Module designation	***PDG711 Higher Education Pedagogy***
Semester(s) in which the module is taught	*1st semester, Fall*
Person responsible for the module	*Narmin Ibrahimova*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*Total workload: 90* *Contact hours (lecturer): 24* *Private study including examination preparation, specified in hours: 66*
Credit points	*3*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** The purpose of the course is to develop the participant's understanding of the main issues of higher education institutions. The aim of the course to help master's degree students to improve their pedagogical skills and guide their self-learning improvement. And these skills will help students later in their teaching career to: · Acquire main theories of learning and teaching; · Be able to understand students' behavior, learning problems occurred in the educational environment and meet their cognitive and psychosocial needs; · Be able to motivate and provide the techniques for guidance in learning. · Be able to improve both oral and written communication with students consequently it will lead to effective discussion and dialogues with students, strengthen students' research skill and working in groups. **Learning outcomes:** • The ability to understand the notion and theories of education, explain different categories of pedagogy. • The ability to apply pedagogical ideas to the development of one's personal and professional growth, and to improve education • The ability to critically assess theories and the ability to select them • The possession of fundamental pedagogical knowledge for the solution of learning problems, misbehavior, demotivation • The ability to generate new ideas and to implement them in practice • The ability to design individual and group projects and implement them

	• The ability to develop research skills • The ability to improve communication skills • The ability to build relationship
Content	1. Introduction to Pedagogy. 2. Teaching. Theories in Teaching. A Transactional Model of Teaching/Leaning process. 3. Academic Learning Time. Pedagogical Cycle. 4. Higher Education Pedagogy 5. Domains of learning. Teaching Methods in Education. Bloom's taxonomy 6. Assessment, Measurement, Evaluation. 7. Classroom Planning 8. Managing the Teaching and Learning Process. 9. Communication Principles. The nature of classroom communication.
Examination forms	Quiz/Oral Presentation – 40 % Final exam – 60 %
Study and examination requirements	Attend and participate in lectures; provide presentation; pass written exam;
Reading list	1. Hayes, Amanda. Teaching Adults, Bloomsbury Publishing Plc, 2006. 2. Pamela A. Kramer. (2003). To develop a strong sense of professionalism. 3. Building Teaching Capacities in Higher Education: A Comprehensive International Model, and Mariane Frenay, Stylus Publishing, LLC 2010. 4. Harland, Tony, and Neil Pickering. Values in Higher Education Teaching, Taylor & Francis Group, 2010. 5. S. Saeed & D. Zyngier. (2012). How Motivation Influences Student Engagement. Journal of Education and Learning; Vol. 1, No. 2; 2012 6. Geoff Petty, Teaching Today. Nelson Thornes Ltd, 2009. Robert MacGregor, Modern Teaching Methods. Centre de formation d'enseignants Robert MacGregor, 2019. 7. Michael K. Russel, Peter W. Airasian, Classroom Assessment. McGraw Hill, 2012.

Module designation	*PSY611 Psychology*
Semester(s) in which the module is taught	*1st semester, Fall*
Person responsible for the module	*Nigar Gadashova*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture*

Workload (incl. contact hours, self-study hours)	*Total workload: 90* *Contact hours (lecturer): 24* *Private study including examination preparation, specified in hours: 66*
Credit points	*3*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** This course provides a comprehensive introduction to the key concepts and theories in psychology. It covers the foundational knowledge on psychology including history of psychological science, mental functioning, cognitive and emotional processes as well as practical skills. During the course, various psychological frameworks will be explored, including developmental, social, educational and cognitive psychology. A central focus of the course is to equip students with psychological insights that may enhance their effectiveness as future lecturers. Topics such as motivation, cognitive functioning, learning theories, classroom management, and interpersonal communication will be explored to offer tools for creating supportive learning environments **Learning outcomes:** • Understand basic psychological concepts and their relevance to everyday life. • Apply psychological theories to enhance teaching and learning strategies. • Develop a deeper understanding of human behavior, motivation, and learning. • Utilize psychological insights to foster effective communication and student engagement in a classroom setting.
Content	1. Introduction to Psychology 2. Developmental Psychology 3. Emotion and Motivation 4. Sensation and Perception 5. Attention and Memory 6. Thought and Language 7. Introduction to Educational Psychology 8. Introduction to Social Psychology 9. Effective Communication 10. The Essentials of Self-care
Examination forms	Quiz one per week – 30 % Essays and reports – 20 % Final exam – 50 %
Study and examination requirements	Attend and participate in lectures; provide Essays and reports; pass written exam;
Reading list	1. 1 Susan Nolen-Hoeksema, Barbara L. Fredrickson, Geoff R. Loftus and Willem A. Wagenaar, Atkinson & Hilgard's

	Introduction to Psychology, 15th edition, 2009 2. David G. Myers, Jean M. Twenge, Social Psychology, 12th edition, 2016 3. David G. Myers, C. Nathan Dewell, Psychology in Modules, 10th edition, 2016 4. Karabanova O.A., Developmental Psychology, 2005 5. Judith S. Beck, Cognitive Behavior Therapy: Basics and Beyond, 3rd edition, 2020 6. Ronal J. Comer, Jonathan S. Comer, Abnormal Psychology, 10th edition, 2018 7. Nurkova V.V., Berezanskaya N.B, General Psychology, 3rd edition, 2019

