Graduate Certificate

Well Performance Engineering Certification

35 days **COMP/WELLPERFENGE**

Overview

LEVEL

Foundation

PURPOSE

This course provides in-depth technical knowledge in well performance engineering in order to hold rapidly and very effectively, the position of field engineer, design engineer, or project engineer.

LEARNING OBJECTIVES

Upon completion of this course the participants will be able to:

discuss main principles of thermodynamics applied to reservoir engineering studies,

build a PVT model for reservoir simulation and carry out a well test interpretation,

identify main flow regimes and define or recommend a well test design.

explain the natural, secondary and EOR mechanisms of production of Oil & Gas reservoirs and discuss their related performance,

perform simple material balance calculations for matching reservoir parameters/forecast recovery for a real case and consequently reserve definition,

estimate the ultimate reservoir recovery by decline curve analysis,

select the relevant reservoir characteristics and fluid properties related to well performance modeling,

design artificial lift, select the adequate method and optimize well performance,

analyze the impact of well completion and equipment on well performance, analyze the operation process.

WAYS AND MEANS

Highly interactive training with industry specialist lecturers.

Multiple teamwork sessions and industrial case studies.

Numerous simulation exercises using corresponding software (MBAL™, PROSPER™ & GAP™).

Knowledge assessment on a weekly basis.

LEARNING ASSESSMENT

Quiz.

PREREQUISITES

Engineering degree or equivalent professional experience within the petroleum industry.

WHY AN IFP TRAINING CERTIFICATION?

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Well Performance Engineering Certification.
- Ready-to-use skills.

Agenda

RESERVOIR FLUID PROPERTIES - PVT

5 d

Thermodynamics: hydrocarbon families, compositional presentation of reservoir fluids.
Thermodynamics of petroleum fluids: pure component, binary mixture, multicomponent systems. Phase behavior, hydrocarbon fluids: under saturated oil, saturated oil, dry gas, wet gas, retrograde gas. Phase envelope.
Measurements: sampling: bottom hole and surface sampling. Representativity and validity of sampling, analysis, PVT studies: oil-gas condensate, fluid modeling: PVT matching.
PVT matching with a PVT EOS package.

WELL TESTING & WELL TEST ANALYSIS

5 d

Purpose of well testing, practical well test operations: types of tests, equipment, safety and environmental issues.
Definitions and typical flow regimes: radial flow, fractured reservoirs, limited reservoirs and closed reservoirs.
Productivity index, radius of investigation.
Basic equations and methods: Darcy's law and the diffusivity equation, time superposition, multirate testing, space superposition, boundary effect, pressure curves analysis, pressure derivative analysis.
Wellbore conditions, Boundary models, test design. Hands-on session…

DRIVE MECHANISMS

5 d

Primary recovery: undersaturated oil expansion, solution gas drive, gas gap drive, natural water drive, analytical aquifer models. Hurst & Van Everdingen model. Carter-Tracy model, gas reservoirs with and without aquifer, material balance.
Secondary recovery: multiphase flow in the reservoir, water/immiscible gas injection. Principles, multiphase flow stability and influence of mobility ratio. Diffusive flow, sweep efficiency, water & gas injection.

MATERIAL BALANCE & DECLINE CURVE ANALYSIS

5 d

Material balance: material balance equations for the various drive mechanisms “Drive Index’’, Practical exercises on synthetic and real field case data using MBAL™ software: PVT and reservoir parameters history match, production forecast.
Decline curve analysis: fundamentals of decline curve analysis, Arps equation, decline exponent, Exponential, Harmonic and Hyperbolic Declines, Application and limitation of decline curve analysis.
Type curve matching and case studies.

WELL PERFORMANCE

15 d

Well performance design for naturally flowing well: inflow/outflow theory and practice, well completion equipment and design optimization.
Artificial Lift (AL) methods design and practice: AL methods and corresponding equipment and performance, ESP and gas lift design.
Gas well and water injection well performance design.
Case study: well performance project design.