PET 342E RESERVOIR ENGINEERING I

Course Title		Reservoir Engineering I				
				Course Implementation, Hours/Week		
Code	**Semester**	**Local Credits**	**ECTS Credits**	**Theoretical**	**Tutorial**	**Laboratory**
PET 342E	5	3	6	3	0	0
Department		Petroleum and Natural Gas Engineering				
Course Type		Compulsory		**Course Language**		English
Course Prerequisites		(PET 212E MIN DD or PET 212 MIN DD) and (PET 311E MIN DD or PET 211E MIN DD)				
Course Category By Content, %		Math & Basic Sciences	Engineering Topics; Check if Contains Significant Design (√)		Other	
		-	100		-	

Course Description	The course introduces the classifications and drive mechanisms of hydrocarbon (oil and gas) reservoirs and the basic methods for estimating the reserves. Identifying oil-water, oil-gas and gas-water contacts from pressure measurements. Derivation and modification of generalized MBE (Material Balance Equation) for reservoirs of various drive mechanisms is presented. Water influx theory and models are explained in detail.
Course Objectives	1. Develop students' ability in solving reservoir engineering problems by analytical thinking and reasoning, while applying the integrated knowledge of physics, mathematics, geo-sciences and engineering sciences, 2. Develop students' ability in taking the basic reservoir management decisions in the presence of uncertainty and lack of information,
Course Learning Outcomes	Students who pass the course will be able to: 1. Describe basic elements and production mechanisms of reservoirs. 2. Determine oil-water, gas-water and / or gas-oil contacts by way of pressure measurements. 3. Formulate mathematical models regarding the production mechanisms. 4. Estimate original hydrocarbon in place for a variety of reservoir types (dry gas reservoirs, saturated reservoirs and undersaturated reservoirs) 5. Estimate water influx using well established methods in the literature.
Textbook	Craft, B. C., and Hawkins, M. F., "Applied Petroleum Reservoir Engineering", 2nd Edition, Prentice-Hall, Englewood Cliffs, N.J.,1991
Other References	1. Fundamentals of Reservoir Engineering, Dake, L.P., Elsevier, New York City, 1981. 2. Petroleum Reservoir Engineering-Physical Properties, Amyx, J. W., Bass, Jr. D. M and Whiting, R. L., McGraw-Hill, New York, New York, USA, 1960. 3. Practical Petroleum Reservoir Engineering Methods, Slider, H. C., PennWell, Tulsa, OK, USA, 1976. 4. Fundamentals of Reservoir Engineering, Calhoun, Jr J. C. University of Oklahoma Press, Norman, Oklahoma, USA, 1976.
Homework & Projects	Throughout the semester the students will be given one project.
Laboratory work	-
Computer Use	Students will be using the computer for their homework and projects.
Other Activities	-

Assessment Criteria	**Activities**	**Quantity**	**Effects on Grading, %**
	Midterms	1	20
	Quizzes	4-5	20
	Homework	0	0
	Projects	1	20
	Term Paper/Projects	-	-
	Laboratory Work	-	-
	Other Activities	-	-
	Final Exam	1	40

Weeks	Course Plan	Course Outcomes
1	Physics of oil and gas production. Concept of compressibility	1
2	Major elements and classification of reservoirs. Capillarity and reservoir fluid contacts	2
3	Reservoir pressure gradients, datum selection and calculation of bottom hole pressures	2
4	Generalized MBE (Material Balance Equation)	3
5	Single-phase dry gas reservoirs. OGIP, recovery factor, and p/z plots	3,4
6	Underground storage of natural gas	3,4
7	Havlena and Odeh method for the MBE	3,4
8	Undersaturated (solution gas drive) oil reservoirs, MBE, and original oil and gas in place	3,4
9	Saturated (solution gas and gas cap drive) oil reservoirs, MBE, and original oil and gas in place	3,4
10	Steady state water influx	4,5
11	Tank models for oil and geothermal reservoirs	4,5
12	Unsteady state water influx	4,5
13	Pseudo steady state water influx	4,5
14	Review session	1,2,3,4,5

Related Performance Indicators
1a. The students will be able to demonstrate the ability to identify and formulate appropriate methods for solving petroleum, natural gas, and geothermal engineering problems **1b.** The students will be able to demonstrate the ability to apply engineering methods to reservoir, drilling and production engineering problems

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