

# Tracer Training

## Technical Course for Petroleum Engineers

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This course will guide participants through a comprehensive program to acquire knowledge about different tracer tests, benefits of tracer tests, and field data analysis. Participants will learn about various tracer tests (i.e. single well and interwell) and about the chemical tracers used in each test.

## Target Audience

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This course will benefit engineers with an interest in tracer technologies and a desire to acquire basic knowledge on how to analyze and simulate field results.

## Skills Learned in Course

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Participants in the course will:

- Gain knowledge about the oil field tracer tests
- Understand the application and tracers used in each test
- Use the UTCHEM simulator to match tracer test results in lab corefloods
- Simulate field-scale tracer tests (single well and interwell)

## Course Description

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The course will begin with an overview of different tracer technologies. Example field tests for each tracer test will be reviewed. Afterwards participants will model and simulate different tracer tests using UTCHEM.

## Course Content

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- General Tracer Overview
  - What are tracer tests?
  - How are they applied in an oilfield?
  - Literature review and history of tracer tests
  - Types of tracer tests
  - Limitations of tracers
  - Potential new tracer technology
  - Lab tour
- Laboratory Scale Tracer Tests
  - Selection of lab-scale tracer
  - Mathematical derivation—tracers in 1-D environment

- Laboratory Scale Tracer Tests
  - Introduction to UTCHEM
    - Capabilities
    - Tracer modules
    - Input files
    - Basic how-to's
- Simulation of 1-D Tracer tests—UTCHEM capability
- Single Well Tracer Tests
  - Background/overview
  - Description of reactive partitioning tracer chemicals & their selection
- Single Well Tracer Tests
  - Mathematical treatment of SWTTs
  - Effect of dispersion, layering, reservoir drift
  - History of SWTTs
    - EOR Floods, pilots and design
    - General SWTT design principles
- Interwell Tracer Testing
  - Overview of IWTT
    - Tracer selection
    - Applications
    - Literature review / history
    - Common causes of failure
    - IWTT & Reservoir architecture
    - Design & Interpretation Challenges
  - Quantitative analysis of IWTT
  - Analytical IWTT analysis
  - Numerical IWTT analysis:
    - Examples in literature of IWTT analysis
    - UTCHEM & IWTT Modeling
      - Conservative tracers
      - Partitioning tracers
      - K value salinity effects
      - K value temperature effects
      - Tracer reactions
      - Radioactive tracers
      - Tracer retardation
      - Full tensor physical dispersion with molecular dispersion
- Partitioning Interwell Tracer Testing
  - Develop mathematics of retardation for partitioning tracer—extension of SWTT math
  - Partitioning tracer selection