering and Construction: Hussain Rabia, Entrac Consulting</i> • <i>Baker Hughes INTEQ, Drilling Engineering Workbook, A Distributed Learning Course</i> • <i>Managed Pressure Drilling: Bill Rehm, Jerome Schubers, Arash Haghshenas, Amir Saman Paknejad and Jim Hughes</i>

Module designation	<i>PETE 444 Production Technology 2</i>
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Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Elvin Hasanli</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Production Technology 2 course covers material to describe advanced well construction and Improved Oil Recovery (IOR) methods and their application, technologies for drilling and completion of horizontal and multi-lateral wells; perforation design and operations, factors effecting perforations performance and damage due to perforations; formation damage and poor well performance, major sources of formation damage; matrix acidizing, candidate selection principles, the role of acid additives and acid volumes and injection rates, sandstone and carbonate acidizing; sand control and management, prediction of sand failure, various sand control options.</i>
Content	<i>Advanced Well Construction: Improved Oil Recovery, Perforating, Formation Damage, Matrix Acidizing, Sand Management</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Well Performance by Michael Golan and Curtis H. Whitson Production Technology - 2 Handbook by HW</i>

Module designation	<i>PETE 472 Fundamentals of Renewable Energy</i>
Semester(s) in which the module is taught	<i>Spring</i>

Person responsible for the module	<i>Prof. Siyavush Azakov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Provide students with a foundational understanding of renewable energy sources and technologies. Explain the principles of energy conversion and storage in renewable systems. Develop the ability to analyze, compare, and evaluate the performance of different renewable energy systems. Introduce environmental, economic, and policy considerations related to renewable energy deployment. Prepare students to apply renewable energy concepts in engineering projects and sustainable energy solutions.</i>
Content	<i>Introduction to Renewable Energy: importance, types, and global energy scenario Solar energy: photovoltaic and solar thermal systems Wind energy: principles, turbines, and performance analysis Hydro energy: small and large-scale hydroelectric systems Biomass energy: types, conversion technologies, and biofuels Geothermal energy: sources, power generation, and direct use Ocean energy: tidal, wave, and thermal energy conversion Energy storage technologies: batteries, pumped hydro, and thermal storage Grid integration of renewable energy systems Energy efficiency and smart grids Environmental and economic aspects of renewable energy Case studies, project presentations, and course review</i>
Examination forms	<i>Written Exam</i>

Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Boyle, G. (2012). Renewable Energy: Power for a Sustainable Future (3rd Edition). Oxford University Press.</i></p> <p><i>Kothari, D. P., Singal, K. C., & Ranjan, R. (2010). Renewable Energy Sources and Emerging Technologies (2nd Edition). Prentice Hall.</i></p> <p><i>Twidell, J., & Weir, T. (2015). Renewable Energy Resources (3rd Edition). Routledge.</i></p>

Module designation	<i>PETE 496 Summer Internship-3</i>
Semester(s) in which the module is taught	<i>Spring(Summer)</i>
Person responsible for the module	<i>Company and University Supervisors Assigned</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>

Teaching methods	<i>Project and In-field experience</i>
Workload (incl. contact hours, self-study hours)	
Credit points	6
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>The Summer Internship Program aims to provide students with hands-on, practical experience in their field of study by applying theoretical knowledge to real-world industry challenges. Through direct engagement with professionals, students will develop technical skills, problem-solving abilities, and professional competencies necessary for career readiness. The internship will enhance their understanding of workplace dynamics, industry standards, and best practices while fostering teamwork, communication, and critical thinking. By the end of the program, students will have gained valuable insights into their profession, expanded their professional network, and improved their ability to analyze and address real-world problems effectively.</i>
Content	<i>Advanced Drilling Engineering & Well Design, Enhanced Oil Recovery (EOR) & Reservoir Management, Production System Optimization, Field Development Planning & Economic Analysis, Petroleum Software & Data Analytics, Industry Case Study & Project Work</i>
Examination forms	<i>Report and presentation</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	

