

Course Code

PE02

Course Title

Reservoir Engineering

Instructor

Dr. Mustafa Onur and Dr. Ömer İnanç Türeyen



Professional Career

Dr. Onur is a professor and head of the Dept. of Petroleum and Natural gas engineering at Istanbul Technical U., Turkey. He has taught at various academic institutions in different countries; Istanbul Technical University, Istanbul, Turkey; King Saud University, Riyadh, Saudi Arabia; Tulsa University, Tulsa, Oklahoma, USA and involved in various industrial projects for private companies and public companies since 1989. His expertise and interest are in well testing, pressure-transient analysis, formation wireline testing, reservoir simulation, reservoir performance predictions (automatic history matching and prediction) methods, geothermal reservoir engineering, and nonlinear regression analysis for parameter estimation. He holds a BS degree from the Middle East Technical U. in Turkey and MS and PhD degrees from the U. of Tulsa, all in petroleum engineering. He has served on the editorial committees of Turkish Journal of Oil and Gas, SPE Reservoir Evaluation and Engineering, SPE Journal, CT&F (Ciencia, Tecnología y Futuro, ecoPETROL) as both technical and associate editor and conducted various short courses related to reservoir engineering, well testing, pressure transient testing, reservoir simulation and history matching, reservoir performance predictions, and geothermal reservoir engineering for industry for many years. He was the recipient of the Society of Petroleum Engineer's Outstanding Technical Editor Awards in 2004, 2005, 2007, and 2008. Further, He has over 35 refereed journal publications, over 60 papers presented and/or published in conferences and proceedings, and over 10 funded research projects. A further detailed CV is upon request. Dr. Türeyen is an assistant professor of petroleum and natural gas engineering at the Istanbul Technical University.

He holds an MSc degree from the Istanbul Technical University, and a PhD degree from Stanford University, all in petroleum engineering. He joined Istanbul Technical University in Aug 2005 as an assistant professor. Dr. Türeyen is involved in research in areas of reservoir characterization, reservoir simulation and geothermal engineering and has also experience in giving short courses to the industry, until now he has given two short courses on geothermal engineering. Dr. Türeyen is a member of the Society of Petroleum Engineers, and the Chamber of the Turkish Petroleum Engineers.

Course Objective and Description

The course provides a fundamental concepts, definitions and methods used in reservoir engineering studies. The course will cover a review of fluid and rock properties that are essential for reservoir engineering. Estimating oil and gas reserves based on the volumetric method as well as based on material balance method are given. The use of Darcy's equation for predicting well deliverability and modeling fluid flow in reservoirs are given. In addition, general review of production processes as well as fundamentals of pressure transient testing including wireline formation testing conducted with single, multi-probe and dual-packer probe configurations. During the 5-day course, several example applications and problem solving will be given to help the audience to better understand the concepts and application of the methods. Homework will be assigned to the attendees during the course, and a final exam will be given at the end of the course to evaluate each attendee's learning outcomes.

Who Should Attend

Reservoir and production engineers, petrophysics, geologists, as well as personnel involved in reservoir engineering, well testing, reservoir simulation, and performance studies.

Prerequisite

BS degree in geology, geophysics and petroleum engineering

Learning Level

Intermediate

Duration

5 days

Course Material

A file of Power Point presentation and handouts

Course Outline

Day Two

- Introduction
- Primary functions of a reservoir engineer
- Formation of petroleum reservoirs-erosion-deposition cycle, formation of beds, rock compaction, petroleum formation, petroleum reservoirs, types of traps
- Brief review of fluid properties
 - o Phase behavior-phase diagram for a pure substance; two, three and multi component mixtures
 - o Petroleum reservoir fluids identification-black oil, volatile oil, condensate, wet and dry gas.
 - o Estimation and measurement of oil, gas, and formation water properties (Bo, Bg, Rs, Rp, densities, viscosities and compressibilities)-Correlations and EOS.
- Example applications and class exercises

Day Two

- Brief review of rock properties
 - o Porosity (effective, residual, total)-factors affecting porosity (packing, compaction, cementation, etc., types of reservoir rocks and their porosity, measurement techniques for porosity
 - o Saturation of phases
 - o Absolute, effective and relative permeability concepts-prediction and measurement techniques for permeability
 - o Permeability terms – isotropy, anisotropy, homogeneity and heterogeneity
 - o Darcy's equation and its simple applications in reservoir engineering
 - o Capillary pressure and saturation distributions in reservoirs-oil/gas zones, transition zone and water zones
 - o Determination of FWL and fluid contacts from pressure gradients
 - o Compressibility of rock
- Example applications and class exercises

Day Three

- Estimating oil and gas reserves
 - o Volumetric method
 - o Estimating reservoir bulk volume
 - o Estimating recovery factors for primary depletion-drive mechanisms (Dissolved or solution gas drive, gas cap drive and water drive)
 - o Estimating recovery for gas reservoirs
- Example applications and class exercises

Day Four

- Material balance method
 - o Solution gas drive with no water influx
 - o Solution gas drive with water influx
 - o Gas cap drive with no water influx
 - o Single phase gas reservoirs-p/z plots for normal and abnormal gas reservoirs.
- A General review of production processes
 - o Primary production
 - o Secondary production (Water flooding/gas flooding)
 - o Tertiary production (Polymer flooding)
 - o Enhanced oil recovery (Steam drive and combustion drive)
- Example applications and class exercises

Day Five

- Fundamentals of pressure transient testing
 - o Primary purpose of pressure transient testing
 - o Methodology of pressure transient testing
 - o Test types (Drawdown, buildup, injection, falloff, interference (Multi-well and vertical interference Tests)
 - o Flow regimes that may be observed in a pressure transient testing
 - o Models
 - o Methods to analyze pressure transient tests
 - o Data needed for analyzing pressure transient tests
 - o DST
 - o Wireline formation testers (single probe, multi-probe, dual-packer w/wo probe configurations) for permeability and permeability anisotropy estimation
- Example applications and class exercises
- Final Exam

Antalya, Turkey
10-14 May
US\$ 2,950

Istanbul, Turkey
1-5 Nov
US\$ 2,950