Module designation	***CHE631 Process Engineering***
Semester(s) in which the module is taught	*1st semester, Fall*
Person responsible for the module	*Dr. Azar Salimov*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 240* *Contact hours (lecture, tutorial): 36* *Private study including examination preparation, specified in hours: 204*
Credit points	*8*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** • Understand the principles of material balances, energy balances, thermodynamics and heat transfer to process engineering; • Describe and the main process operations units associated with oil and gas facilities; • Recognize operational issues affecting of the process equipment. Specific Objectives of the Course: • Understand and be able to determine the material balance for hydrocarbon processing systems; • Understand and apply appropriate techniques to size pumps and heat exchangers; • Understand and apply appropriate techniques for the design or gas conditioning and stabilization systems; • Knowledge of the environmental requirements for process

	engineers. **Learning outcomes:** • Apply the principles of material and energy balances, thermodynamics, and heat transfer to analyze and solve process engineering problems. • Identify and describe the key process unit operations typically used in oil and gas production and refining facilities. • Evaluate and troubleshoot operational issues in process equipment such as pumps, compressors, heat exchangers, and separators. • Perform material balance calculations for various hydrocarbon processing systems, including separation and reaction systems. • Select, size, and evaluate the performance of pumps and heat exchangers using appropriate engineering methods and software tools. • Design gas conditioning and stabilization systems based on given process requirements and industry standards. • Recognize and integrate environmental and safety considerations into the design and operation of process systems in compliance with regulatory requirements. • Communicate technical findings effectively through written reports, process diagrams, and oral presentations.
Content	1. Introduction to Process Engineering 2. Material Balances 3. Thermodynamic Laws 4. Cyclic Processes 5. Fluid Mechanics 6. Flow in a Pipeline 7. Heat Transfer 8. Separation Processes 9. HAZOP
Examination forms	Courswork – 15 % Witten Exam - 85 %
Study and examination requirements	Attend and participate in lectures/tutorials; provide courswork; pass written exam;
Reading list	1. R. M. Felder, R. W. Rousseau, Elementary Principles of Chemical Processes (3rd Edn), Wiley,2004 2. Himmelblau, D. M., Basic Principles and Calculations in Chemical Engineering, 6th Edition, Prentice Hall 3. International Series in the Physical and Chemical Engineering Sciences, Prentice -Hall International, Inc, 1996. 4. Shaheen, E.I., Basic Practic Chemical Engineering, Houghton Mifflin, 1975. 5. Sinnott, R. K., Coulson & Richardson's Chemical Engineering, Volume 6: Chemical Engineering Design, 3rd Edition, Butterworth Heinemann, 1999. 6. Felder, R. M. and Rousseau, R. W., Elementary Principles of

	Chemical Processes, 3 rd Edition, John Wiley, 1999. 7. Perry, R. H. and Green, D., Chemical Engineer's Handbook, 7th Edition, McGraw-Hill, 1997. 8. J. M. Smith, H C Van Ness, M M Abbott, Introduction to Chemical Engineering Thermodynamics (5th Edn Student Ed. Paper), McGraw-Hill, 2001. 9. 7. J F Swafield, J Gasiorek, L Jack, J F D ouglas, Fluid Mechanics, Pearson Higher Education, 2005.

Module designation	***CHE633 Thermodynamics***
Semester(s) in which the module is taught	*1st semester, Fall*
Person responsible for the module	*Dr. Aysel Mammadova*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 240* *Contact hours (lecture, tutorial): 36* *Private study including examination preparation, specified in hours: 204*
Credit points	*8*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** • To provide detailed understanding of the thermodynamic principles, multiphase and multicomponent systems, equilibrium properties, compressible flow • To provide the necessary tools to help engineers design and operate processes and unit operations in chemical engineering and engineering chemistry • To teach effectively fundamental concepts such as enthalpy, entropy, fugacity, free energy, and chemical potential • To demonstrate how to apply the principles of chemical reaction equilibrium and phase equilibrium to the calculation of complex separation processes. • To teach students how to set up and solve thermodynamics problems **Learning outcomes:** • Understand the importance of the equilibrium in the phase behaviour of pure substances and mixtures. • Determine phase diagrams from first principles for binary mixtures and understand the extension to more complex mixtures

