

Dynamic Oil and Gas Reservoir Simulation Training Course

6 – 10 June 2027
Johannesburg

AGILE LEADERS
Training Center

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Overview

Dynamic Oil and Gas Reservoir Simulation Training Course is a one-week intermediate course for reservoir, simulation, subsurface, production, petroleum-engineering, and asset functions who leave with a Reservoir Simulation Study File. Participants convert static earth models and engineering data into initialized dynamic models, represent wells and controls, manage numerical runs, diagnose results, perform foundational history matching, and compare development forecasts. The course emphasizes traceable inputs, stable execution, and decision-ready outputs. Agile Leaders Training Center presents practical dynamic reservoir simulation.

Who Should Attend

- Reservoir-engineering functions responsible for dynamic models and production forecasts
- Simulation functions responsible for model construction, execution, and result diagnosis
- Subsurface-modeling functions responsible for grid, property, and uncertainty inputs
- Production-technology functions responsible for well behavior and surveillance evidence
- Petroleum-engineering functions responsible for recovery plans and development scenarios
- Asset functions responsible for integrating technical forecasts into field decisions

The course assumes participants already use reservoir, well, fluid, and production data at work, and it leaves out introductory petroleum geology, software certification, advanced assisted history matching, and ensemble optimization.

Departments and Industries

The course supports departments and industries that construct, use, or assure dynamic subsurface forecasts.

- Reservoir engineering, simulation, and subsurface modeling
- Production technology, petroleum engineering, and well performance
- Field development, asset planning, and technical assurance
- Oil and gas exploration, development, and production
- Underground gas storage and carbon-storage project teams
- Energy consulting, engineering services, and applied research

Learning Objectives

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

- Build a simulation-ready grid and input register
- Apply fluid, rock-flow, equilibrium, and aquifer data
- Use well models, completions, schedules, and controls
- Diagnose timestep, convergence, balance, and output issues
- Compare historical response and development forecasts
- Evaluate model quality, limitations, and decision evidence

Course Agenda

Day 1: Frame the Dynamic Model

- Reservoir Simulation Purpose and Study-Scope Charter
- Static-to-Dynamic Model Handover Checklist
- Grid Geometry, Active Cells, and Upscaling Register
- Porosity, Permeability, Regions, and Fault Representation
- Units, Datum, Conventions, Assumptions, and Data Lineage

Day 2: Initialize Fluids and Rock Flow

- Pressure-Volume-Temperature Data and Fluid Model Selection
- Relative Permeability and Capillary Pressure Functions
- Rock Compressibility and Pore-Volume Behavior
- Initial Pressure, Saturation, Contacts, and Equilibration
- Aquifer Selection, Boundary Conditions, and Volume Checks

Day 3: Represent Wells and Run Cases

- Well Trajectory, Completion, Connection, and Skin Model
- Production and Injection Controls with Operating Constraints
- Historical Schedule, Events, and Restart Strategy
- Timestep, Solver, Convergence, and Numerical-Control Review
- Run Management, Messages, Material Balance, and Result Plots

Day 4: Calibrate and Forecast

- Pressure, Rate, Water-Cut, and Gas-Oil-Ratio Comparison
- Foundational History-Match Parameter and Evidence Register
- Mismatch Diagnosis and Physically Plausible Adjustment Cycle
- Base Case, Development Scenario, and Forecast Assumptions
- Well, Field, Recovery, and Constraint Forecast Comparison

Day 5: Assure the Simulation Study

- Suggested Exercise: Assemble a Simulation-Ready Input Register
- Suggested Exercise: Initialize and Check a Dynamic Model
- Suggested Exercise: Diagnose a Failed or Unstable Run
- Suggested Exercise: Compare History and Forecast Responses
- Capstone Exercise: Complete the Reservoir Simulation Study File

Practical Exercises

The course uses suggested activities to turn reservoir evidence into a controlled simulation workflow and a reviewable forecast.

- Suggested activity: screen a static model, fluid description, rock-flow tables, contacts, and production history for simulation readiness.
- Suggested activity: locate initialization, convergence, material-balance, and well-control problems from run messages and diagnostic plots.
- Suggested activity: propose physically plausible changes for pressure, rate, water-cut, and gas-oil-ratio mismatches.
- Suggested activity: compare development scenarios and communicate forecast assumptions, limitations, sensitivities, and actions.

FAQs

Who suits dynamic oil and gas reservoir simulation training, and what does it assume?

Dynamic oil and gas reservoir simulation training suits reservoir, simulation, subsurface, production, petroleum-engineering, and asset functions. It assumes practical familiarity with reservoir properties, well data, production history, and engineering calculations.

How does dynamic reservoir simulation differ from static reservoir modeling?

Static reservoir modeling describes geometry and spatial rock properties. Dynamic reservoir simulation adds fluid behavior, rock-flow functions, pressure and saturation conditions, wells, controls, time, and governing flow equations to predict reservoir response.

What inputs are required to initialize a reservoir simulation model?

Initialization normally requires a grid, pore-volume properties, regions, contacts, pressure datum, fluid properties, rock-flow functions, compressibility, saturation rules, aquifer or boundary assumptions, and volume checks that reconcile the model with geological and engineering evidence.

Why do reservoir simulation runs fail to converge?

Convergence problems can arise from inconsistent inputs, abrupt control changes, unsuitable timesteps, difficult phase behavior, sharp saturation changes, grid quality, well constraints, or solver settings. Diagnosis should preserve physical meaning rather than merely force a run to finish.

How is a reservoir simulation forecast quality-checked?

A forecast is checked through input lineage, initialization volumes, material balance, numerical stability, historical response, well behavior, constraint handling, scenario consistency, sensitivity to key assumptions, and clear documentation of limitations.

Conclusion

Participants take back a Reservoir Simulation Study File containing scope, data lineage, grid and property controls, initialization evidence, well and schedule definitions, run diagnostics, foundational calibration, forecast scenarios, quality checks, limitations, and actions. The file connects model construction to a traceable engineering review. It supports clearer simulation challenge and more defensible field-development decisions.