

# ADVANCED OIL RESERVOIR ENGINEERING

## RSE011

### COURSE DESCRIPTION

In the exploration and production business, Reservoir Engineers play a key role in handling, analyzing and interpreting subsurface and production data at all stages of field development. Reservoir Engineering data and models are used in field development plans to optimize economic production of hydrocarbons. In brief, this course will cover a broad spectrum of modern practical reservoir engineering methods are addressed. Extensive use is made of practical and actual field problems to illustrate relevant subjects.

### COURSE GOAL

To enhance participants' knowledge, skills, and abilities necessary for deep understanding of fundamental and advanced reservoir engineering concepts and apply key tools of modern practical reservoir engineers.

### COURSE OBJECTIVES

By the end of this course, participant will be able to:

- Understand how to determine reservoir rock properties.
- Understand how to determine capillary pressures, surface tension, wettability.
- Distribution of hydrocarbon fluids, pressure regimes, fluid gradients and contacts.
- Estimate Hydrocarbons-in-place.
- Understand the SPE PRMS and SEC system for reserves and resource classification and estimation.
- Understand Fluid properties and phase behavior, PVT correlations, fluid sampling and laboratory procedures.
- Understand Recovery drive-energy.
- Apply material balance equations, aquifer models and straight-line methods.
- Understand Gas reservoir engineering concepts.
- Apply Radial flow equations.
- Understand how to how to minimize skin: source.
- Apply theory and practice of oil and gas well testing and pressure analysis techniques.
- Design and interpret of pressure transient well tests.
- Forecast production and analyze decline curve.
- Determine fractional flow curves and oil recovery.

- Understand Reservoir simulation modelling principles.
- Understand secondary recovery and EOR principles.
- Plan field development.
- Deal with uncertainty.

## WHO SHOULD ATTEND

- Reservoir Engineers
- Petroleum Engineers
- Geoscientists that require more than general knowledge of reservoir engineering.

## COURSE DURATION

5 Working Days

## COURSE OUTLINES

### 1. Fluid Behavior and Fluid Modeling

- Course introduction
- Fundamentals Recap
- Capillary Pressure and saturation height relations, leveret-J function
- Distribution of hydrocarbon fluids
- Exercise: permeability averaging and water breakthrough
- Laboratory experiments, constant volume depletion, differential liberation.
- PVT & fluid sampling
- Exercise PVT correlations for oil and gas

### 2. Reserves and DCA Methods

- Reserves classification systems- the SPE petroleum resource management system
- The probabilistic method
- Decline curve analysis and production forecasting
- Exercise: oil production forecasting

### 3. Reservoir Models, Wells. Well Behaviour and Well Tests

- Oil and gas material balance, aquifers, straight line methods
- Wells, inflow performance, skin, horizontal wells
- Exercise: use of well inflow calculations
- Exercise: gas production forecasting
- Modern well test analysis, Pressure Draw Down and Build Up analysis

#### 4. Displacement, Sweep, Flow and Reservoir Modelling

- Relative permeability and capillary pressure, wettingness, drainage vs. imbibition,
- Displacement and Recovery, sweep, heterogeneity, Buckley-Leverett, movable oil
- Pseudo relative permeability
- Exercise mobility ratio
- Reservoir simulation - modelling construction and history matching, QA/QC
- Reading and discussion of simulation field cases

#### 5. Recovery and Development Planning

- Fractured reservoirs
- Secondary recovery, enhanced oil recovery
- Oil Field development planning
- Gas field development planning
- Exercise: development planning regulations
- Handling uncertainty
- Course Recap, Quiz and Evaluation

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