Module designation	PETE 505 Field Development Project A
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Petroleum Engineering Department</i>
Language	<i>English</i>

Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Consultation</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>The aim of the design project is to allow students to show their knowledge of petroleum engineering. Students will be working in a group to complete the task. Students will be provided with a set of real data from a field in the UK sector of the North Sea. Students will however also have to refer to information and data in the petroleum Engineering and Petroleum Geoscience literature and in the standard reference sources available from various sources. The 5th year project is a technical project with the following requirements 1. To produce a technical and economic analysis of a prospective Oil and Gas field, leading to the production of a development plan, which is suitable for presentation to Management 2. Each member to lead a specific section of the project and produce a report on that section. 3. To produce a group report which will be composed of individual sections above. 4. Complete a poster submission. Note that these four activities and submissions take place in semester 2. There will also be a group interim progress report submitted in semester</i>
Content	<i>Geology, Formation Evaluation, Reservoir Engineering, Drilling Engineering, Production Engineering, Economics,HSE</i>
Examination forms	<i>Report and Presentation</i>
Study and examination requirements	<i>Total grade above 61</i>

Reading list	<p>1. "Hydrocarbon Exploration and Production", Frank Jahn, Mark Cook, Mark Graham, Elsevier, 2008</p> <p>2. "Petroleum Engineering Handbook", Lake L.W., Editor-in-Chief, 2006, Society of Petroleum Engineers, ISBN 978-1-55563-126-0</p> <p>3. "Well Completion Design", 1st Edition, Jonathan Bellarby, J., Elsevier Science, 2009, ISBN: 9780080932521 (eBook) and 9780444532107 (Print Book)</p> <p>4. "Well Completion and Servicing", Perrin, D., 1999, Editions TECHNIP, ISBN: 9782710807650 "Petroleum Production Systems", 2nd Edition, M. Economides, D. Hill, C. Ehlig-Economides, D. Zhu, Prentice Hall, 2013, ISBN 0-13-703158-0</p> <p>5. "Production Optimization Using Nodal Analysis", 2nd Edition, Beggs, Dale H., OGCI and Petroskills Publications, 2003, ISBN: 0-930972-14-7</p>
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Module designation	PETE 507 Field Development Project B
Semester(s) in which the module is taught	Spring
Person responsible for the module	Petroleum Engineering Department
Language	English
Relation to curriculum	Compulsory
Teaching methods	Consultation
Workload (incl. contact hours, self-study hours)	<p>(Estimated) Total workload:180</p> <p>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60</p> <p>Private study including examination preparation, specified in hours: 120</p>
Credit points	6
Required and recommended prerequisites for joining the module	

<p>Module objectives/intended learning outcomes</p>	<p><i>The aim of the design project is to allow students to show their knowledge of petroleum engineering. Students will be working in a group to complete the task. Students will be provided with a set of real data from a field in the UK sector of the North Sea. Students will however also have to refer to information and data in the petroleum Engineering and Petroleum Geoscience literature and in the standard reference sources available from various sources.</i></p> <p><i>The 5th year project is a technical project with the following requirements</i></p> <ol style="list-style-type: none"> <i>1. To produce a technical and economic analysis of a prospective Oil and Gas field, leading to the production of a development plan, which is suitable for presentation to Management</i> <i>2. Each member to lead a specific section of the project and produce a report on that section.</i> <i>3. To produce a group report which will be composed of individual sections above.</i> <i>4. Complete a poster submission.</i> <p><i>Note that these four activities and submissions take place in semester 2. There will also be a group interim progress report submitted in semester</i></p>
<p>Content</p>	<p><i>Geology, Formation Evaluation, Reservoir Engineering, Drilling Engineering, Production Engineering, Economics,HSE</i></p>
<p>Examination forms</p>	<p><i>Report and Presentation</i></p>
<p>Study and examination requirements</p>	<p><i>Total grade above 61</i></p>
<p>Reading list</p>	<ol style="list-style-type: none"> <i>1. "Hydrocarbon Exploration and Production", Frank Jahn, Mark Cook, Mark Graham, Elsevier, 2008</i> <i>2. "Petroleum Engineering Handbook", Lake L.W., Editor-in-Chief, 2006, Society of Petroleum Engineers, ISBN 978-1-55563-126-0</i> <i>3. "Well Completion Design", 1st Edition, Jonathan Bellarby, J., Elsevier Science, 2009, ISBN: 9780080932521 (eBook) and 9780444532107 (Print Book)</i> <i>4. "Well Completion and Servicing", Perrin, D., 1999, Editions TECHNIP, ISBN: 9782710807650 "Petroleum Production Systems", 2nd Edition, M. Economides, D. Hill, C. Ehlig-Economides, D. Zhu, Prentice Hall, 2013, ISBN 0-13-703158-0</i> <i>5. "Production Optimization Using Nodal Analysis", 2nd Edition, Beggs, Dale H., OGCI and</i>

