KHAZAR UNIVERSITY

DEPARTMENT OF PETROLEUM ENGINEERING

COURSE SYLLABUS

PETROLEUM RESERVOIR ENGINEERING

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Identification

Subject:	Petroleum Reservoir Engineering (PETE 313)
Department:	Petroleum Engineering
Instructor:	Gurbanov Rafig S.
Office:	# 413
Phone:	+994 12 4217916
Term:	Spring 2010

Prerequisites: Physics Of Oil and Gas Reservoirs (PETE 202)

Textbooks and Materials:

Core material:

1. Adrian Todd, Dr. Jim Somerville. Petroleum Reservoir Engineering. 2004. Edinburgh. .

Supplements:

2. Larry Lake. Petroleum Engineering Handbook., vol. 5, Reservoir Engineering and Petrophysics, 2006

For class presentations and discussion, the students should utilize Journal, and Internet materials, the course doesn't limit the use of learning materials available at Khazar University library.

Objective:

Generic Objective of the course:

To provide of modern concepts of illumination on Petroleum reservoir. Analysis of oil field data using all Petroleum tools. Reservoir description, calculation of hydrocarbon reserves, properties of reservoir fluids, properties of reservoir rocks, formation drive mechanisms, material balance equation water influx and so on.

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Specific Objectives of the course:

- To support the students academically, to improve their chance of realizing their potential.
- To encourage students participation and in interaction and fostering and atmosphere of tolerance and respect.
- To develop on understanding of the theory and practice in Petroleum Reservoir Engineering.
- To build background for the student's further Petroleum Engineering Development.

Outcome:

By the end of the course the students should be able:

- To get knowledge in theory and practice of Petroleum Reservoir Engineering
- To solve out problems by on Petroleum Reservoir Engineering

Developed Skills Throughout the course the students should develop and maintain the following skills:

- Analytical thinking
- Critical reasoning
- Leadership
- Presentation
- Other

Evaluation

Quizzes	5%
Course Project	15%
Participation & activity	10%
Mid-Term Exam	30%
Final Exam	40%
Total	**100%**

Learning & Teaching Methods

This course considers active learning process rather than passive, one-studying lectures, discussions, simulating, case analysis.

Weeks	Topics	Hours		References
		Lectures	Practicals	
1	Introduction to Reservoir Engineering. History of reservoir engineering. The coordinating role of reservoir engineer in reservoir development. Hydrocarbon reser-ves estimation. Development planning. Petroleum reserves calculation.	3	1	[1] Ch 1 p.1-16
2	Reservoir pressure and temperature. Abnormal pressure. Pressure gradients around the WOC. Reservoir temperature.	3	1	Ch 1 p.3-13
3	Reservoir fluids composition. Chemistry of hydrocarbons. Non-hydrocarbon compo-unds. Compositional description for reservoir engineering.	3	1	[1] Ch 3 p.1-16
4	Phase behavior of hydrocarbon systems. Phase behavior of pure substances. Two component systems. Retrograde conden-sation. Multi-component hydrocarbon.	4		[1] Ch 4 p.1-25

5	Behavior of gases. Ideal gas laws. The equation of state for an ideal gas. Dalton's law.of partial pressures. Amagat's law. Molecular weight and specific gravity of gas. Behavior of real gases. Compressibi-lity factor. Law of corresponding states.	3	1	[1] Ch 5 p.1-35
6	Properties of reservoir liquids. Composition of black oil models. Volume factors. Bubble point. Oil compressibility. Fluid density, viscosity, interfacial tension. Comparison of fluid models.	3	1	[1] Ch 6 p 1-47
7	Fundamental properties of reservoir rocks. Physical characteristics of reservoir rocks. Porosity. Permeability. Darcy's law. Stress effects on core measurements. Porosity- permeability relationships. Surface kinetics. Rock properties measurement. Capillary pressure	4		[1] Ch 7 p.1-49 [1] Ch 8 p.1-40
8	Midterm Exam			
9	Fluid flow in porous media. Characterisa-tion of flow patterns. The steady state solu-tion. Non-steady state solution. The skin factor. Principle of superposition.	4		[1] Ch 10 p.1-131
10	Drive mechanisms. Natural drive mechanisms types. Reservoir performance of different drive systems. Oil recovery factor in different drive mechanisms. Well spacing in different drive mechanisms.	4		[1] Ch 11 p.1-21
11	Material balance equation (MBE). Material balance for gas reservoirs. The general material balance equation.	3	1	[1] Ch 15 p1-29
12	Material balance equation application Linear form of material balance equation. Gas field applications of MBE. Material balance equation applied to oil reservoirs.	3	1	[1] Ch 16 p.1-35
13	Water influx. Models for water encroach-ment. Reservoir performance prediction. History matching water influx.	3	1	[1] Ch 17 p.1-48
14	Immiscible displacement. The reason for water injection. Basic water drive theory. Displacement theories.	3	1	[1] Ch 18 p.1-35
15	Application to field performance. Immis-cible displacement in gas drive systems.	2	2	[1] Ch 18 p.56-76
16	Model solutions.		4	[1] Ch 19
	Final Exam			