	• Determine equilibrium points and the compositions of the phases present. • Understand and use equations of state for determining the PVT behaviour of substances. • Understand the relationships between thermodynamic properties and a range of methods for determining their values. • Understand the concept of compressible flow and the relationship between pressure, density, and velocity of a fluid in converging and diverging pipes.
Content	1. Review of Basic Thermodynamics Concepts 2. Energy Analysis of Closed and Open Systems 3. Thermodynamic Properties of Pure Substances 4. Entropy and the Second Law of Thermodynamics 5. The Framework of Solution Thermodynamics 6. Power Systems 7. Phase Equilibria Qualitative Analysis
Examination forms	2 Quiz – 40 % Witten Exam - 60 %
Study and examination requirements	Attend and participate in lectures/tutorials; pass quizzes; pass written exam;
Reading list	1. Thermodynamics: An Engineering Approach, Yunus A. Cengel, Michael A. Boles, Mehmet Kanoglu, 9th ed., Mc Graw Hill Education, ISBN 978-1-259-82267-4. 2. Introduction to Chemical Engineering Thermodynamics, J.M. Smith, H.C. Van Ness, M.M. Abbott, 8th ed., Mc Graw Hill Education, ISBN 978-1-259-69652-7 3. Fundamentals of Thermodynamics, R.E. Sonntag, C. Borgnakke, Wiley, 6th ed., ISBN 0-471-15232-3 4. Chemical and Engineering Thermodynamics, S.I. Sandler, Wiley, 3rd ed., 1999 5. Thermodynamics Applications in Chemical Engineering and the Petroleum Industry, Jean VlDAL, EditionsTechnip, Paris, ISBN 2-7108-0800-5 6. Advanced thermodynamics for engineers, Kenneth Wark, Jr., Mc Graw Hill Education, ISBN-10: 0-07-068286-0 7. Characterization and Properties of Petroleum Fractions, M. R. Riazi, ASTM 100 Barr Harbor West Conshohocken, ISBN 0-8031-3361-8

Module designation	***CHE635 Transportation and Storage***
Semester(s) in which the module is taught	*1st semester, Fall*
Person responsible for the module	*Ruslan Abishov*

Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 240* *Contact hours (lecture, tutorial): 36* *Private study including examination preparation, specified in hours: 204*
Credit points	*8*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** The objective of the course is to equip students with fundamental and advanced knowledge of the principles, techniques, and technologies used in the efficient transport and storage of fluids, including liquids and gases. The course covers fluid dynamics, pressure loss calculations, pump and compressor operations, pipeline design, and storage tank systems. Students will learn to analyze, design, and optimize fluid transportation systems while considering safety, environmental, and economic factors. By the end of the course, students will be prepared to solve real-world engineering problems related to fluid handling in industries such as oil and gas, water management, and chemical processing. **Learning outcomes:** • Understand and apply the fundamental principles of fluid mechanics in transportation and storage systems. • Analyze and calculate pressure losses in pipelines and fluid flow systems. • Design and select appropriate pumps, compressors, and valves for fluid transport applications. • Evaluate and design pipelines and storage facilities considering safety, environmental, and economic constraints. • Identify and address operational challenges in fluid transportation and storage, such as cavitation, pipeline corrosion, and thermal expansion. • Apply modern tools and techniques to model, simulate, and optimize fluid handling systems for various industrial applications.
Content	1. Introduction to Fluid Transportation and storage 2. Metallurgy 3. Stress and Strain 4. Pressure Vessels 5. Manufacturing 6. Pipeline Networks 7. Ancillary Equipment 8. Codes and Standards
Examination forms	Courswork – 40 %

	Witten Exam - 60 %
Study and examination requirements	Attend and participate in lectures/tutorials; provide courswork; pass written exam;
Reading list	1. Bird, R.B., W.E. Stewart and E.N. Lightfoot, 2007, Transport Phenomena, Second Edition, Published by John Wiley & Sons, Inc. 2. Chemical Engineering MSc Oil & Gas Technology, 2019, B41OD Fluid Transportation and Storage, School of Engineering and Physical Sciences, Heriot-Watt University.

Module designation	***CHE638 Reservoir Engineering***
Semester(s) in which the module is taught	*2nd semester, Spring*
Person responsible for the module	*Kanan Mammadov*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 210* *Contact hours (lecture, tutorial): 36* *Private study including examination preparation, specified in hours: 174*
Credit points	*7*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** This course is aimed at understanding the rock and fluid properties of a hydrocarbon reservoir. The course covers the nature of fluid flow and pressure distribution within a reservoir and also looks at the effect of production or injection on flow and pressure, and therefore on the recovery of reserves from the reservoir. The overall aim of this course is to allow the student to: • Understand the rock and fluid properties of a hydrocarbon reservoir • Describe the nature of the fluid flow and pressure distribution in a reservoir • Understand the effects of production/injection on recovery of reserves **Learning outcomes:** • Understand the definition and characteristics of a reservoir. • Identify the different types of reservoirs and their significance in the petroleum industry. Recognize the key roles and responsibilities of a reservoir engineer. Explain the role of

