

# GULF INSTITUTE



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# Enhanced Oil Recovery (EOR)

## INTRODUCTION

- The increasing demand of oil by the global industry develops very good opportunity for more applications of current and advanced enhanced oil techniques in mature oil fields. This Enhanced Oil Recovery (EOR) training course is designed to provide attendants with comprehensive understanding of different design aspects, types, screening criteria, and field application of current, advanced, and emerging techniques of Enhanced Oil Recovery (EOR) processes.
- The goal of this five-day training course is to present basics, problems, advanced solutions, field applications of chemical, miscible, and thermal EOR methods, and emerging technologies of different EOR processes with actual field cases. Today, it is better to apply EOR in a secondary mode. Detailed advanced EOR methods of Steam Assisted Gravity Drainage (SAGD), Low Salinity (LSW), Vapor Extraction (VAPEX), microbial and enzyme, microwave, electric, and hybrid chemical-thermal-miscible methods will be discussed. All of these techniques suffer from several problems of accurate reservoir characterization, difficult screening actual severe heterogeneous reservoir, pilot design, and field implementations. This Enhanced Oil Recovery (EOR) training course is designed as an interactive learning environment of lecturing, industry videos, and solved field cases.

### This training course will feature:

- Rock and Fluid Properties for better reservoir characterization
- Classify and Screen different EOR methods for current producing reservoirs
- Screen Actual Reservoir(s) to select the best EOR method for your reservoir
- Maximize Oil Recovery using chemical, miscible, and thermal EOR methods
- Know newly-developed EOR methods of Chemical, Thermal, Miscible, Hybrid EOR Methods
- Understand Microbial, Low Salinity Water, SAGD, VAPEX, THAI, Microwave, Electric Methods
- Understand different problems and proposed solutions of different EOR processes

## OBJECTIVES

### By the end of this training course, participants will be able to:

- Describe different chemical, miscible, and thermal EOR processes
- Maximize oil recovery using Mobility Ratio and Capillary Number
- Apply reservoir characterization and screening actual fields for EOR
- Understand chemical, miscible, thermal, and hybrid EOR techniques
- Understand newly-developed EOR methods and compare with current ones

## TRAINING METHODOLOGY

- This Enhanced Oil Recovery (EOR) training course will utilize a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. This training course is designed as a blended environment of presentation, class exercises, field application/analysis and several industry videos showing all processes.

## WHO SHOULD ATTEND?

This training course is suitable to a wide range of professionals but will greatly benefit:

- Petroleum, Production & Reservoir Engineers
- Processing Engineers & other Discipline Engineers
- Engineers who are new to the profession
- Other individuals who need to know about EOR technologies

## Course Outline

### Different EOR Processes and Screening Criteria

- Different Enhanced Oil Recovery (EOR) Methods
- Reservoir Concepts, Rock and Fluid Properties for EOR
- Screening Criteria and Mechanisms of Different EOR Methods
- Maximize Oil Recovery using Mobility Ratio and Capillary Number
- Limitations, Challenges and Problems of Different EOR Methods

### Reservoir Fluid Properties and Reservoir Characterization

- Reservoir Concepts, Main Rock and Fluid Properties for EOR
- Advanced Reservoir Characterization Techniques for EOR Methods
- Water Flooding: Design Requirement, Limitations, and Displacement Theory
- Polymer Flooding: Polymer Types, Properties, and Types of Degradation
- Polymer Flooding: Mobility Ratio (M), Slug Design, and Field Application

### Current Chemical and Miscible EOR Techniques

- Alkaline / Polymer and ASP Flooding: Process and Limitations
- Two Actual Field Results: Daqing (China) and Kentucky (USA)
- Miscible Gas EOR: CO<sub>2</sub>, HC, and Nitrogen Injection Methods;
- Lab and Numerical Determination of Minimum Miscibility Pressure
- Carbon Dioxide Miscible and Immiscible Flooding Processes

## Current and Advanced Thermal EOR Processes

- Thermal Processes; Cyclic and Continuous Steam Injection
- Steam-Assisted-Gravity-Drainage (SAGD)
- In- situ Combustion Methods: Forward and Backward
- Toe-to-Heel Air Injection (THAI) and CAPRI Processes
- Steam-CO<sub>2</sub> Hybrid EOR Technique and Field Application

## Other Advanced EOR Processes

- Microbial (MEOR) and Enzymes (EEOR) Processes
- Low Salinity Water (LSW) and Pulsed Water Processes
- Seismic, Electric, and Electromagnetic Heating EOR Methods
- Hybrid EOR Applications; CO<sub>2</sub>-thermal and Chemical-thermal Methods

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