	<i>Petroskills Publications, 2003, ISBN: 0-930972-14-7</i>
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Module designation	<i>PETE 515 Reservoir Flow Simulation</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Assoc. Prof.Javid Shriyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:210 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 150</i>
Credit points	<i>7</i>
Required and recommended prerequisites for joining the module	

Module objectives/intended learning outcomes

- *Introduction: Description of a simulation model; Simplifications required to create a reservoir simulation model; Workflow for reservoir simulation; Reservoir simulation at different stages of reservoir development; Simulation case studies.*
- *Basic concepts in reservoir engineering: Material balance equation for an under-saturated oil reservoir; Conditions under which the material balance equations are valid; Single and two-phase Darcy Law in one dimension; Buckley-Leverett and Welge fractional flow theory.*
- *Gridding and well modelling: Concept of gridding and of spatial and temporal discretisation; Types of grid in 1D, 2D and 3D used in reservoir simulation; Numerical dispersion and grid orientation; Calculation of average permeability between grid cells; Well models and productivity index (PI); Average grid block pressure and Peaceman formula.*
- *Flow equations: Physics of single phase compressible Flow through porous media; equation for single phase compressible flow (PDE); Linearization of PDE for slightly compressible flow involving the hydraulic diffusivity; Extension of the single phase pressure equation to 2D; Conservation equation for two-phase flow; Simplified two-phase pressure equation for an incompressible system.*
- *Numerical methods in reservoir simulation: Simple finite difference expressions for derivatives, $(\partial P/\partial x)$, $(\partial P/\partial t)$ and $(\partial^2 P/\partial x^2)$; Application of finite difference approximations to a simple partial differential equation (PDE); Explicit and an implicit numerical schemes; Implicit finite difference scheme applied to a simple linear PDE leading to a set of linear equations which are tridiagonal in 1D and pentadiagonal in 2D; Methods for solution of linear equations; Simple description of Newton-Raphson method of solution of non-linear equations.*
- *Modelling and Upscaling: Overview of geological modelling approaches; Reason for upscaling; Calculation of effective permeability in simple models by averaging; Numerical upscaling of single-phase flow; effects of heterogeneity on two-phase flow; Limitations of applying singlephase upscaling to a two-phase problem; Description of upscaling methods for two-phase flow; Effect of small-scale structures on hydrocarbon recovery; Streamline simulation.*
- *Petrophysical and fluid data: Introduction to pore-scale effects; Capillary pressure; difference between drainage and imbibition; Leverett-J function for scaling capillary Pressure; methods for generating relative permeability curves; Hysteresis phenomena; Introduction to wettability; Fluid data for incompressible and compressible fluids.*
- *History matching – Introduction to history matching; Data required for history matching; Parameters adjusted during history matching; History-matching workflow; Overview of automated history-matching methods.*
- *Simulation of reservoir recovery processes: Introduction to EOR (enhanced oil recovery); Comparison of black oil and compositional simulation;*

