

Identification	Subject	PETE 312 Well Logging, 6 ECTS
	Department	Petroleum Engineering
	Program	Undergraduate
	Term	Fall 2025
	Instructor	Leyla Alimuradova
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	Phone:	
	Classroom/hours	11 Mehseti str.(Neftchilar campus)
	Office hours	Friday, 15:00 - 17:00
Prerequisites	Petroleum Geology, basics of geosciences, physics	
Language	English	
Compulsory/Elective	Elective	
Required textbooks and course materials	<ol style="list-style-type: none"> 1. Dr.Paul W.J.Glower, 2010. "Petrophysics MSc Course Notes", MSc Petroleum Geology Department of Geology and Petroleum Geology University of Aberdeen UK, 2. Nnaemeka Ezekwe, 2011, "Petroleum reservoir engineering practice", Prentice Hall. 3. Djebbar Tiab, Erle C. Donaldson, 2010. "Petrophysics", Elsevier. 4. Gary Mavko, Tapan Mukerji, Jack Dvorkin, 2009 "The Rock Physics Handbook" 	
Course outline	<p>This course is designed for the bachelor and master students to study the properties of rocks and their interaction with fluids (gases, liquid hydrocarbons, and formation aqueous solutions). Course address's introduction to the basic hydrocarbon reservoir formation evaluation using open-hole logs (resistivity (micro and focused), gamma ray, self-potential, caliper, density neutron, sonic, cement bond and variable density), laboratory (core) and field measurements data and geological information. The well logging course will essentially deal with geological strata identification and the determination of physical properties of petroleum fluids and reservoir rocks as well as includes the determination of the lithology of hydrocarbon reservoirs; rocks porosity, permeability, and fluids saturation distribution in hydrocarbon reservoirs.</p>	
Course objectives	<p><i>Basic Objective of the Course:</i></p> <ul style="list-style-type: none"> ▪ To equip students with the core concepts, methods, and techniques of well logging and interpretation. ▪ To prepare students for the industry environment <p><i>Specific Objectives of the Course:</i></p> <ul style="list-style-type: none"> ▪ To support the students academically, to improve their chance of realizing their potential. ▪ To give basic knowledge in geology and physics is required to understand petrophysical models. ▪ To encourage students' participation and interaction and fostering atmosphere of tolerance and respect ▪ To develop an understanding of the theory and practice of managerial analysis, and strategic decision making ▪ To develop an understanding of the theory in Well logging ▪ To furnish of students with the "Interpretation charts" ▪ To build background for the students further Well logging interpretation ▪ To introduce the key concepts of rock physics 	

Learning outcomes	By the end of the course the students should be able: <ul style="list-style-type: none"> ▪ Perform quick look interpretation of logs. ▪ Perform log interpretation of real case studies. ▪ Calculate field reserves. ▪ Use well-to-well correlations of logs to identify geological signatures of formations. ▪ Understand the math and physics behind each measurement technique and rock physics models. ▪ Evaluate elastic properties from log data and apply them to drilling and reservoir stimulation. ▪ Identify rock facies using velocity transforms. ▪ Build Rock Physics models for sandstone formations. 		
Teaching methods	Lecture		X
	Group discussion		X
	Practical exercises		X
	Simulation		
	Case analysis		X
	Course paper		
	Others		
Evaluation	Methods	Date/deadlines	Percentage (%)
	Midterm Exam		30
	Class Participation		5
	Assignments		10
	Quizzes		5
	Projects		10
	Final Exam		40
	Total		100
Policy	<ul style="list-style-type: none"> ▪ Quiz Each quiz will consist of 5 questions, and each question will be marked with 1 point. One quiz will be organized in the middle of the first semester and the midterm exam. The second quiz will be organized between the midterm exam and the final exam. ▪ Mini project The mini project must consist of an abstract, introduction, objectives, methodology, results, discussion, conclusion, and references. The report must be no longer than 5-7 pages of A4 in portrait orientation, with a title and text size set to Arial 12. The mini project must be presented. The mini-project report and presentation marks will be summarized and divided by 2 to obtain an average mark. ▪ Activity The students should participate in seminars, conferences, and other events related to their courses to build new connections between academic and non-academic institutions. By 10 May 2024, a one-page report on the students' activities will be required. ▪ Cheating/plagiarism Any form of plagiarism or cheating on a proposal, work plan, bibliography, presentation of literature review, final report will result in the cancellation of the work. In this case, the student will receive a mark of nought without any further consideration. ▪ After identification cheating or plagiarism, any chance will NOT 		

	<p>be given for correction and rewrite report.</p> <ul style="list-style-type: none"> ▪ Professional Behavior Guidelines During class hours, students are expected to conduct themselves in a manner that fosters a positive academic and professional atmosphere. Unauthorized discussions and unethical conduct are strictly forbidden. ▪ Ethics Students must NOT be late to class. All mobile phones must be turned off and put away during the class. ▪ Email Use your Khazar University email account ONLY when contacting your professor. ▪ Student should include "Environmental Science Project" in the subject of any emails that he/she sends, at least for the first few emails. ▪ Generally, all emails will be responded to within 72 hours during weekdays (not including holidays). ▪ 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.
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Tentative Schedule			
Week	Date/Day (tentative)	Topics	Textbook/ Assignments
1		Introduction to Petrophysics and Well logging: terminology and application.	Lecture Notes Ch.1 p.3-9 Ch.5 p.55-64 [1]
2		Borehole Environment, Wellsite. Quick-look log interpretation. Full interpretation.	Ch.6 p. 65-73 [1]
3		Lithology identification and physics of a reservoir.	Ch.16 p.172-197 [1]
4		Spontaneous Potential (SP), Resistivity Logging (RL) and Caliper.	Ch.9 p. 88-92 Ch.17-18 p.198-245 [1]
5		Radioactivity logging (Total Gamma ray log, Spectral Gamma ray log, Neutron (NL, NGL) logs)	Ch.10-12 p.95-120 Ch.15 p.150-171 [1]
6		Holiday	
7		Density Log (Formation density and Litho-density logs)	Ch.13 p.121-149 [1]
		Sonic Porosity Logs (tool physics, application and limitations) and INNK. Quiz 1	Ch.16 p.172-197 [1]
8		Mid-term Exam	
9		NMR log and Residual Oil saturation.	Lecture Notes

10		Introduction to Rock Physics. Rock properties	Ch.2-3 p.172-197 [1]
11		Porosity and Permeability. Well Logging Data Interpretation: Additional: Geomechanics for porosity	Ch.1 p.1-12 Ch.2 p.15-32 [2]
12		Holiday	
13		Formation resistivity and water saturation. Capillary pressure and wettability.	Ch.3 p.39-49 [2] Ch.4 p.34-50 [1]
14		Well Logging Data Interpretation: evaluation of lithology and log correlation.	Ch.18 p.641-675 [2]
15		Hydrocarbon reserves estimation. Quiz 2	Ch.8-9 p.191-29 [2]
	TBA	Final Exam	

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