

PET 333E DRILLING ENGINEERING

Course Title		Drilling Engineering				
		Course Implementation, Hours/Week				
Code	Semester	Local Credits	ECTS Credits	Theoretical	Tutorial	Laboratory
PET 333E	5	3	5	3	0	0
Department		Petroleum and Natural Gas Engineering				
Course Type		Compulsory		Course Language		English
Course Prerequisites		STA 204 MIN DD or STA 204E MIN DD) and (AKM 204 MIN DD or AKM 204E MIN DD)				
Course Category By Content, %		Math & Basic Sciences	Engineering Topics; Check if Contains Significant Design (√)			Other
		-	100			-

Course Description	The course provides the students with the basic principles, concepts and models used in drilling engineering to solve problems encountered in a well being drilled. The important concepts are developed from fundamental scientific principles and illustrated with examples. The level of engineering science gradually advances as one proceeds through the course. Main systems of drilling processes and operational procedures are provided. Drilling cost equations and analysis to make recommendations such as drilling fluid treatment, pump operation, and bit selection are derived.		
Course Objectives	To introduce the student rotary drilling equipment and operational procedures, drilling cost evaluation, functions of drilling fluids, cements, cement placement techniques, and cement job design, drilling hydraulics, drilling bits; selection, evaluation, factors affecting bit wear and drilling speed, bit optimization, casing and various types of casing strings, directional drilling and deviation control, environmental effects of drilling.		
Course Learning Outcomes	<p>Students who pass the course will be able to:</p> <ol style="list-style-type: none"> 1. Identify the major systems in rotary drilling and make necessary calculations 2. Calculate and design the proper drilling fluids parameters 3. Analyze well cement slurry properties and requirements 4. Calculate the pressure loss in the circulation system for wells drilled using drilling fluids having different rheological properties 5. Determine the overall drilling cost by each drilled section 6. Estimate the lifetime and requirements of drilling bits for different well conditions 		
Textbook	Applied Drilling Engineering, Bourgoyne, A.T. et al, SPE Textbook Series, Vol.2, Richardson, Texas, USA, 1991.		
Other References	<ol style="list-style-type: none"> 1. Oilwell Drilling Engineering Handbook, Mitchell, B., SPE., Richardson, Texas, 1995. 2. Practical Well Planning and Drilling, Steve Deverux, PennWell Publishing Company, Tulsa, Oklahoma, USA, 1998. 		
Homework & Projects	Throughout the semester the students will be given homework assignments which include problems and steps to evaluate different drilling systems and identify proper drilling conditions.		
Laboratory work	-		
Computer Use	Students will be using the computer for their homework assignments.		
Other Activities	-		
Assessment Criteria	Activities	Quantity	Effects on Grading, %
	Midterms	2	50
	Quizzes	-	-
	Homework	4-6	10
	Projects	-	-
	Term Paper/Projects	-	-
	Laboratory Work	-	-
	Other Activities	-	-
Final Exam	1	40	

Weeks	Course Plan	Course Outcomes
1	Introduction, rotary drilling	1
2	Rig power, hoisting, circulation and rotary systems	1
3	Drilling Cost Analysis	5
4	Drilling Fluids	2
5	Diagnostic and Pilot Tests	2
6	Well Cements	3
7	Cement Placements Technique	3
8	Drilling Hydraulics	4
9	Non-static well conditions	4
10	Rheological Models	4
11	Laminar and Turbulent flow in pipes and annuli	4
12	Jet bit nozzle size selection	4
13	Rotary Drilling Bits	6
14	Factors affecting tooth and bearing wear	6

Related Performance Indicators

- 1a.** Identify and formulate appropriate methods for solving petroleum, natural gas, and geothermal engineering problems
1b. Apply engineering methods to reservoir, drilling and production engineering problems
2c. Conduct economic analysis in Petroleum, Natural Gas, and Geothermal Engineering design.

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