	<i>Introduction to simulation of gas injection, including CO2 storage; Brief review of thermal and chemical EOR; Simulation of fractured reservoirs.</i>
Content	<i>Introduction, Rock and Fluid Properties, Governing Equations, Finite Difference Method, Solution Process, Radial Flow Modelling, Single Phase Nonlinearities, Component Transport, Single Phase Component Transport Solution, Black Oil Model, Multiphase Multicomponent Flow</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>AN INTRODUCTION TO MULTIPHASE MULTICOMPONENT RESERVOIR SIMULATION BY MATTHEW BALHOFF</i>

Module designation	<i>PETE 521 Energy Geopolitics and Petroleum Economics</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Shahin Maharramli</i>
Language	<i>English</i>

Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 150</i>
Credit points	<i>7</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Consistent with the University's mission, the Energy and Petroleum Economics course provides our students a framework to understand the diverse economic forces that drive individuals, global economies, and resource distribution, to apply economic principles and methodologies to management practice and build vital analytical and quantitative skills. The course covers the following topics: The Market- Demand and Supply, Evaluation Methods in Petroleum Economics, Time Value of Money, Net Present Value, Project Economics, Project Parameters, The Role of government in Development Oil and Gas Policies, Source of Risk and Uncertainties, Risk Management, Present Value, Discount Factor, Economically Profitable Project, Value of Information, Payback period, etc.</i>
Content	<ul style="list-style-type: none"> • <i>Economic/Financial appraisal of engineering projects – the role of financial planning and estimation.</i> • <i>Cash flows modelling and cash returns.</i> • <i>The concept of discounting and its relationship with compounding</i> • <i>Define price inflation and explain methods of inflation measurement</i> • <i>Net present value</i> • <i>Internal Rate of Return (IRR)</i> • <i>Cost evaluation methods including mathematical tools to assess viability – fixed capital cost and estimation, investment appraisal methods and minimum cost decisions.</i>
Examination forms	<i>Witten Exam</i>

Study and examination requirements	<i>Total grade above 61</i>
Reading list	<ul style="list-style-type: none"> • <i>“The Prize” by Daniel Yergin</i> • <i>Economics of Worldwide Petroleum Production by Fraser H. Allen & Richard D. Seba</i>

Module designation	<i>PETE 531 Health, Safety, Environment and Sustainability</i>
Semester(s) in which the module is taught	<i>Fall</i>

Person responsible for the module	<i>Natavan Samadova</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:120 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 72</i>
Credit points	<i>4</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>This course is divided into two sections: Health & Safety, and Sustainability. Course material builds upon the “Business Awareness, Safety and Sustainability” one taken in previous (fourth) year, going into the subject areas in more depth and breadth.</i></p> <p><i>Health & Safety: Material is focused on the basic ideas about professional responsibility, risk assessment and risk management; it has been illustrated with case histories that are included through the material to illustrate particular concepts. Students will be expected to read notes before the lecture sessions and should be prepared to discuss them. This course will include much more detail about structured Safety Management Systems, technical aspects of fires and explosions and more advanced Risk Assessment techniques applicable to the process industry.</i></p> <p><i>Sustainability: The previous course has explored the features of the sustainability problem, thus setting the foundation for an effective solution strategy which will be further explored, outlined and developed in this course. A number of areas will be covered, including establishment of the desirability and need for Sustainability Awareness and Competence within Chemical Engineering, the requirements and barriers faced, principles of Industrial Ecology and tools for possible solution. Case Studies and class activities will be introduced throughout each part of the Sustainability material. These are considered to be part of the course material and students are expected to be in attendance throughout.</i></p>

