Identification	**Subject**	PETE 323 Petroleum Reservoir Engineering and lab – 6 ECTS credits
	Department	Petroleum Engineering
	Program	Undergraduate
	Term	Spring, 2023
	Instructor	Grigorii Penkov
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	Phone:	+994 12 421 10 93 (ext. 243)
	Classroom/hours	TBC
	Office hours	Monday 10:00-17:00
Prerequisites	Consent of instructor	
Language	English	
Compulsory/Elective	Compulsory	
Required textbooks and course materials	*1. Tiab, Djebbar, and Erle C. Donaldson. Petrophysics: theory and practice of measuring reservoir rock and fluid transport properties. Gulf professional publishing, 2015.* *2. Reservoir engineering: Heriot-Watt University, Department of Petroleum Engineering, Edinburgh, UK 2004, 814 p.* *3. Ahmed, Tarek. Reservoir engineering handbook. Gulf professional publishing, 2018.*	
Course outline	The course aims to provide students with the fundamental principles, theories, and practical techniques essential for understanding and managing petroleum reservoirs. Through a combination of theoretical lectures, computational exercises, and hands-on applications, students will develop the skills necessary to characterize reservoirs, predict their behavior, and optimize production strategies.	
Course objectives	This course explains the fundamentals of reservoir engineering and their practical application in conducting a comprehensive field study. 1st mid-term includes fundamentals of reservoir fluid behavior with an emphasis on the classification of reservoir and reservoir fluids. Here the fundamental mathematical expressions that are used to describe the reservoir fluid flow behavior in porous media. Principles of oil and gas well performances calculations are also discussed. Parallel you will be deeply familiar with water influx processes in reservoir. In the 2nd mid-term, it is introduced the basic principle of oil recovery mechanisms and presented by the generalized form of the material balance equation. Later, waterflooding and Enhanced Oil Recovery methods will be discussed. After gaining knowledge about Gas and fractured reservoirs, modern approach such as reservoir simulation will be discussed and illustrated at the end of the course.	

