KOMAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
(KUST)

RESERVOIR EVALUATION AND MONITORING SYLLABUS			
Course Title	**Reservoir Evaluation and Monitoring**		
Course Code	**PTE 4345**	**No. of Credits**	**3 CR**
Department	**Petroleum Engineering**	**College**	**College of Engineering**
Pre-requisites Course Code	**PTE 3315C**	**Co-requisites Course Code**	
Course Coordinator(s)	**Hiwa Sidiq**		
Email	**hiwa.sidiq@komar.edu.iq**	**IP No.**	**134**
Other Course Teacher(s)/Tutor(s)	**None**		
Class Hours	**MON//WED: 10:00 – 11:30 Room: 203**		
Contact Hours	**TUE: 13:00 - 16:00 Room:308**		
Course Type	**Departmental Requirement**		
Offer in Academic Year	**Fall 2015**		

COURSE DESCRIPTION

This course describes the theoretical development of flow equations governing well testing in oil and gas reservoir. Interpreted data of well testing will be used for reservoir evaluation purpose. How to optimize oil performance and predict of reservoir performance using flow equation will be clarified. A long-term strategy to produce from a reservoir to selecting the path that leads to the fastest release of cash flow will be discussed in details to enable sequential production.

COURSE OBJECTIVES

On completion of this course students are expected to understand the process of reservoir management and monitoring, be able to estimate reserves using both volumetric and MB, be familiar with Darcy law, understand drive mechanisms, understand the concept of enhanced oil/gas recovery and interpret basic well pressure and production test results

COURSE LEARNING OUTCOMES

After participating in the course, students should be able to:

1. Understand and determine basic flow regime from weltest analysis. (ABET A and E)
2. Understand and determine basic reservoir geometry. (ABET K and D)
3. Analyse transient well testing data (ABET A and E)
4. Estimate reservoir performance using analysis from different recovery mechanisms techniques. (ABET E)
5. Structure a framework for evaluating, planning, and executing monitoring programs. (ABET A and E)
6. Understand the well and production system monitoring (ABET E)
7. Identify and screen the quality of measured data. (ABET K)
8. Discuss and presents contemporary issues in reservoir engineering. (ABET G and J)

RELATED PROGRAM OUTCOMES:	
A	An ability to apply knowledge of mathematics, science, and engineering
D	An ability to function on multidisciplinary teams
E	An ability to identify, formulate, and solve engineering problems
G	An ability to communicate effectively
J	A knowledge of contemporary issues
K	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Reference: http://www.abet.org/eac-criteria-2014-2015/

GUIDELINES ON GRADING POLICY

Points	*Percentage Scores*	*Grade*
A *A-*	*95–100* *90-94*	*4.0* *3.7*
B+ *B* *B-*	*87–89* *83-86* *80-82*	*3.3* *3.0* *2.7*
C+ *C* *C-*	*75–79* *70-74* *65-69*	*2.3* *2.0* *1.7*
D+ *D* *D-*	*60–64* *55-59* *50-54*	*1.3* *1.0* *0.7*
F	*0–49*	*0*
I	*Incomplete Course Work*	
W	*Official Withdrawal*	
Passing Grade is 65% or above		

COURSE CONTENTS

Course topics include:

- Fundamentals of Reservoir Engineering
- Fluid flow equations welltest analysis
- Performance of oil reservoir
- Predicting oil reservoir
- Economic analysis
- Reservoir surveillance
- Data acquisition and QC procedure
- Planning, integration and space-time monitoring

Note: Adding more chapters is governed by the time.

Course Teaching and Learning Activities:

Lectures: during week, the theoretical and practical lectures will be presented throughout the semester; the discussion of practical work within lab will be organized and illustrated with activities.

Assignments: after the lectures, the assignment will be explained and given to students. It is expected to be done on fortnightly bases.

Quizzes: the contents of each lecture will be discussed during class for open question and answer to make sure every student will participate and active.

Test: In class test on the subjects have been studied during the course.

In class brainstorming sessions: provide students with enough sources and background knowledge briefly within the topics during class to top up their challenge packs to be more active.

CLASS REQUIREMENT

- A Scientific Calculator
- Notebook

***Note: Students must bring a notebook, a pen, notebook, calculator, and the periodic table to every class**

Assessment Tool	Description	Weight
Assignment and Homework	Assignments within the updated topics (ABET G and D)	15%
Presentation	Presenting the results of the assignments (ABET G and J)	5 %
Group discussion	Active participation in group discussion on the given technical papers (ABET D, G and J)	5%
Tests	Two tests before and after midterm exam (ABET A and K)	15%
Quizzes	The open questions and answer during class (ABET A and E)	10%
Midterm Exam	Examination questions from lectures W1 to W7 (ABET A and K)	20%
Final Exam	Examination questions from all lectures and topics (ABET A, E and K)	30%

ESSENTIAL READINGS: (Journals, textbooks, website addresses etc.)