Content	<ul style="list-style-type: none"> • <i>Understand process fires and explosions types and technical aspects</i> • <i>Be able to estimate Infra-Red radiation from pool fires</i> • <i>Understand Inherently safer design (ISD) basic concepts and barriers to implementation</i> • <i>Understand the reliability concept, probability and types of probability</i> • <i>Be able to do failure rate and hazard rate calculations</i> • <i>Understand different maintenance strategies</i> • <i>Understand Safety management systems and their application in practice</i> • <i>Understand and differentiate risk assessment techniques: HAZOP, LOPA, fault trees, event trees. Quantitative risk assessment</i> • <i>Understand the importance of sustainability, definitions/description in the context within Chemical and Petroleum Engineering</i> • <i>Explain Industrial Ecology and Industrial symbiosis requirements and advantages of embracing sustainable options</i> • <i>Understand Environmental management systems; Cradle-to-Grave liability and awareness</i> • <i>Explain the concepts of Practical Sustainable Development and Sustainable Processing</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Sustainability, Health and Safety Handbook by HW Health and Safety Executive (2015). Safe use and handling of flammable liquids HSG140, 2nd edition</i></p> <p><i>T. A. Kletz (2010). Process Plants: A Handbook for Inherently Safer Design, 2ndEdn, Taylor and Francis Ltd, London, United Kingdom.</i></p> <p><i>T. A. Kletz (2009). What went wrong 4th edn, Gulf Professional Publishing, Houston, USA</i></p> <p><i>T. A. Kletz (2001). Hazop and Hazan, 4th edn, IChemE, UK</i></p> <p><i>Frank P. Lees (2012a). Reliability Engineering. In: Loss Prevention in the Process Industries, 4thEdn., Vol. 1, Chapter 7, Butterworth Heinemann, Oxford, United Kingdom</i></p> <p><i>Frank P. Lees (2012b). Failure and Event Data. In: Loss Prevention in the Process Industries, 4thEdn., Vol. 3, Appendix 14, Butterworth Heinemann, Oxford, United Kingdom</i></p>

Module designation	<i>PETE 568 Engineering and Management (management of engineering projects, optimization of resources)</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<p><i>(Estimated) Total workload:150</i></p> <p><i>Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60</i></p> <p><i>Private study including examination preparation, specified in hours: 90</i></p>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>This course introduces students to the essential concepts and practices of engineering project management and resource optimization. It builds upon general engineering knowledge and provides a structured understanding of how complex technical projects are planned, executed and controlled, with emphasis on decision-making, cost efficiency and organizational effectiveness.</i></p> <p><i>The first part of the course covers foundational management principles including project lifecycle, stakeholder engagement, scheduling, budgeting and risk assessment. Students will learn standard tools such as Gantt charts, critical path analysis and work breakdown structures, and will be expected to review core materials prior to class discussions. Case studies are used to illustrate the challenges encountered in real engineering environments.</i></p> <p><i>The second part focuses on optimization of engineering resources—human, financial, material and technological. Topics include productivity analysis, resource allocation models, cost–</i></p>

	<i>benefit evaluation, quality assurance, performance indicators and continuous improvement strategies. Emphasis is placed on practical applications and decision-making frameworks commonly used in industry. Students will be guided through exercises and case-based activities, which constitute an important part of the learning outcomes, and full participation is expected.</i>
Content	<ul style="list-style-type: none"> • <i>Project management fundamentals and project life cycle</i> • <i>Stakeholder management and communication</i> • <i>Project planning methods: WBS, CPM, PERT, Gantt charts</i> • <i>Cost estimation, budgeting and financial control</i> • <i>Risk identification, qualitative and quantitative assessment</i> • <i>Resource allocation strategies and optimization techniques</i> • <i>Productivity measurement and performance metrics</i> • <i>Quality management and continuous improvement</i> • <i>Decision-making models for engineering projects</i> • <i>Case studies from engineering, construction and energy sectors</i> • <i>Leadership, teamwork and professional responsibility in project environments</i>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Project Management: A Systems Approach to Planning, Scheduling, and Controlling – Harold Kerzner</i> <i>Engineering Project Management – Neil G. Siegel</i> <i>Project Management for Engineering, Business and Technology – John M. Nicholas & Herman Steyn</i>

