

Fundamentals of Enhanced Oil Recovery

Basic Course for Engineers and Managers

This course is an introduction to the fundamentals of enhanced oil recovery (EOR). Participants will learn what the broad term EOR encompasses, how to assess targets for EOR applicability, design of crucial experiments and piloting. Participants will become familiar with all currently deployed EOR techniques, including miscible and immiscible gas flooding, chemical methods including polymer and surfactant flooding, thermal flooding, modified brine flooding and more. Typical metrics for performance and economics of EOR will be provided.

Target Audience

Any individual involved in improving recovery from assets will benefit from this course. This includes engineers responsible for increasing oil and gas production rates and ultimate recovery in assets that are undergoing primary or secondary depletion. Managers and non-engineers in teams who require knowledge of EOR processes will also benefit from the course.

Skills Learned in Course

Participants in the course will learn to:

- Understand the crucial reservoir aspects of EOR
- Understand reservoir lifecycle: primary, secondary and EOR
- Describe the various EOR techniques, their advantages and limitations
- Understand physics of reservoir displacement, incremental recovery
- Complete a high level reservoir screen for several EOR Processes in a hypothetical field
- Explain life cycle of EOR implementation (Screening - Lab - Pilot - Field)
- Set expectations of performance of EOR floods in laboratory, pilot and field scales
- Review relevant EOR field projects, performance and potential for incremental recovery
- Achieve fluency in EOR terminology

Course Content

- Reservoir life cycle and role of EOR
 - Primary & secondary recovery
 - Residual oil saturation
 - Estimate of EOR target
- Overview of EOR techniques
 - Displacement mechanisms
 - Current techniques (Gas miscible & immiscible, chemical, steamflood, SAGD, Huff'n'Puff, low salinity flooding and more)
 - New Technologies (ACP, thermal hybrids, foam, Wag)
- Discussion of EOR displacement mechanisms
 - Mobility control strategies
 - Wettability alteration
 - Interfacial tension
 - Residual saturation estimates
- Reservoir screening for EOR
 - Hypothetical giant middle east reservoir
 - Evaluate for Gas, Polymer, ASP, Thermal, WAG, Foam and more
 - Understand which reservoir properties are drivers for EOR selection and why
 - Select most promising CEOR method
- Laboratory studies
 - Scope of typical laboratory operations for EOR techniques
 - Phase behavior for gas and chemical flooding
 - Evaluation of mobility control
 - Quality control of laboratory results
- Performance Predictions
 - Understand approaches to modeling EOR performance
 - Volumetric techniques
 - Analytical Buckley-Leverett Techniques
- Reservoir simulation strategies
 - CMG
 - Eclipse
 - UTCHEM
 - UTCOMP
- EOR Piloting approaches
 - Pilot area selection
 - Parameter sensitivity
 - Performance evaluation
 - Economic viability