Textbooks:

Advanced Reservoir Management and Engineering, Tarek Ahmed, 2nd Edition. 978-0-1238-5548-0

Reservoir Surveillance, Jitendra Kikani. Tarek Ahmed. Elsevier, 4th Edition. ISBN 978-1-85617-803-7

References:

- Fundamentals of Reservoir Engineering. L.P. Dake, Elsevier. 17th impression 1998. ISBN 0-444-41830-X

- Reservoir Engineering Handbook. Tarek Ahmed. Elsevier, 4th Edition. ISBN 978-1-85617-803-7
- Hydrocarbon reservoir characterization: geologic framework and flow unit modeling, Emily L. Stoudt, Paul Mitchell Harris, 1995.

- Proceedings: 1996 International Symposium of the Society of Core Analysts : Improving reservoir management

COURSE POLICY *(including plagiarism, academic honesty, attendance etc)*

KUST Academic Policy

http://sar.komar.edu.iq/files/Student%20hand%20Book%202013.pdf

Attendance:

- Students are expected to attend all lectures and must attend all examinations, quizzes, and practical exercises.
- There is no make-up work for students who miss classes without official permission.
- Student must arrange with the faculty to make-up the missed class.
- Students are subject to the regulation and policies mentioned in the KUST Student Handbook.
- KUST guidelines for lateness are as follows: Three occasions of lateness count as one absence. (You can be considered late the first minute of the lecture time).

GUIDELINES FOR SUCCESS

1. Be able to work independently and in groups,
2. Pay-attention in the classes is the guarantee of success,
3. Extend your knowledge beyond the given textbooks to master the subject, and
4. Try not to miss the classes

KOMAR UNIVERSITY OF SCIENCE AND TECHNOLOGY
(KUST)

Course calendar: Please check the academic calendar for 2015/2016

Week	Beg/End Dates	Topics	Assessment
1	28 Sep – 1 Oct	- Weltest analysis - Reservoir geometry Fluid flow equation Darcy's law Steady State Flow: Linear, radial flow Unsteady state, Transient flow equation Radial flow for slightly and compressible fluids	
2	4– 8 Oct	- Pseudosteady State - Skin Factor - Principle of superposition - Transient well testing - Drawdown test	Quiz 1
3	11– 15 Oct	- Wellbore Storage - Radius of investigation - Pressure buildup test - Type curves - Pressure derivative methods - Analysis of early and middle time data - Interference testing	
4	18– 22 Oct	Group discussion case studies from SPE papers on reservoir evaluation and Monitoring	Test 1
5	25– 29 Oct	- Plus test design - Homogeneous anisotropic reservoirs - Formation testing - Pressure Falloff test	Assignment 1
6	1– 5 Nov	- Performance of oil reservoir - Recovery mechanisms - Generalised MBE - Tracy's form of MB	Quiz 2
7	8– 12 Nov	- Predicting oil reservoir performance - Prediction methods - Oil well performance - Reservoir performance relationship with time	
15– 19 Nov Midterm Exam			
8	22– 26 Nov	- Planning Asset management Uncertainty planning Reservoir monitoring plan - Value and analysis of information	Assignment 2

9	29– 3 Dec	Decision making Tools and process Decision tree methodology	Quiz 3
10	6– 10 Dec	Group discussion case studies from SPE papers on reservoir evaluation and Monitoring	Test 2
11	13– 17 Dec	- Well and production system Surface facility and production monitoring Well system and drilling Well construction and completion - Subsurface measurement - Measurement characteristic, types, quality etc - Hardware characteristic - Calibration principle	Assignment 3
12	20– 24 Dec	- Measurement and equipment assessment - Telemetry Conveyance - Running procedure and best of practice - Data gathering and preparation - Data assessment and quality control - Data preparation - Treatment of inconsistent data	Quiz 4
27– 31 Dec New Year Holiday			
13	3– 7 Jan	Group discussion case studies from SPE papers on reservoir evaluation and Monitoring	
14	10– 14 Jan	- Data filtering, smoothing, and correction - Data analytics Data mining Field and well analytics Pattern performance - Special techniques Consideration of EOR process Tracer technique Geochemical monitoring - Planning, integration and space-time monitoring - EOR monitoring	Quiz 5
15	17 Jan – 21 Jan	Review Week	
24 -28 Jan Final Exam			