Module designation	<i>PETE 598 Petroleum Engineering Design , Diploma work</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Petroleum Engineering Department</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Consultation</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:300 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):24 Private study including examination preparation, specified in hours: 276</i>
Credit points	<i>10</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<p><i>The Research Project is a major component of final year work and is a paper-based study. This may involve investigating the current state-of-play with a particular area of technology or an analysis and appraisal of existing data. It is not merely a review of literature. In order to find a suitable project title, a list of possible titles is provided to the members of staff in all overseas campuses.</i></p> <p><i>The lecturer who runs this course acts as a supervisor for the students, offers advice, provides pointers and monitors the students' progress.</i></p> <p><i>The projects will be carried out in the form of a paper-based study, where the students will be asked to find out information from the scientific and engineering literature, and beyond, about a particular topical aspect in process engineering, or a related area. In SEM 1 Students must carry out a literature survey/data appraisal on a topic using the resources from the BHOS Library and beyond.</i></p>

Content	<i>Introduction to Research, Topic Selection and Literature Review, Research Methodologies and Data Appraisal, Structuring and Writing a Research Paper, Ethical Considerations and Referencing, Presentation of Research Findings</i>
Examination forms	<i>Report and Pr�sentation</i>
Study and examination requirements	<i>Total grade above 61</i>

Module designation	<i>PETE 303 Engineering Mechanics 2</i>
Semester(s) in which the module is taught	<i>Fall</i>
Person responsible for the module	<i>Prof. Fuad Valiyev</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):72 Private study including examination preparation, specified in hours: 108</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Analyze the response of engineering structures under direct loads and bending moments. Understand bending in slender members (beams) due to transverse loads. Construct shear force and bending moment diagrams with proper sign conventions. Apply fundamental design principles based on structural strength theory. Differentiate between rotational and rectilinear motion in dynamic systems. Understand mass moment of inertia, angular velocity, and energy methods in rotational motion. Compute mass moment of inertia for various bodies and apply Newton's laws to rotational dynamics.</i>

	<p><i>Define and derive the momentum-impulse equation and apply it to dynamic problems.</i></p> <p><i>Utilize momentum methods as an alternative to Newton's laws in solving motion problems.</i></p> <p><i>Apply momentum conservation principles to impact and collision scenarios.</i></p>
Content	<p><i>Bending Moment Diagrams, Bending Stress in Beams, Slopes and Deflection of Beams, Non-uniformly Distributed Loads, Buckling of Beams, Moment of Mass Inertia, Rigid Body Motion in the Plane, the Energy Method, Impulse and Momentum</i></p>
Examination forms	<p><i>Written Exam</i></p>
Study and examination requirements	<p><i>Total grade above 61</i></p>
Reading list	<p><i>R.C. Hibbeler, Engineering Mechanics. Statics and Dynamics (14 Edition), 2015</i></p> <p><i>R.C. Hibbeler, Mechanics of Materials (10th edition), 2016</i></p> <p><i>For class presentations and discussions, the student should utilize internet materials. Moreover, the course does not limit the use of learning materials available at BHOS library.</i></p>

Module designation	<i>PETE 331 Engineering design,academic and professional skills</i>
Semester(s) in which the module is taught	Fall
Person responsible for the module	<i>Aida Aslanova, Kanan Mammadov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, consultation</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 120</i>
Credit points	6
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Interpret and create engineering diagrams relevant to process and mechanical design. Apply mass and energy balance principles to engineering systems. Understand mechanical engineering concepts essential for process design. Design and analyze heat exchangers for efficient thermal energy transfer. Perform pump selection and sizing for various engineering applications. Develop teamwork and cooperative skills by working collaboratively on engineering projects. Reflect on teamwork experiences to enhance problem-solving and project management abilities. Address real-world challenges in petroleum engineering through project-based learning. Receive and incorporate feedback from academic and industry partners to improve project outcomes.</i>
Content	<i>Introduction and Engineering Diagrams, Mass Balance, Energy Balance, Mechanical Engineering for Design, Heat Exchanger Design, Pump Design</i>