	reservoir • Understand hydrocarbon reserves and its classification. Difference between resources and reserves. • Identify some uncertainties associated with hydrocarbon reserves estimation. • Write the mathematical expression for the different pressure regimes. Know the range of the different fluid gradients; Understand the causes of abnormal pressure • Understand the classification of reservoirs and reservoir fluids, including oil and gas types. • Interpret pressure-temperature diagrams to analyze phase behavior of hydrocarbon systems. • Explain the properties and behavior of natural gases, including distinctions between ideal and real gases. • Analyze the impact of nonhydrocarbon components on the Z-factor and gas compressibility. • Explain key rock properties, including porosity, saturation, wettability, and permeability, and their roles in reservoir performance
Content	1. Introduction to Reservoir Engineering, Reservoir Geology, and Geophysics 2. Resources and Reserves 3. Reservoir Pressure and Temperature 4. Fundamentals of Rock Propertie 5. Darcy's Law and Applications 6. Well Inflow Equations for Stabilized Flow Conditions 7. Oil Recovery Mechanisms and the Material Balance Equation
Examination forms	Project – 20 % 2 Quizes – 20 % Witten Exam - 60 %
Study and examination requirements	Attend and participate in lectures/tutorials; provide project; pass quizzes; pass written exam;
Reading list	1. Basics of Reservoir Engineering, R.Cosse 2. Reservoir Engineering Fundamentals and Applications, Sylvester Okotie, Bibobra Ikporo 3. Petroleum Engineering Handbook Volume V – Reservoir Engineering and Petrophysics, Larry W. Lake 4. Reservoir Engineering Handbook, Tarek Ahmed, Fourth Edition 5. Fundamentals of Reservoir Engineering, L. P. Dake

Module designation	***CHE644 Oil and Gas Processing***
Semester(s) in which the module is taught	*2nd semester, Spring*
Person responsible for the module	*Dr. Azar Salimov*

Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 210* *Contact hours (lecture, tutorial): 36* *Private study including examination preparation, specified in hours: 174*
Credit points	*7*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** This course is designed to look at the process engineering of typical oil and gas facilities – from conceptual designs and flow schemes to developing the stages for treatment of fluid from the reservoir, to sizing some of the key operations. We will also cover process control, safety and HAZOP analysis as it relates to the oil and gas facility operations. The course covers a large but not exclusive range of unit operations. There will be some units that are currently in proving trials that may appear in outline format during lecture sessions. Students should therefore use the course notes alongside the power point slides pack and the additional information sessions. • perform design procedure of two phase gas oil separators design • perform design procedure for three phase gas oil water separators design • perform engineering calculations for wastewater treatment facilities • familiarize with gas processing facilities • learn engineering safety procedures • familiarize with control and instrumentation **Learning outcomes:** • Analyze and interpret process flow schemes and conceptual designs for oil and gas production facilities, including primary separation and treatment stages. • Perform engineering design calculations for two-phase (gas-oil) and three-phase (gas-oilwater) separators in accordance with industry practices. • Apply process engineering principles to the design and evaluation of wastewater treatment systems in oil and gas operations. • Describe the functionality and configuration of key gas processing facilities, including dehydration, sweetening, and compression units. • Understand and apply basic principles of process control and instrumentation, including control loops and

	sensor selection, as relevant to oil and gas unit operations. • Demonstrate familiarity with industry-recognized safety procedures, including HAZOP (Hazard and Operability) analysis, risk assessment, and mitigation strategies. • Interpret process control diagrams (P&IDs), identify instrumentation components, and assess their role in operational safety and efficiency..
Content	1. Offshore Platforms 2. Subsea Systems 3. Processing Schemes 4. Two Phase Gas Oil Separators 5. Three Phase Gas Oil Water Separators 6. Emulsion Treatment 7. NGL Processing 8. Gas Processing 9. Control and Instrumentation 10. Surface Supporting Infrastructure
Examination forms	Witten Exam - 100 %
Study and examination requirements	Attend and participate in lectures; pass written exam;
Reading list	1. E.O. Gordal, M.J.Realff "Optimal Design of Two and Three-Phase Separators SPE 56645, October 1999 2. Arnold, K. and Stewart, M. Surface Production Operations, Volume 1: Design of Oil Handling Systems and Facilities, 2nd Edition, Gulf Publishing Company, Houston, Texas, USA, 1998 3. Arnold, K. and Stewart, M. Surface Production Operations, Volume 2: Design of Gas Handling Systems and Facilities, 2nd Edition, Gulf Publishing Company, Houston, Texas, USA, 1998 4. P. Greenwood "Produced Water Management from an Offshore Operators Perspective" Produced Water Workshop, 26th-27th March 2003 5. Petroleum Technology (SPE), May 1973: 607-617. 6. Tom Boyle (2002). Advanced Risk Control Technoqies, Health and Safety, Risk Management, 2nd Edition, Chapter 21, IOSH Services Ltd., Wigston, Leicestershire, UK

Module designation	***CHE646 Research Methods in Chemical Engineering***
Semester(s) in which the module is taught	*2nd semester, Spring*
Person responsible for the module	*Dr. Aysel Mammadova*
Language	*English*

Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 180* *Contact hours (lecture, tutorial): 24* *Private study including examination preparation, specified in hours: 154*
Credit points	*6*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** • To provide detailed understanding of research methods, principal of analytical equipment, using of some analytical equipment to characterization of materials. • Provide the necessary tools to help engineers design and operate processes and unit operations in chemical engineering and engineering chemistry • To demonstrate how to use analytical equipment and its results in sample control, data analysis, or process interpretation. **Learning outcomes:** • Demonstrate a solid understanding of research methodology and its application in chemical engineering problem-solving. • Apply appropriate research design techniques to investigate engineering problems systematically and critically. • Explain the principles and working mechanisms of common analytical instruments used in material characterization. • Operate selected analytical equipment (e.g., FTIR, UV-Vis, TGA, DSC, SEM, XRD) for sample testing and material characterization. • Interpret and analyze data obtained from analytical instruments to support process evaluation, quality control, or research conclusions. • Integrate analytical results into chemical process design and optimization tasks. • Apply data analysis techniques for accurate evaluation of experimental results, including error estimation and reproducibility assessment.

