Reservoir Modelling and Simulation Course for Subsurface Asset Leaders

20 – 24 September 2027
Tokyo

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Programme Summary

Reservoir modelling and simulation is the subject of this one-week training course for subsurface managers, asset leaders and reservoir engineers, ending in a reservoir study decision pack for one field. Reserves bookings and development plans rest on models that join geology, petrophysics, well tests and production data, yet each discipline often builds its own version. The programme joins them into one reservoir model, tested against history and used to compare recovery options. Mars Training Centre UK delivers this programme on reservoir modelling and simulation to mixed-organisation cohorts.

The Business Case

A field plan is only as sound as the model behind it. When static and dynamic models disagree, teams spend months reconciling them and managers receive forecasts that nobody can defend. Leaders who can question data quality, history match, uncertainty ranges and reserves logic can commit capital with clearer evidence, whether the asset is a mature oil field or a gas development.

- Forecast Reliability: Improves as models are tested against production history and tracked for drift.
- Reserves Confidence: Strengthens as volumes are tied to data and stated uncertainty.
- Decision Cycle Time: Shortens as geoscience and engineering work from one shared model.

Principles and Evidence Base

- SPE Petroleum Resources Management System: The classification of reserves and resources frames the volume work in Sessions 1 and 5.
- Material balance: The conservation of fluid volumes in a reservoir guides the checks in Session 3.
- Darcy's law: The relation between flow, permeability and pressure underpins well test reading in Session 2 and simulation in Session 4.
- Uncertainty analysis: Ranges and scenarios replace single-value forecasts in Sessions 4 and 5.

Intended Participants

- Subsurface managers who sign off models used for reserves and field plans.
- Asset leaders who weigh recovery options and capital against model forecasts.
- Reservoir engineers who build, match and run simulation models.
- Geoscientists and petrophysicists who supply the static framework and rock properties.
- Commercial and planning leaders who rely on production forecasts for budgets.

Typical functions include reservoir engineering, geoscience, asset management and field development planning.

Learning Outcomes

1. Participants will be able to evaluate geological and petrophysical inputs for gaps and bias.
2. Participants will be able to interpret well test responses for permeability, skin and boundaries.
3. Participants will be able to construct a material balance to check volumes and drive mechanisms.
4. Participants will be able to diagnose a poor history match and trace its cause.
5. Participants will be able to prioritise recovery and development options under uncertainty.
6. Participants will be able to justify a field decision with a reservoir study pack.

Programme Structure

Day 1: Reservoir Framework and Static Data

What do geology and petrophysics tell the model, and where are the gaps?

- Structural and Facies Framework
- Log Interpretation Summary
- Porosity and Saturation Cross-Check
- In-Place Volume Estimate
- Data Quality Register

Day 2: Well Tests and Dynamic Behaviour

What do pressure and rate data reveal about flow and boundaries?

- Pressure Transient Diagnostic Plot
- Permeability and Skin Estimate
- Boundary and Fault Response Review
- Production Decline Analysis
- Fluid Property Sheet

Day 3: Material Balance and Drive Mechanisms

Do fluid volumes and pressures agree with the proposed drive?

- Material Balance Plot
- Aquifer Influx Check
- Gas Cap and Solution Gas Review
- Recovery Factor Benchmark
- Volume Reconciliation Table

Day 4: Simulation and History Matching

How is a dynamic model built, matched and ranged?

- Grid and Upscaling Review
- Relative Permeability Assumptions
- History Match Error Chart
- Sensitivity and Uncertainty Matrix
- Forecast Case Set

Day 5: Applying the Model to Field Decisions

Do the combined tools support one reserves and development decision?

- Applying the Session 1 Data Quality Register
- Testing the Session 3 Volume Reconciliation Table
- Using the Session 4 Forecast Case Set
- Ranking Development Options by Recovery and Risk
- Completing the Reservoir Study Decision Pack

Methodology

The programme uses a data workshop method built on anonymised well logs, pressure transient records, production histories and simulation outputs from oil and gas fields. Participants work in mixed technical and management groups on one shared field, challenge each other's interpretations and receive written facilitator feedback after each exercise set.

- Suggested activity: Reconciling in-place volumes from geology with those from material balance.
- Suggested activity: Reading a pressure transient plot to identify a boundary.
- Suggested activity: Comparing two history match cases and their forecast ranges.

Capstone Output

Each participant completes a reservoir study decision pack for one field. It holds a data quality register, a volume reconciliation table, a history match summary, a forecast case set and a ranked list of development options. The pack is used at work to brief asset leadership, support a reserves review and set the agenda for the next modelling update.

Frequently Asked Questions

Is reservoir modelling and simulation suitable for managers who are not reservoir engineers?

Yes. Reservoir modelling and simulation assumes some exposure to field data or asset decisions and builds reading skills step by step, without requiring you to run a simulator.

Which principles does reservoir modelling and simulation rest on?

Reservoir modelling and simulation rests on the SPE Petroleum Resources Management System for reserves, with material balance, Darcy's law and uncertainty analysis.

How is the pack from reservoir modelling and simulation used at work?

You use the reservoir study decision pack to brief asset leadership, support a reserves review and plan the next model update.

How does reservoir modelling and simulation differ from fracture and shale reservoir training?

Reservoir modelling and simulation covers conventional integration of geology, tests and history matching, while fracture and shale training centres on fracture networks and unconventional wells.