Examination forms	<i>Report and presentations</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<p><i>Sinnott, R.K. 1993. Coulson and Richardson's Chemical Engineering, Volume 6, Chemical Engineering Design. 2nd ed. Oxford: Elsevier Butterworth Heinemann.</i></p> <p><i>Process Industries A & B , Process Industries C, Process Engineering A, Process Engineering B, Process Engineering C Handbooks by HWU</i></p>

Module designation	PETE 342 Properties of reservoir rocks and fluids
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Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Assoc.Prof.Gasham Zeynalov ; Assoc. Prof. Rauf Nadirov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):72 Private study including examination preparation, specified in hours: 78</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Understand the basic properties of reservoir rocks, including porosity, permeability, wettability, and capillary pressure. Explain the physical properties of reservoir fluids, such as density, viscosity, compressibility, and phase behavior. Analyze core analysis and well-log data to determine rock properties and fluid saturations. Interpret PVT behavior of reservoir fluids and its relevance to reservoir engineering applications. Understand fluid–rock interactions and their impact on hydrocarbon flow and recovery. Apply laboratory and field measurement techniques to evaluate rock and fluid properties. Analyze multiphase flow in porous media, including relative permeability and displacement mechanisms. Evaluate how variations in rock and fluid properties influence reservoir performance and recovery efficiency. Develop problem-solving skills for applying rock and fluid property principles to real reservoir engineering problems.</i>
Content	<i>Reservoir Rock Properties, Core Analysis, Reservoir Fluid Properties, PVT Behavior, Fluid–Rock Interactions, Multiphase Flow in Porous Media, Reservoir Characterization, Applications in Reservoir Engineering</i>
Examination forms	<i>Witten Exam</i>

Study and examination requirements	<i>Total grade above 61</i>
Reading list	

Module designation	<i>PETE 392 Production Experience 2</i>
Semester(s) in which the module is taught	<i>Summer</i>

Person responsible for the module	<i>Company and University Supervisors Assigned</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>Project and In-field experience</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload: 180</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>The Summer Internship Program aims to provide students with hands-on, practical experience in their field of study by applying theoretical knowledge to real-world industry challenges. Through direct engagement with professionals, students will develop technical skills, problem-solving abilities, and professional competencies necessary for career readiness. The internship will enhance their understanding of workplace dynamics, industry standards, and best practices while fostering teamwork, communication, and critical thinking. By the end of the program, students will have gained valuable insights into their profession, expanded their professional network, and improved their ability to analyze and address real-world problems effectively.</i>
Content	<i>Advanced Safety & Risk Management in Drilling & Production, Drilling Engineering Applications, Production Engineering & Artificial Lift Systems, Reservoir Engineering Fundamentals, Project-Based Work & Data Interpretation</i>
Examination forms	<i>Report and presentation</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	

Module designation	<i>PHYS 211 Physics 1</i>
Semester(s) in which the module is taught	<i>Fall</i>

Person responsible for the module	<i>Prof. Siyavush Azakov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>
Teaching methods	<i>lecture, tutorial</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:180 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):48 Private study including examination preparation, specified in hours: 132</i>
Credit points	<i>6</i>
Required and recommended prerequisites for joining the module	
Module objectives/intended learning outcomes	<i>Develop a high level of understanding of the fundamental principles of physics in Mechanics, Molecular Physics, and Thermodynamics. Develop basic laboratory skills demonstrating the application of physical principles. Work cooperatively to facilitate a collegial atmosphere conducive to learning for all students in the class. Prepare for and attend each class by reading the assigned sections before class, completing homework, and participating in class discussions and team activities.</i>
Content	<i>The Nature of Physics. Units. Scalars and Vectors. Measurements, Calculations, and Uncertainties. Units, Standards and SI System. Dimension and Dimensional Analysis. Displacement. Speed and Velocity. Acceleration. Freely Falling Bodies. Graphical Analysis of Velocity and Acceleration. Equations of Kinematics in Two Dimensions. Projectile Motion. Relative Velocity. The Concepts of Force and Mass. Newton's First Law of Motion. Newton's Second Law of Motion. The Vector Nature of Newton's Second Law of Motion. Newton's Third Law of Motion Types of Forces. The Gravitational Force. The Normal Force. Static and Kinetic Frictional Forces. The Tension Force. Equilibrium Applications of Newton's Laws of Motion. Uniform Circular Motion. Centripetal Acceleration and Force. Banked Curves. Satellites in Circular Orbits. Apparent Weightlessness and Artificial Gravity. Vertical Circular Motion. Work Done by a Constant Force. The Work–Energy Theorem and Kinetic Energy. Gravitational Potential Energy. Conservative Versus</i>