Content	1. Research Methods in Chemical Engineering 2. Ultraviolet and Visible Spectroscopy 3. Infrared Spectroscopy 4. X-ray Diffraction (XRD) 5. Thermal Analysis (DSC, TGA) 6. Chromatography
Examination forms	Quiz – 20 % Project – 20 % Witten Exam – 60 %
Study and examination requirements	Attend and participate in lectures; pass written exam;
Reading list	1. M. J. K. Thomas, D. J. Ando, Ultraviolet and Visible Spectroscopy: Analytical Chemistry, by open learning, 1996. 2. B. M. Stuart, Infrared Spectroscopy: Fundamentals and Applications, 2004. 3. Waseda Y., Matsubara E., S. Kozo, X-Ray Diffraction Crystallography, Introduction, Examples and Solved Problems, Wiley, 2011. 4. R. F. Egerton, Physical Principles of Electron Microscopy, Springer 2005. 5. B. Wunderlich, Thermal Analysis of Polymeric Materials, Springer 2005. 6. S. Fanali and A.M. Striegel, Liquid Chromatography; Fundamentals and Instrumentation, Chapter 9, Elsevier, 2013.

Module designation	***CHE648 Field Development Project***
Semester(s) in which the module is taught	*2nd semester, Spring*
Person responsible for the module	*Fatimeyizahra Nabizada*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Seminar*
Workload (incl. contact hours, self-study hours)	*Total workload: 300* *Contact hours (seminar): 24* *Private study including examination preparation, specified in hours: 276*
Credit points	*10*

Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objectives:** To develop the ability of students to plan and design an integrated oil and gas field development project, including process systems for oil, gas, and produced water treatment. The course emphasizes applying multidisciplinary engineering knowledge to optimize the number of production wells, plan field operating life, and design process equipment on the platform or facility. · To enable students to perform early-phase planning of oil and gas field development, including production forecasting and facility capacity planning. · To teach students how to design surface processing systems for oil, gas, and produced water separation and treatment. · To provide knowledge on estimating the number of wells and production duration based on reservoir data and economic assumptions. · To integrate process simulation, equipment sizing, and environmental and safety considerations in platform design. · To prepare students for presenting and defending a comprehensive field development plan in a multidisciplinary context **Learning outcomes:** • Develop a conceptual field development plan including well count, production schedule, and operational lifespan based on reservoir and production data. • Design and optimize surface process facilities (separation, gas treatment, produced water management) for offshore or onshore platforms. • Perform mass and energy balances for multi-phase systems to determine equipment specifications and process flow. • Select and size key process equipment (e.g., separators, dehydrators, pumps, compressors) based on expected production profiles. • Integrate environmental and safety requirements (e.g., flare systems, water reinjection, hazardous areas) into field design. • Use simulation tools (e.g., Aspen HYSYS or Aspen Plus) to model and validate process designs. • Evaluate economic feasibility and suggest operational strategies (e.g., phased development, artificial lift, EOR) to extend production life. • Collaborate in multidisciplinary teams to prepare and present a complete technical report and oral defense of the development plan.Demonstrate project management and communication skills required for real-world field development planning.

Content	1. Introduction to FDP & Initial Setup 2. Reservoir Modeling & Well Placement 3. Production Optimization & Surface Facilities Design 4. Sensitivity Analysis, Optimization & Final Report
Examination forms	Literature Review and Research – 15 % Presentation – 25 % Final report – 60 %
Study and examination requirements	Attend and participate in lectures; Literature Review and Research; provide presentation; provide final report;
Reading list	1. "Petroleum Engineering: Principles and Practice" by J.S. Archer & C.G. Wall – Covers reservoir engineering, drilling, and field development strategies. 2. "Offshore Petroleum Drilling and Production" by Q. Wang & M. Economides – Discusses offshore field development, drilling operations, and production techniques. 3. "Subsea Engineering Handbook" by Yong Bai & Qiang Bai – Essential for understanding offshore infrastructure, subsea processing, and flow assurance. 4. "Project Management for the Oil and Gas Industry" by Adedeji B. Badiru & Samuel O.Osisanya – Covers economic, technical, and risk considerations in field development.

