

# Principles of Chemical Enhanced Oil Recovery

## Basic Course for Engineers and Managers

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This course is an introduction to the fundamentals of chemical EOR (CEOR). Participants will learn the methods of CEOR flooding, including reservoir screening, laboratory tests, pilot phase, and field implementation. An understanding of CEOR processes and their displacement mechanisms will be obtained.

## Target Audience

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Individuals requiring an understanding of chemical EOR 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

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Participants in the course will learn to:

- Explain life cycle of CEOR implementation (Screening - Lab - Pilot - Field )
- Screen reservoirs for CEOR and other EOR methods
- Select promising CEOR techniques for evaluation from a suite of options
- Understand chemical phase behavior and displacement mechanisms essential to CEOR
- Set expectations of performance of CEOR floods in laboratory, pilot and field scales
- Achieve fluency in CEOR terminology
- Evaluate quality of CEOR work

## Course Description

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Chemical EOR has received increasing attention as an EOR recovery technique that is robust, cost-effective and efficient in producing incremental oil from certain reservoirs. Familiarity with the topic is important when evaluating assets for CEOR potential. Participants in this course will begin by learning about all currently implemented technologies, including polymer flooding, surfactant-

polymer flooding (SP), alkaline-surfactant-polymer flooding (ASP), and others. Promising new CEOR technologies, such as alkaline-co-solvent-polymer flooding (ACP) will also be covered. With knowledge of the advantages and challenges of various EOR methods, participants will learn to screen reservoirs for chemical EOR and alternatives based on reservoir characteristics.

Next, participants will learn the process of CEOR implementation from lab scale to pilot and finally to field scale. This section will be based on past field projects to help demonstrate advantages and limitations of CEOR. Participants will obtain performance guidelines for all phases of CEOR studies in order to evaluate work done, whether in-house or by contractors. Cost analysis of CEOR schemes will help participants make decisions about the value of the technology to an asset. Throughout the course, instructors will help participants gain understanding of common vocabulary and techniques used in the field.

## Course Content

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- Reservoir life cycle and role of CEOR
- Overview of CEOR techniques
  - Displacement mechanisms
  - Current techniques (Polymer, SP, ASP, AP, SF, ASG)
  - New Technologies (ACP, thermal hybrids)
  - Alternative EOR techniques (gas flooding, thermal, steam)
- Reservoir screening for CEOR
  - Evaluate CEOR versus alternatives
  - Select most promising CEOR method
- Laboratory investigation interpretation
  - Microemulsion phase behavior experiments
  - Corefloods
  - CEOR performance evaluation
- Up-scaling to pilot phase and field scale
  - Pilot area selection
  - Parameter sensitivity
  - Performance evaluation
  - Economic viability
- Discussion of UEORS case studies
- Answering Client Questions pertinent to target reservoir