	<p><i>Nonconservative Forces. The Conservation of Mechanical Energy. Power. Work Done by a Variable Force.</i></p> <p><i>The Impulse–Momentum Theorem. The Principle of Conservation of Linear Momentum. Collisions in One Dimension. Collisions in Two Dimensions. Center of Mass.</i></p> <p><i>Rotational Motion and Angular Displacement. Angular Velocity and Angular Acceleration. Angular Variables and Tangential Variables. Centripetal Acceleration and Tangential Acceleration. Rolling Motion.</i></p> <p><i>The Vector Nature of Angular Variables. The Action of Forces and Torques on Rigid Objects. Rigid Objects in Equilibrium. Center of Gravity. Newton’s Second Law for Rotational Motion about a Fixed Axis. Rotational Work and Energy. Angular Momentum.</i></p> <p><i>Common Temperature Scales. Thermometers. Thermal Expansion. Heat and Internal Energy. Heat Capacity. Heat and Phase Change: Equilibrium Between Phases of Matter. Thermodynamic Systems. The First Law of Thermodynamics. Thermal Processes. Specific Heat Capacities.</i></p> <p><i>The Second Law of Thermodynamics. Heat Engines. Carnot’s Principle and the Carnot Engine. Entropy. The Third Law of Thermodynamics. Molecular Mass, the Mole, and Avogadro’s Number. The Ideal Gas Law. Kinetic Theory of Gases.</i></p>
Examination forms	<i>Written Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Cutnell & Johnson Physics, 10th Edition</i>

Module designation	<i>PHYS 232 Physics 2</i>
Semester(s) in which the module is taught	<i>Spring</i>
Person responsible for the module	<i>Prof. Siyavush Azakov</i>
Language	<i>English</i>
Relation to curriculum	<i>Compulsory</i>

Teaching methods	<i>lecture, tutorial, lab</i>
Workload (incl. contact hours, self-study hours)	<i>(Estimated) Total workload:150 Contact hours (please specify whether lecture, exercise, laboratory session, etc.):60 Private study including examination preparation, specified in hours: 90</i>
Credit points	<i>5</i>
Required and recommended prerequisites for joining the module	<i>PHYS 211</i>
Module objectives/intended learning outcomes	<i>Differentiate between vectors and scalars and apply them in physical problems. Analyze kinematic relationships for linear and rotational motion. Apply concepts of mass, force, and momentum in dynamics. Understand circular motion and rotational dynamics principles. Explain simple harmonic motion and its applications. Utilize concepts of work, heat, energy, and power in problem-solving. Apply significant figures, errors, and error propagation in measurements and calculations.</i>
Content	<i>Vectors and Scalar, Kinematic Relationships, Mass, Force and Momentum, Circular Motion, Rotational Dynamics, Simple Harmonic Motion, Work, Heat, Energy and Power, Significant Figures, Errors and Error Propagation.</i>
Examination forms	<i>Witten Exam</i>
Study and examination requirements	<i>Total grade above 61</i>
Reading list	<i>Cutnell & Johnson Physics, 10th Edition, Foundation Engineering A Handbook by HWU</i>