Module designation	***CHE 651-Production Technology***
Semester(s) in which the module is taught	*3rd semester, Fall*
Person responsible for the module	*Kanan Mammadov*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 210* *Contact hours: 36 hours (lecture -24, tutorial-12)* *Self-study:174 hours (private study including exam preparation)*
Credit points	*7*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objective:** Production Technology course studies upper and lower completion types and techniques for conventional and advanced (horizontal, deviated, multilateral) 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. · Identify the major components of the production system · Consider the options available to efficiently complete a well · Understand and apply the theory behind Reservoir – Well – Facility flow modelling · Examine the techniques available to enhance production from both reservoir and well · Design appropriate procedures to ensure optimal initial production · Understand the process of delivering and treating reservoir and injection fluid at the surface **Learning outcomes:** ·Understand and appreciate the production system from reservoir to surface · Design suitable bottom hole completions systems · Understand the design principles of different perforation systems · Design an artificial lift system based on pumping and gas lifting techniques · Assess the degree of formation damage present in a formation · Design acidizing and hydraulic fracturing treatments · Understand and be able to select appropriate methods to enable sand control · Understand the processes and equipment used in produced water handling
Content	1. *Introduction:* Role of production engineer; review of wellbore/reservoir connection and implications for fluid flow 2. *Well completions:* Evaluate bottom hole completion options; geometrical configurations for drilled wellbores for both production and injection applications; selection of flow conduit between reservoir and surface; completion string facilities 3. *Multiple completions*: Describe the options, and their inherent constraints/advantages, for producing multiple reservoir units, general completion schematic options for producing two, three or more zones simultaneously 4. *Advanced Wells:* Describe the technology required for drilling, steering and completing horizontal wells. Describe the application of horizontal wells. Understand the basics of Multi-Lateral technology and list their applications. 5. *Artificial Lift:* Explain the importance of Artificial Lift (AL) for world oil production; selection of AL based on ranking criteria; electric submersible pump; beam pump; fluid driven hydraulic pumps *6. Tubing outflow performance* *7. Nodal analysis*

	8. Introduction to Artificial Lift *9. Rod pumps, rod pump operation and design* *10. Electric Submersible Pumps (ESP)* *11. Gas Lift*
Examination forms	Witten exam – 100%
Study and examination requirements	Attend and participate in lectures/tutorials; pass written exam
Reading list	1. David Davies, Production Technology, Produced by Heriot-Watt University, 2015, (available in BHOS library) Supplementary textbooks 2. "Well Completion Design", 1st Edition, Jonathan Bellarby, J., Elsevier Science, 2009, ISBN: 9780080932521 (eBook) and 9780444532107 (Print Book) 3. "Well Completion and Servicing", Perrin, D., 1999, Editions TECHNIP, ISBN: 9782710807650 4. "Petroleum Engineering Handbook", Lake L.W., Editor-in-Chief, 2006, Society of Petroleum Engineers, ISBN 978-1-55563-126-0 5. "Petroleum Production Systems", 2nd Edition, M. Economides, D. Hill, C. EhligEconomides, D. Zhu, Prentice Hall, 2013, ISBN 0-13-703158-0

Module designation	***CHE 661-Oil and Gas Economics***
Semester(s) in which the module is taught	*3rd semester, Fall*
Person responsible for the module	*Javid Majidov*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 240* *Contact hours: 36 hours (lecture -24, tutorial-12)* *Self-study:204 hours (private study including exam preparation, preparation for assignment)*
Credit points	*8*
Required and recommended prerequisites for joining the module	-
Module objectives/intended	**Course objective:**

learning outcomes	To explain general financial aspects of the petroleum industry and the economic evaluation of petroleum projects. Understand the concept of the "time value of money", the idea that money received or spent at different points in time may have different perceived value. To provide the balance between environmental and business needs, the impact of legislation on organizations, the role of environmental management systems. To teach awareness of the need to address issues on safety, legal requirements for occupational practice. Enhanced skills in occupational risk assessment. **Learning outcomes:** Analyze the structure of a market, its components, and factors that affect its dynamics. Review the idea of an "asset" as something possessing value or bestowing value on its owner. Apply the method of cash flow analysis and identifies a number of important parameters, which may be derived. Identify the diversity and significance of government involvement in the petroleum industry. Review the risk environment, within which petroleum investment is made. Follow some of the important procedures, which may be used to reduce or to quantify risk.
Content	1. *Introduction to Petroleum Economics* 2. *BP plc* 3. *Investment in petroleum* 4. The market: demand and supply 5. *Definition of an asset* 6. *Evaluation concepts and objectives* 7. *Book value and Market value* 8. *Cash flow models* 9. *Compound interest* 10. *Price inflation* 11. *Cumulative cash flow and simple measures of value* 12. *Discounted measures of values* 13. *Government: petroleum development* 14. *Mathematical expectations*
Examination forms	Witten exam – 75% Assignment– 25%
Study and examination requirements	Attend and participate in lectures/tutorials; complete assignment; pass written exam
Reading list	1. Daniel Yergin, The Prize 2. Inkpen & Moffett – The Global Oil & Gas industry: Management, Strategy & Finance 3. Lumby: "Investment Appraisal and Financial Decisions" 4. Seba:- "Economics of Worldwide Petroleum Production" 5. Newendorp:- "Decision Analysis for Petroleum Exploration"

