Advanced Reservoir Simulation and Modeling Strategies Training Course

21 - 25 Dec 2026

Cape town

4600 € (Per Person)

Ref: #OG7084_274692

Course Introduction / Overview:

This comprehensive training course provides an in-depth exploration of modern reservoir simulation and modeling strategies, essential for optimizing hydrocarbon recovery and making informed field development decisions. In an era of complex reservoirs and challenging economic conditions, mastering simulation is no longer a niche skill but a core competency for subsurface professionals. This program moves beyond basic software operation to instill a deep understanding of the underlying principles, workflows, and strategic applications of reservoir modeling. Participants will delve into the entire simulation lifecycle, from building robust geocellular models to performing history matching, forecasting production, and quantifying uncertainty. The curriculum is grounded in established principles, referencing the foundational work of authors like Khalid Aziz, whose book "Petroleum Reservoir Simulation" remains a cornerstone of the discipline. BIG BEN Training Center has designed this course to bridge the gap between theoretical knowledge and practical application, equipping engineers and geoscientists with the skills to critically evaluate simulation results and use them to drive significant value in reservoir management and field development planning. The course emphasizes a hands-on, problem-solving approach to tackle real-world challenges in both conventional and unconventional reservoirs.

Target Audience / This training course is suitable for:

- Reservoir Engineers.
- Simulation Engineers.
- Petroleum Engineers.
- Geoscientists and Geologists.
- Production Engineers.
- Petrophysicists.
- Asset Managers and Team Leads.
- Technical Managers involved in field development planning.

Target Sectors and Industries:

- Oil and Gas Exploration and Production (E&P) Companies.
- National Oil Companies (NOCs).
- International Oil Companies (IOCs).
- Integrated Energy Companies.
- Oilfield Service and Technology Companies.
- Engineering and Petroleum Consulting Firms.
- Governmental bodies and regulatory agencies in the energy sector.
- Research and Development institutions focused on subsurface engineering.

Target Organizations Departments:

- Reservoir Engineering and Management.
- Subsurface and Geoscience Teams.
- Field Development Planning.
- Production Technology and Optimization.
- Exploration and Appraisal.
- Asset Management.
- Unconventional Resources Teams.
- Enhanced Oil Recovery (EOR) Projects.

Course Offerings:

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

- Construct and validate robust static and dynamic reservoir models.
- Apply fundamental principles of fluid flow in porous media to simulation.
- Select appropriate gridding systems and upscaling techniques for different reservoir types.
- Integrate geological, petrophysical, and engineering data into a cohesive model.
- Master the art and science of history matching to calibrate models with field data.
- Develop reliable production forecasts for various development scenarios.
- Evaluate the potential of Enhanced Oil Recovery (EOR) methods through simulation.
- Perform sensitivity and uncertainty analysis to quantify risk in development projects.
- Utilize simulation results to optimize field development and reservoir management strategies.
- Critically assess and troubleshoot common issues in reservoir simulation studies.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to be highly interactive, practical, and engaging, ensuring that participants gain both theoretical knowledge and hands-on skills. This course moves beyond traditional lectures by incorporating a blended learning approach. The instructor will facilitate sessions using a combination of detailed presentations, real-world case studies from diverse geological environments, and interactive group discussions. A significant portion of the course is dedicated to practical workshops and conceptual simulation exercises where participants will work collaboratively to build models, perform history matching, and run prediction scenarios. This problem-based learning approach allows attendees to apply concepts immediately and reinforces understanding. Regular Q&A sessions are scheduled to address specific challenges and queries. Participants will receive continuous feedback from the expert instructor, fostering a supportive learning environment. The focus is on developing a strategic mindset for applying simulation as a powerful decision-making tool in reservoir management, rather than just focusing on software-specific commands. This immersive methodology ensures a lasting and practical impact on each participant's professional capabilities.

Course Agenda (Course Units):

Unit One: Fundamentals of Reservoir Simulation and Model Construction

- Introduction to reservoir simulation concepts and objectives.
- Governing equations for multiphase fluid flow in porous media.
- Overview of simulation model types: Black Oil, Compositional, and Thermal.
- Key data requirements for a simulation study.
- Principles of grid design: Cartesian, corner-point, and unstructured grids.
- Rock and fluid property (PVT) modeling fundamentals.
- Building the static model: Integrating geological and petrophysical data.

Unit Two: Static Modeling, Upscaling, and Initialization

- Geostatistical methods for property distribution (porosity, permeability).
- Facies modeling techniques for reservoir heterogeneity.
- The process and challenges of upscaling geological models for flow simulation.
- Initialization of the dynamic model: Defining fluid contacts and equilibrium.
- Understanding and modeling relative permeability and capillary pressure (SCAL data).
- Validating the static model and initial volumetric calculations.
- Best practices for quality control in model construction.

Unit Three: Dynamic Modeling and The Art of History Matching

- Setting up the dynamic model with well and production data.
- The history matching workflow: objectives and philosophy.
- Manual vs. assisted history matching techniques.
- Identifying and adjusting key matching parameters (aquifer strength, permeability, faults).
- Analyzing pressure and saturation changes during history matching.
- Common pitfalls and troubleshooting in the matching process.
- Assessing the quality and uniqueness of a history match.

Unit Four: Production Forecasting and Uncertainty Quantification

- Setting up and running prediction cases and development scenarios.
- Forecasting techniques for infill drilling, workovers, and new wells.
- Modeling and evaluating waterflood and gas injection performance.
- Introduction to uncertainty analysis and risk assessment.
- Sensitivity analysis (Tornado charts, Spider plots) to identify key parameters.
- Probabilistic forecasting using Monte Carlo simulation.
- Integrating simulation results into reserves estimation and economic analysis.

Unit Five: Advanced Simulation Topics and Field Development Planning

- Modeling complex wells: horizontal, multilateral, and intelligent completions.
- Introduction to fractured reservoir simulation (dual-porosity/dual-permeability models).
- Fundamentals of compositional simulation for gas condensate and volatile oil reservoirs.
- Overview of thermal simulation for heavy oil recovery (EOR).
- Streamline simulation as a complementary tool.
- Integrating simulation results into a comprehensive Field Development Plan (FDP).
- The role of simulation in modern reservoir management and surveillance.

FAQ:

Qualifications required for registering to this course?

There are no requirements.

How long is each daily session, and what is the total number of training hours for the course?

This training course spans five days, with daily sessions ranging between 4 to 5 hours, including breaks and interactive activities, bringing the total duration to 20 - 25 training hours.

Something to think about:

How can the integration of machine learning and AI with traditional numerical simulation methods revolutionize our approach to reservoir uncertainty quantification and management?

What unique qualities does this course offer compared to other courses?

This course distinguishes itself by focusing on the strategic application and critical thinking behind reservoir simulation, rather than on the mechanics of a specific software package. While many courses teach "button-pushing," this program cultivates a deep understanding of the "why" behind each step of the simulation workflow. It emphasizes the art and science of modeling, teaching participants how to make geologically and physically sound decisions during model construction, history matching, and forecasting. The curriculum is uniquely structured to bridge the gap between geoscience and engineering, ensuring that models are not just numerically stable but also geologically realistic. We delve into the common pitfalls and sources of error in simulation studies, equipping participants with the skills to critically evaluate their own models and those of others. The course content is enriched with diverse case studies that highlight how simulation strategies must be adapted for different reservoir types, from conventional clastics to complex fractured carbonates. The emphasis is on building robust, predictive models that serve as reliable tools for high-stakes field development and investment decisions, fostering a level of mastery that transcends software proficiency.