# Advanced Dynamic Reservoir Simulation

**5 days** **SIMRADV-EN-P**

## Overview

### LEVEL

Knowledge

### PURPOSE

This course provides deep insight into some advanced dynamic reservoir simulation features including gridding, aquifers and wells representation, compositional simulation and assisted history matching.

### LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

apply the fundamental concepts of dynamic reservoir simulation,

carry out local grid refinement,

model complex wells,

perform compositional simulation,

discuss and carry out assisted history matching.

### WAYS AND MEANS

Interactive lectures and exercises.

Hands-on practice using state-of-the-art software packages: ECLIPSE™, PETREL-RE™ or PumaFlow™ reservoir simulator.

### LEARNING ASSESSMENT

Knowledge assessment with multiple choice questions and open explanatory questions.

Assessment from results obtained on hands-on exercises using the simulator.

### PREREQUISITES

Reservoir engineering degree or experience, with basic dynamic reservoir simulation knowledge.

## Agenda

### FUNDAMENTALS OF DYNAMIC RESERVOIR SIMULATION — 0.5 d

Physical aspects and basic laws.
Mathematical and numerical aspects (diffusivity, transport and general equations).
Review of basic rock and fluid properties for input into dynamic reservoir simulation models.

### GRIDDING & LOCAL GRID REFINEMENT — 0.5 d

Review of main types of grids (Cartesian grid, radial grid, corner point grid, etc.) and related properties.
Gridding and Local Grid Refinement - Principles and application.
Convergence problems within Local Grid Refinement.
Practical exercise using the simulator.

### WELL PERFORMANCE — 1 d

Formalisms used by the simulator:

Inflow performance and numerical PI.
Outflow performance and VFP tables.
Practical exercise using the simulation software.

## COMPOSITIONAL SIMULATION

**1.5 d**

Components and composition - Black Oil vs. compositional models:
Lumping and de-lumping.
Compositional EOS - Ternary diagram.
Gas modeling in compositional models.
Practical exercise using the simulator.

## HISTORY MATCHING & ASSISTED HISTORY MATCHING

**1.5 d**

Objectives and methodology.
Production data and identification of data to match.
Production mechanisms and identification of matching parameters.
History matching strategies (pressure, saturation, early and late times) and uncertainty reduction.
Principles of assisted history matching:
Experimental design.
Response surface.
Objective function and optimization.
Practical exercise using the simulator.