N607 – Petroleum Engineering for Non-Engineers (4 Day)

Duration

Four classroom days providing 3.2 CEU (Continuing Education Credits) or 32 PDH (Professional Development Hours)

Summary

This course is designed to provide non-engineering petroleum industry technical professionals with a thorough overview of most key aspects of petroleum engineering technology and its applications. The course addresses engineering issues ranging from initial involvement with explorationists, reserves evaluation and field development, production optimization, and all the aspects of well drilling. The sessions will focus on relevant and practical issues; including real case studies.

Who Should Attend

This course is aimed at non-engineering professionals involved in the oil industry and also for junior exploitation engineers/technologists, and geologists.

Participants will learn to:

1. Learn about an overview of the industry and how the roles of different professional disciplines are integrated to generate development plans.
2. Oil industry value chain (upstream, midstream, and downstream)
3. Understand subsurface geology to learn how economic oil/gas fields are formed and discovered
4. Learn how subsurface rock samples are collected and the various laboratory conducted to define their physical properties which will be used by the engineer to prepare drilling and completion programs.
5. Fluid sampling; including oil, gas, and formation water, will be discussed. The various laboratory tests conducted on the fluid samples are reviewed and how engineers use this information to make decision on how oil and gas fields will be developed to achieve the best economic benefits.
6. How wells are drilled, including different drilling techniques; rotary, top drive, and sliding rotary steerable. The function of the drilling rig equipment, down-equipment, and the mud are discussed. Including horizontal well and offshore drilling
7. Case study to discuss the design and application of horizontal wells to improve performance
8. Learn about completion techniques for vertical and horizontal wells to allow for safe operation and to control production.
9. How engineers/geologists determine oil/gas reserves, which define the value of E&P companies.
10. A review of the decisions that need to be made to develop oil/gas field with special sections on artificial lifts (down-hole pumps) and Hz well applications.
11. How to diagnose production problem and perform remedial action.
12. The application of different Enhanced Oil Recovery EOR schemes and benefits.
13. The use of Multi-stage frac Hz wells in tight and unconventional formations.
14. How economic analysis is performed to confirm that proposed projects will economic benefits

Course Agenda

Day One
Morning
1. Overview
   a. Oil and gas reserves breakdown
   b. The main components of oil/gas field development plans briefing the role of each discipline (engineers, geologists, geophysicists, petrophysicists, landmen, etc.)

2. Reservoir Geology
   a. Geologic cycle
   b. Depositional environment
   c. Types of reservoir rocks
   d. Main elements of petroleum reservoirs
   e. Geological maps

Afternoon
3. Rock properties
   a. Types of rock porosity and measurements
   b. Definitions of formation permeability and measurements
   c. Rock wettability and effect on field performance
   d. Capillary pressure
   e. Case Study from Ekofish (Norway)

4. Fluid properties
   a. Hydrocarbon classifications and fluid sampling
   b. Phase envelops description of oil and gas field
   c. Physical properties of oil and gas fields
   d. Methods of fluid sampling and PVT analysis

Day Two
Morning
5. Well drilling and completion methods
   a. Background history
   b. Well construction/drilling

6. Rotary drilling
   a. Description of rotary systems
b. Hoisting system
c. Rotary system
d. Pipe connection, BOP, tubing and casing hangers
e. Top drive method

7. Drilling fluids
   a. Function of drill mud
   b. Physical properties of drill mud
   c. Water and oil base
d. Mud weight, viscosity, fluid loss

8. Drill bits
   a. Types of drill bits
   b. Design and performance

9. Other drilling equipments (drill collars, stabilizers, underreamer)
   a. Drilling operation/problems
   b. Stuck drillpipe (mechanical and differential sticking)
   c. Equivalent circulating density (ECD)
   d. Swabbing and surging
   e. Well kicks and blowout
   f. How to increase rate of penetration (ROP)

