PET 335E WELL LOGGING I

Course Title		Well Logging I				
				Course Implementation, Hours/Week		
Code	**Semester**	**Local Credits**	**ECTS Credits**	**Theoretical**	**Tutorial**	**Laboratory**
PET 335E	7	3	6	3	0	0
Department		Petroleum and Natural Gas Engineering				
Course Type		Compulsory		**Course Language**		English
Course Prerequisites		(PET 212E MIN DD)				
Course Category By Content, %		Math & Basic Sciences	Engineering Topics; Check if Contains Significant Design (√)			Other
			100			0

Course Description	An overview of open hole well logging and fundamental concepts. Measurement environment. Physical properties of rocks; electrical, acoustic, thermal and radioactive. Electrical logs. Spontaneous potential logs. Induction logs: dual induction logs and microresistivity logs. Gamma ray logs. Neutron logs. Density logs. Acoustic (sonic) logs.
Course Objectives	1. Develop basic understanding of well logging as essential formation evaluation tool and use basic well logging to evaluate hydrocarbon formations 2. Develop students' ability in understanding the petrophysical/physical properties of reservoir rocks, physical and chemical properties of hydrocarbons, and formation waters. 3. Develop students' ability to recognize theory of measurements, relate and interpret the well logs data.
Course Learning Outcomes	Students who pass the course will be able to: 1. Characterize the measurement environment including borehole diameter, geothermal gradient, temperature, water resistivity and salinity from logs and fluid samples 2. Estimate resistivity, fluid saturations, porosity and formation thickness from resistivity and spontaneous potential logs 3. Estimate porosity, shale corrections, and shale volume from neutron, density, sonic and gamma ray logs data.
Textbook	1. Bassiouni, Z. (1994) *Theory, Measurement and Interpretation of Well Logs*, SPE Textbook Series, Vol. 4, Richardson, Texas, USA. 2. Log Interpretation Charts, Schlumberger Co., Houston, Texas, USA, 1998. 3. Log Interpretation Principles/Applications, Schulumberger Co., Houston, Texas, USA, 1998.
Other References	1. Darling,T., 2005. *Well Logging and Formation Evaluation*, Elsevier, Gulf Drilling Guides, USA. 2. Serra, O., 2008. *The Well Logging Handbook*, Editions Technip, Paris. 3. Serra, O., 1986. *Fundamentals of Well Log Interpretation,* Elsevier, N.Y., USA. 4. Hilchie, D.W., 1989. *Advanced Well Log Interpretation*, Dougles W.Hilchie Inc., Boulder, Colorado, USA. 5. Well Logging and Interpretation Techniques: The Course for Home Study, Dresser Atlas Co., USA, 1984.
Homework & Projects	Throughout the semester, the students will be given at least 3 homeworks, 2 quizzes, and 1 term project.
Laboratory work	-
Computer Use	Students will be using conventional methods for their homework assignments.
Other Activities	-

Assessment Criteria	**Activities**	**Quantity**	**Effects on Grading, %**
	Midterms	1	30
	Quizzes	min 2	10
	Homework	min 3	10
	Projects	min 1	10
	Term Paper/Projects	-	-
	Laboratory Work	-	-
	Other Activities	-	-
	Final Exam	1	40

Weeks	Course Plan (Tentative)	Course Outcomes
1	Introduction: Fundamental Concepts	1
2	Fundamental Concepts Cont'd. + Investigation of the near borehole (Measurement Environment)	1
3	Electrical properties of rocks	2
4	Electrical properties of rocks and Spontenous Potential Logs	2
5	Conventional Electrical Logs (Resistivity Logs): Normal Logs & Lateral Logs	2
6	Conventional Electrical Logs (Resistivity Logs): Normal Logs & Lateral Logs cont'd.	2
7	Focusing Electrode Logs Resistivity Logs: Laterologs	2
8	Focusing Electrode Logs Resistivity Logs: Dual Laterologs- Micrologs	2
9	Induction Logs-Dual Induction Logs-Microresistivity	2
10	Induction Logs-Dual Induction Logs-Microresistivity Cont'd.	2
11	Gamma logs	3
12	Density logs	3
13	Sonic logs	3
14	Neutron logs	3

Related Performance Indicators
1a. Identify and formulate appropriate methods for solving petroleum, natural gas, and geothermal engineering problems **6b.** Acquire, analyze, and interpret data.

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