Module designation	***CHE 671-Petrochemical Processes and Technology***
Semester(s) in which the module is taught	*3rd semester, Fall*
Person responsible for the module	*Sanan Suleymanli*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture*
Workload (incl. contact hours, self-study hours)	*Total workload: 240* *Contact hours: 36 hours (lecture -36)* *Self-study:204 hours (private study including exam preparation, preparation for assignment)*
Credit points	*8*
Required and recommended prerequisites for joining the module	-
Module objectives/intended learning outcomes	**Course objective:** To provide students with a comprehensive understanding of the industrial processes and technologies involved in the production of key petrochemical products derived from oil and natural gas. The course emphasizes the principles of process design, reaction mechanisms, and technological developments in the petrochemical industry. To introduce the major petrochemical building blocks (ethylene, propylene, benzene, toluene, xylene, etc.) and their industrial production pathways. To analyze key conversion processes such as steam cracking, catalytic reforming, alkylation, and polymerization. To explore downstream product manufacturing including plastics, synthetic fibers, and resins. To develop understanding of process flow diagrams (PFDs), equipment involved, and operating conditions of typical petrochemical plants. To examine current and emerging petrochemical technologies with a focus on energy efficiency and environmental impact. **Learning outcomes:** Identify and explain the primary feedstocks and petrochemical building blocks used in the industry. Describe and compare major industrial processes such as steam cracking, catalytic reforming, aromatic extraction, alkylation, and polymerization. Analyze reaction pathways and mechanisms involved in the transformation of hydrocarbons into petrochemical products. Interpret process flow diagrams (PFDs) and identify the key equipment units used in petrochemical plants. Evaluate the operating conditions, yields, and selectivity of various petrochemical processes. Discuss the production routes for common petrochemical products such as ethylene, propylene, styrene, polyethylene, polypropylene, and BTX aromatics. Assess economic, safety, and environmental aspects of petrochemical

	technologies. Explore emerging trends in the petrochemical industry, such as bio-based feedstocks, carbon capture, and process intensification.
Content	*1.* Introduction to Petrochemical Industry 2. Unit operations in petrochemical processes 3. Ethylene Production 4. Low-Density Polyethylene (LDPE) Production 5. High-Density Polyethylene (HDPE) Production 6. Polypropylene Production 7. Methanol Production 8. Urea Production 9. Four Major Petrochemical Processes 10. Future Trends and Sustainability in Petrochemicals
Examination forms	Witten exam – 60% Assignment– 40%
Study and examination requirements	Attend and participate in lectures; complete assignment; pass written exam
Reading list	1. Petrochemical Processes" – F. B. Petlyuk 2. "Handbook of Petrochemicals Production Processes" – Robert A. Meyers 3. "Petrochemical Process Technology" – I. D. Mall 4. Unit Operations of Chemical Engineering" – Warren L. McCabe, Julian C. Smith, Peter Harriott 5. "Transport Processes and Unit Operations" – Christie J. Geankoplis 6. "Chemical Process Equipment: Selection and Design" – James R. Couper

Module designation	***CHE 681-Critical Analysis and Research Preparation***
Semester(s) in which the module is taught	*3rd semester, Fall*
Person responsible for the module	*Dr. Azer Salimov*
Language	*English*
Relation to curriculum	*Mandatory*
Teaching methods	*Lecture, tutorial*
Workload (incl. contact hours, self-study hours)	*Total workload: 210* *Contact hours: 24 hours (lecture -12, tutorial-12)* *Self-study:186 hours (private study including preparation for project portfolio report writing)*
Credit points	*7*
Required and recommended prerequisites for joining the module	-

Module objectives/intended learning outcomes	**Course objective:** The purpose of this course is to prepare the students for carrying out an extended Masters-level research or development project in a science or engineering program. In the course they will develop skills in critical thinking, research planning and management, academic writing, experimental design, data handling and analysis as a base for your MSc dissertation. To prepare students for carrying out an extended level of research or development project in a science or engineering programs by developing their skills in critical thinking, research planning and management, academic writing, experimental design and data handling. **Learning outcomes:** ndustrial, Commercial & Professional Practice: Deal with complex professional issues and make informed judgments on issues not addressed by current professional and / or practices. Demonstrate an awareness of the application of his / her work in an industrial and / or commercial context. Autonomy, Accountability & Working with Others: Exercise substantial autonomy and initiative in planning and managing his / her research. Take responsibility for his / her work and for interaction with others. Take responsibility for accessing and using significant range of resources including literature, electronic documents and software / computational resources. Demonstrate initiative by making an identifiable contribution to planning his / her research. Exercise critical reflection on his/ her own and others' roles and responsibilities.
Content	*1. Critical thinking& analysis(CTA)* *2. Reinforcing the Critical Thinking Model* *3. The purpose of the literature review* *4. Why use historical research? Archival sources Oral History Other historical sources* *5. Project management Organizing resources Risk Management & Contingency planning* *6. Time managementCommon Time management problems Study and Personal Priorities – get the right balance*
Examination forms	Project Portfolio report submission – 100%
Study and examination requirements	Attend and participate in lectures/tutorials; prepare project report
Reading list	1. Inside Track - Critical Thinking & Analysis, Mary Deane& Erik Borg, 2011, Pearson education; 2. Learning Development, University of Plymouth 2006: can be accessed at http://www.learnhigher.ac.uk/ ; 3. Hartley, L.P.(1953)The Go-Between. London:Hamish Hamilton; 4. Harvey,K. (2009) Introduction.InK. Harvey(Ed.), History and Material Culture: A Student's Guideto Approaching Alternative Sources (pp. 1-23). London: Routledge;