10. Underbalanced drilling and coiled tubing drilling

Afternoon

11. Horizontal/directional well drilling
    a. Stages of drilling and types of Hz wells
    b. Design considerations
    c. Kickoff points
d. Types of casing
e. Rotary vs sliding drilling
   f. Downhole motors and geo-steering technique

12. Offshore drilling
    a. Safety considerations
    b. Types of drilling rigs
    c. Differences between onshore and offshore drilling techniques

13. Well completion techniques
    a. Open hole, cased hole, and gravel pack
    b. Process of cementing the casing
c. Well perforation

14. Formation Evaluation Techniques
    a. Mud logging
    b. coring
c. Open hole logs
d. Logging while drilling (LWD) and measure while drilling (MWD)
e. Wireline testing
Day Three

Morning

15. Reservoir drives and reserves determination
16. Reservoir derives
   a. Primary and secondary recoveries
   b. Types of reservoir drives and impact on performance
17. Reserves determination
   a. Reserves classification and definitions
   b. Volumetric and material balance methods
   c. Decline analysis
   d. Probabilistic method
   e. Empirical method to estimate recoverable reserves

Afternoon

18. Reservoir delineation & development
   a. Structure of oil companies (past and now)
   b. Field development considerations
   c. Micro aspects (well design)
   d. Macro aspects (number of wells, production profile)
19. Types and applications of artificial lift
   a. Impact on field performance
   b. Different techniques (advantages and disadvantages)
20. Horizontal well applications
   a. Benefits of horizontal wells
   b. Geological, completion, and drilling risks
21. Well productivity and case studies

Day Four

Morning

22. Production operations and optimization
   a. Methods estimating well performance
   b. Operational problems (diagnostic and remedy methods)
23. Well testing
   a. Equipment used in well testing
   b. Objectives setting of well testing
   c. Types of well tests
   d. Flow/buildup test and analysis
   e. Formation damage
   f. Drawdown testing and reservoir limit testing (RLT)
   g. Case study
24. Well stimulation methods (acidizing and fracking)
Afternoon

25. Enhanced Recovery Mechanism
   a. Oil recovery mechanisms
   b. Types of EOR and screening
   c. Planning of a waterflood design
   d. Monitoring of waterflood project

26. Review chemical and CO2 floods

27. Unconventional Oil and Gas
   a. Oil sands and thermal recovery (steam injection and in-situ combustion)
   b. Coal bed methane (CBM)
   c. Shale gas and oil shale and the applications of horizontal wells with multi fracing

28. Economics
   a. Input data to economic evaluation
   b. The concept of discounting cash flow
   c. Various economic profitability indices
   d. Example of running economics of well drilling

29. Closing comments

Instructor

Saad Ibrahim has over 35 years of diversified experience in the Petroleum Industry in Western Canada and internationally, including projects in Libya, Yemen, Iran, Kazakhstan, Venezuela, Columbia, and Argentina, with special expertise in reservoir engineering/management with emphasis on field development planning, evaluation of depletion strategies and production optimization of a wide spectrum of oil and gas fields. Other interests include well test planning and analysis using state of the art commercially-available software; the implementation of secondary and tertiary recovery schemes; and technical and economic evaluations of oil and gas properties for acquisition and divestiture ventures.

For the past 25 years, Mr. Ibrahim has been a worldwide recognized instructor covering a wide range of petroleum engineering topics. He graduated from the University of Alexandria (Egypt) with B.Sc. in Mechanical Engineering in 1973, and obtained a post-graduate diploma from the University of Calgary in Chemical and Petroleum Engineering in 1983. Saad is a member of the APEGA, and the SPE.

Course Dates

Please visit the course details webpage for currently scheduled course dates.

Available for In-House Group Delivery

This course is available for In-House Training and the content can be customized to suit the needs of your organization. For more information or to request a proposal, please email inhouserequests@peice.com or call 713-482-3858 (USA), 403-284-1250 (Canada).