

Course Code

PE09

Course Name**Basic Petroleum Engineering****Instructor**

Dr. Serhat Akın

**Professional Career**

Dr. Serhat Akın is professor of Petroleum and Natural Gas Engineering at the Middle East Technical University (METU), Ankara, Turkey. He has served on the faculty since 1998. Prior to joining METU, Dr. Akın was a post-doctoral researcher and Blaustein Visiting Professor in Petroleum Engineering Department, Stanford University in 1996 - 1998 and 2006 respectively. He holds B.Sc., M.Sc. and PhD degrees from METU all in petroleum and natural gas engineering. His research interests include computerized tomography applications, image processing, EOR, reservoir and geothermal engineering. Dr. Akın received the Society of Petroleum Engineers Outstanding Technical Editor award three times in 2001, 2002 and 2004. He is an associate editor of the SPE Reservoir Evaluation and Engineering and an editorial board member in International Journal of Petroleum Science and Technology (IJPST), the Open Petroleum Engineering Journal and Turkish Oil and Gas Journal.

Course Objective and Description

This 5-day course provides a systematic approach to acquaint the students with the basic concepts of petroleum engineering. The course is structured around field case studies and background lectures in order to familiarize engineers with real life problems associated with the exploration, assesment and exploitation, optimal appraisal, development and operation of oil and gas fields, and to provide a basis for management decisions. This course is designed for engineers or geologist who have just started working in the petroleum industry.

Who Should Attend

This course is designed for engineers and geologists who have just started working in the petroleum industry. It is anticipated that the participants would have at least a B.S. degree, or equivalent, in Engineering or Geology. However many of the basic techniques used in petroleum engineering studies will be described in sufficient detail for participants to obtain an understanding on the fundamentals behind the use of these techniques.

Prerequisite

Some basic engineering and geology would be useful but not essential.

Learning level

Introductory, undergraduate to graduate level.

Duration

5 days

Course Material

The course material will consist of hard copies of the power point presentation plus and CD and copies of a number of important and relevant papers that will be discussed in the course.

Course Outline**Day One**

- Introduction to petroleum engineering
 - Historical background, sources, world supply and demand, chemical and physical properties of petroleum.
 - Introduction to petroleum exploration, reservoir types and engineering concepts, production methods, refining and transportation of natural hydrocarbons.
 - Engineering ethics, health, safety and environmental aspects in petroleum engineering profession.

Day Two

- Reservoir rock and fluid properties
 - Fundamental properties of fluid-permeated rocks; porosity, permeability, saturation and electrical properties; properties of porous media
 - with multiple fluid saturations; wettability, capillarity and relative permeability
 - PVT relationships of hydrocarbon gas and liquid systems
 - Reservoir fluid characteristics of hydrocarbons and formation waters

Day Three

- Drilling engineering
 - Drilling machinery: hole and equipment.
 - Drilling fluids and hydraulics.
 - Cementing and hydraulics.
 - Drill off tests (bit performances).
 - Pressure control
 - Drill string design
 - Casing design
 - Casing setting.

Day Four

- Petroleum production engineering
 - Drill stem testing, well completion methods, completion fluids and sand control.
 - Perforating, well head equipment and flow control devices, production packers, oil and gas separators.
 - Flowing well performance, sucker rod pumping, submersible electrical centrifugal pumping, well stimulation techniques; acidizing, hydraulic fracturing.

Day Five

- Petroleum Reservoir Engineering
 - Estimation of hydrocarbon pore volume and recovery factor.
 - Classification of oil reservoirs.
 - Reservoir performance prediction for solution gas drive, water drive, gas-cap drive, drainage and combination drive reservoirs using material balance approach.
 - Water influx theory.
 - Water and gas coning in oil producing formations.
 - Characterization of fractured reservoirs.
 - Decline Curve Analysis.
 - Steady and unsteady state single phase flow equations through porous media, steady and unsteady superposition.
 - Multiphase flow through porous media.