<table>
<tr><td>Learning outcomes</td><td colspan="3">• Identify and articulate reservoirs by pressure-temperature diagrams
• Formulate and calculate different types of fluid flow in reservoir
• Formulate and calculate flow in reservoir for any kind of geometry
• Classify numerical and analytical aquifers
• Analyzing fluid flow through in porous media
• Understand how to solve unsteady state PDE.
• How to use dimensionless method to obtain flow parameters in reservoir.
• Understand recovery mechanisms by using Material Balance Equation
• Familiarize with Reservoir Simulation (Dynamic modeling)
• Analyzing two phase flow.
• Application relative permeability curves in reservoir engineering problems</td></tr>
<tr><td rowspan="4">Teaching methods</td><td colspan="2">Lecture</td><td>X</td></tr>
<tr><td colspan="2">Group discussion</td><td>X</td></tr>
<tr><td colspan="2">Experiential exercise</td><td>X</td></tr>
<tr><td colspan="2">Case analysis</td><td>X</td></tr>
<tr><td rowspan="6">Evaluation</td><td>Methods</td><td>Date/deadlines</td><td>Percentage (%)</td></tr>
<tr><td>Midterm Exam</td><td></td><td>30</td></tr>
<tr><td>Class Participation</td><td></td><td>5</td></tr>
<tr><td>Assignment and quizzes</td><td></td><td>25</td></tr>
<tr><td>Final Exam</td><td></td><td>40</td></tr>
<tr><td>Total</td><td></td><td>100</td></tr>
<tr><td>Policy</td><td colspan="3">•A midterm exam is an exam given near the middle of an academic grading term or near the middle of any given quarter or semester. The purpose of the examination is that students have a better idea of whether they're advancing well in the course.
•The student receives 5 bonus points at the end of the semester if they attend all classes and follow all course policies and procedures.
•Assessment of the participant’s activity in lectures, practical classes, and in the learning process in general.
•A quiz is a quick assessment of student knowledge to test a students' level of comprehension briefly regarding course material, providing teachers with insights into student progress and any existing knowledge gaps.
•A project is a collaborative activity of students relating to scientific research. The reasons for including projects in the subject course is to show prospective students and research activity on the subject.
•A final examination is an exanimation administered at the end of an academic term, with a set of questions or exercises evaluating the skill or knowledge of students given to students at the end of a course of study.</td></tr>
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	Class assignments Class assignments will be provided during class. The contents will be based on the calculation of formation properties etc. **Project** Research skills and the techniques learnt during class assignments and practical exercises will be the tools to complete the projects**.** **Quizzes** Quizzes will cover the materials studied in previous classes. There will be 2 quizzes during the semester. **Preparation for class** The structure of this course makes your individual study and preparation outside the class extremely important. The lecture material will focus on the major points introduced in the text. Reading the assigned chapters and having some familiarity with them before class will greatly assist your understanding of the lecture. **Withdrawal (pass/fail)** A student is normally expected to achieve a mark of at least 60% to pass. In case of failure, he/she will be required to repeat the course the following term or year. **Cheating/plagiarism** Cheating or other plagiarism during the Quizzes, Mid-term, and Final Examinations will lead to paper cancellation. In this case, the student will automatically get zero (0), without any considerations. After identification of cheating or plagiarism, any chance will not be given for correction and rewriting of the report. **Professional behavior guidelines** The students shall behave in a way to creates favorable academic and professional environment during the class hours. Unauthorized discussions and unethical behavior are strictly prohibited. **Ethics** Students must not be late to class. All mobile phones must be turned off and put away during the class. **Expected behavior** Includes attending all class activities; meeting deadlines; observing common courtesies to fellow students, teachers, and staff; being honest; making a diligent effort to learn; and does not engage in any disruptive irresponsible manner. Legitimate collaboration is encouraged but academic collusion or dishonesty will not be tolerated. **Illness** Students with an illness may miss a quiz or presentation. This might be because the student needs to go to the hospital, recover at home, or attend regular medical appointments. In this case, the student must inform the instructor in advance about the illness and must present a document from their doctor. After considering the situation, the instructor may set a new date for the quiz or project presentation. Only one opportunity will be given to the student. The students who do not inform the instructor in advance will not be given a chance to retake the quiz or give a presentation.
Tentative Schedule	

Week	Date/Day (Tentative)	Topics	Textbook/ Assignments
1	Week 1	Introduction to reservoir engineering.	Book 2 Chapter 2-10
2	Week 2	Core analysis. Sample preparation. Cleaning and saturation determination.	Book 2 Chapter 8
3	Week 3	Measurement of density, specific gravity, API gravity, and specific gravity of gases.	Book 1 Appendix
4	Week 4	Viscosity. Methods for measuring viscosity.	Book 1 Appendix
5	Week 5	Surface and interfacial tension. Contact angle and wettability.	Book 1 Appendix
6	Week 6	**Novruz Holiday**	
7	Week 7	Particle size distribution. Surface area of sediments. Pore size distribution.	Book 1 Appendix
8	Week 8	Measurement of porosity.	Book 1 Appendix
9	Week 9	**Mid-Term Exam**	
10	Week 10	Measurement of permeability. Verification of the Klinkenberg effect.	Book 1 Appendix
11	Week 11	Effect of stress on reservoir rock properties.	Book 1 Appendix
12	Week 12	Measurement of physical and mechanical properties of rocks.	Book 1 Appendix
13	Week 13	PVT analysis for oil	Book 1 Appendix
14	Week 14	Basic well log petrophysical parameters. Part 1	Book 1 Appendix
15	Week 15	Basic well log petrophysical parameters. Part 2	Book 1 Appendix
16	Week 16	Overall revision and preparation for exam	
	TBA	**Final Exam**	

This syllabus is a guide for the course and any modifications to it will be announced in advance.