PET 310E DRILLING AND COMPLETION FLUIDS PROPERTIES LABORATORY

Course Title		Drilling and Completion Fluids Laboratory				
				Course Implementation, Hours/Week		
Code	**Semester**	**Local Credits**	**ECTS Credits**	**Theoretical**	**Tutorial**	**Laboratory**
PET 310E	6	1	3	0	0	2
Department		Petroleum and Natural Gas Engineering				
Course Type		Compulsory		**Course Language**		English
Course Prerequisites		-				

Course Category By Content, %	Math & Basic Sciences	Engineering Topics; Check if Contains Significant Design (√)	Other
	-	100	-

Course Description	Drilling optimization; guidelines and assumptions, and optimum drilling program. Drilling fluids; functions, selections, types, planning, and field-tested properties. Diagnostic tests; detection potential problems and identifying their causes. Pilot tests; alternative mud treatment. Clay chemistry; drilling clays, hydration mechanism, physical properties, effect of sodium chloride, and pH. Water-base muds; low-solids nondispersed muds, dispersed muds, formulation, maintenance, chemical additives, chemical removal of contaminants, filtration-density-solids control. Inhibitive water-base muds; calcium treated muds, lignosulfonate treated muds, high salinity muds, formulation, maintenance, and treatment. Oil muds; formulation, additives, maintenance, and treatment. Cement slurry design.
Course Objectives	1. To inform about the primary functions of the drilling fluid, 2. To inform about the test procedures used to determine whether the drilling fluid has suitable properties for performing primary functions of the drilling fluid, 3. To inform about the common additives used to obtain the desirable properties under various well conditions, 4. To inform about the main factors governing the selection of drilling fluids, 5. To give an ability to write the technical report.
Course Learning Outcomes	Students who pass the course will be able to: 1. Recognize health, safety and environment related issues in laboratory and field experiments in the petroleum industry 2. Conduct laboratory experiments and write technical reports effectively in a team setting 3. Conduct laboratory experiments to measure reservoir rock and fluid properties 4. Determine physical properties of reservoir rock and fluids experimentally 5. Infer and report engineering conclusions from the analysis and interpretation of experimental data. 6. Communicate effectively via technical and laboratory reports
Textbook	1. Bourgoyne, A.T. et al, Applied Drilling Engineering, SPE Textbook Series, Vol.2, Richardson, Texas, USA, 1991 2. James L. Lummus and J.J. Azar, Drilling Fluids Optimization: A Practical Field Approach, Penn Well Books, Tulsa, Oklahoma, USA, 1986. 3. Altun, G., Drilling Fluids Lab, Course Notes, ITU Petroleum and Natural Gas Engineering, Istanbul, Turkey, 2000-2002.
Other References	1. API Standards used in Drilling Fluids Lab: API RP 13B-1, API RP 13B-2, API RP 13G, API RP 13D, API RP 13I 2. Moore, P.L., Drilling Practices Manual, The Petroleum Publishing Co., Tulsa, 1974. 3. Monicard, R., Drilling Mud and Cement Slurry Rheology Manual, Gulf Publishing Company, Houston, Texas, USA, 1982.
Homework & Projects	-
Laboratory work	Students are assigned to prepare a technical lab. report to analyze the experiment. All reports are to be **HANDED IN** a week after every experiment.
Computer Use	The technical reports are required to be prepared by using computer. Therefore, some MS office programs (such as grapher, excel, word, etc.) usage is encouraged throughout the course.
Other Activities	-

Assessment Criteria	Activities	Quantity	Effects on Grading, %
	Midterms	1	30
	Quizzes		
	Homework		
	Projects		
	Term Paper/Projects		
	Laboratory Work	9	30
	Other Activities		
	Final Exam	1	40

Weeks	Course Plan	Course Outcomes
1	The primary propeties of the drilling fluids and its functions	3, 4, 5
2	The primary propeties of the drilling fluids and its functions	3, 4, 5
3	Yield of clay	3, 4, 5
4	API water loss	3, 4, 5
5	Solid content analysis of unweighted drilling mud	3, 4, 5
6	Low solids mud systems	3, 4, 5
7	Solid content analysis of weighted drilling mud	3, 4, 5
8	Salt contaminated drilling mud	3, 4, 5
9	Calcium contaminated drilling mud	3, 4, 5
10	General review and evaluation of technical reports	2
11	Water based inhibitive muds	3, 4, 5
12	Oil based muds	3, 4, 5
13	Strength test of cement	3, 4, 5
14	Cement slurry design	3, 4, 5

Related Performance Indicators
2a. Consider public health, safety, and welfare issues in Petroleum, Natural Gas, and Geothermal Engineering design. **3a.** Communicate effectively by delivering formatted reports **5b.** Collaborate in a team's activities to complete a project **6a.** Develop and/or execute experiments in Petroleum Engineering applications. **6b.** Acquire, analyze, and interpret data. **6c.** Infer and report engineering conclusions from the analysis and interpretation of data

Relationship of Course Learning Outcomes to the Performance Indicators						
	Performance Indicator					
Course Learning Outcome	**(2a)**	**(3a)**	**(5b)**	**(6a)**	**(6b)**	**(6c)**
1	x					
2			x			
3				x		
4					x	
5						x
6		x				