Module designation	***CHE 688 - Master Thesis***
Semester(s) in which the module is taught	*4th Semester, Spring*
Person responsible for the module	*Supervisors of Chemical Engineering Department*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	• *Supervised individual or team project work* • *Weekly or bi-weekly progress meetings with supervisor* • *Independent research, design, and implementation* • *Lab sessions for hands-on development and testing* • *Peer review and self-assessment activities*
Workload (incl. contact hours, self-study hours)	*Total workload: 540h = 540h extracurricular hours* ***Contact hours:*** *Lab experiments, consultation, self-study = 45 h/ week*
Credit points	*18 ECTS*
Required and recommended prerequisites for joining the module	• *Satisfactory progress in the MSc programme* • *Completion of core master courses* • *Approval of project proposal by supervisor*
Module objectives/intended learning outcomes	• *Identify a significant and research-worthy problem and formulate a clear research question and objectives.* • *Conduct a comprehensive literature review, critically evaluating existing works and identifying gaps, challenges, and opportunities.* • *Apply suitable research methodologies (quantitative, qualitative, experimental, or hybrid) for collecting, analyzing, and interpreting data.* • *Design and implement experiments, models, or prototypes applying technical and analytical reasoning.* • *Demonstrate independent problem-solving skills, scientific integrity, and adherence to ethical standards in research.* • *Analyze results, interpret findings, and provide evidence-based conclusions supported by data, experiments, or simulations.* • *Write a well-structured academic thesis consistent with scientific and institutional formatting standards.* • *Defend research findings effectively during the presentation, demonstrating professional communication skills and critical reflection.* • *Evaluate limitations, societal implications, and potential future directions of the conducted research.*

Content	*1.Preparation and approval of a research proposal including objectives, hypotheses, scope, expected outcomes, and methodology.* *2.Use of industry-standard tools and software, laboratory equipment, or real-field data where applicable.* *3.Ongoing monitoring, progress reporting, and documentation of research activities.* *4.Thesis writing, formatting, and submission according to department guidelines.* *5.Oral defense of the completed work.*

Module designation	***PDG 686 -Scientific Pedagogical Internship***
Semester(s) in which the module is taught	*4th Semester, Spring*
Person responsible for the module	*Supervisors of Chemical Engineering Department*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Mentored teaching practice, observation, class delivery, laboratory supervision, feedback discussions, report writing*
Workload (incl. contact hours, self-study hours)	*Total workload: 180 h = 180h extracurricular hours* ***Contact hours:*** *Examination preparation, consultation, self-study = 45 h/ week*
Credit points	*6 ECTS*
Required and recommended prerequisites for joining the module	• *Successful completion of prior theoretical and laboratory-based modules in the MSc curriculum* • *Completion of the Higher Education Pedagogy* • *Basic pedagogical knowledge or willingness to engage in reflective teaching practice*

Module objectives/intended learning outcomes	*Apply academic knowledge from OGT courses in a teaching or mentoring environment, demonstrating the ability to plan and deliver effective learning sessions.* • *Develop teaching, communication, and mentoring skills by conducting seminars, laboratory demonstrations, and student consultations under faculty supervision.* • *Design instructional materials (lectures, labs, or tutorials)* • *Assess and evaluate student performance, providing constructive feedback aligned with academic learning outcomes.* • *Demonstrate classroom management, professional ethics, and adherence to institutional teaching standards.* • *Reflect critically on teaching experiences and identify areas for professional growth.* • *Communicate technical topics clearly to diverse audiences, adjusting the level of complexity appropriately.*
Content	*Introduction to pedagogy in higher education* • *Lesson planning and learning-outcome mapping* • *Teaching observation and feedback cycles* • *Laboratory supervision and mentoring practices* • *Assessment design and evaluation strategies* • *Professional conduct and ethical behavior in academic settings* • *Reflective journaling and peer feedback* • *Final teaching demonstration and report submission*
Examination forms	*Report – 50%* *Supervisor evaluation – 30%* *Teaching demonstration – 20%*

Module designation	***CHE 684 - Research Internship***
Semester(s) in which the module is taught	*4th Semester, Spring*
Person responsible for the module	*Academic staff of Chemical Engineering Department*
Language	*English*
Relation to curriculum	*Compulsory*
Teaching methods	*Independent research, report writing, presentation, seminar discussion, supervision meetings*

Workload (incl. contact hours, self-study hours)	*Total workload: 180h = 180h extracurricular hours* ***Contact hours:*** *Examination preparation, consultation, self-study = 45 h/ week*
Credit points	*6 ECTS*
Required and recommended prerequisites for joining the module	*Critical Analysis and Research Preparation*
Module objectives/intended learning outcomes	*Upon completion, students will be able to apply:* • *the main methods and methodology of practical approbation of theoretical aspects of the master's dissertation topic;* • *the main provisions of the methodology of scientific research;* • *the main methods and methodology for empirically verifying the results of the study, its analysis and interpretation;* • *to apply the basic methodology of experimental approbation of the theoretical aspects of the master's thesis topic;* • *express the results of research and scientific knowledge on the selected problem in the form of a lecture, article, or report;* • *apply the basic principles of scientific research methodology in accordance with the specifications of the tasks set during the experiment;* • *to independently summarize, correct and implement their activities in the process*