Subsurface Modeling and Reservoir Simulation Training Course

Ref: #OG4662

Course Introduction / Overview:

The oil and gas industry relies heavily on understanding and predicting the behavior of subsurface reservoirs. This training course delves into the core principles and advanced applications of subsurface modeling and reservoir simulation, which are essential for effective reservoir management. We will cover the creation of static geological models and their transformation into dynamic simulation models, a crucial process for forecasting reservoir performance and optimizing production. This program, offered by BIG BEN Training Center, is designed to provide participants with the skills to use reservoir modeling and simulation for making informed decisions. Drawing on foundational works like the book "Reservoir Engineering Handbook" by Tarek Ahmed, this course will equip you with the knowledge to manage complex reservoir challenges. The curriculum emphasizes a detailed, step-by-step approach to modeling fluid flow and pressure behavior, and we will explore the impact of various recovery techniques. Participants will gain practical expertise in building and running simulations, interpreting results, and using these insights to maximize hydrocarbon recovery. The course aims to transform theoretical knowledge into a practical skillset for real-world application.

Target Audience / This training course is suitable for:

- Reservoir engineers and geologists.
- Petroleum and production engineers.
- Geomodelling and simulation specialists.
- Asset managers and exploration professionals.
- Students in petroleum engineering and geoscience.
- Professionals in government and regulatory bodies.

Target Sectors and Industries:

- Oil and gas exploration and production.
- Geothermal energy.
- Carbon capture and storage.
- Hydrogeology and groundwater management.
- Government agencies and regulatory commissions.

Target Organizations Departments:

- Reservoir engineering.
- Geoscience and geology.
- Petroleum economics.
- Asset management and planning.
- Research and development.

Course Offerings:

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

- Understand the fundamental concepts of reservoir engineering and fluid flow.
- Build comprehensive static geological models from various data sources.
- Develop and run dynamic reservoir simulation models.
- Analyze and interpret simulation results to predict reservoir performance.
- Evaluate different enhanced oil recovery (EOR) methods through simulation.
- Use simulation to optimize placement and production strategies.
- Quantify and manage uncertainty in reservoir models.
- Integrate geological, petrophysical, and production data.

Course Methodology:

This training course uses an intensive and hands-on methodology to ensure a comprehensive understanding of reservoir modeling and simulation. The program combines expert-led lectures with practical workshops and case studies. Participants will work on real-world datasets, building both static and dynamic models from the ground up. The course will feature collaborative sessions where teams can discuss challenges and explore solutions, fostering an environment of shared learning. Our instructors, who are experienced reservoir engineers, will provide one-on-one guidance to ensure participants master the tools and techniques. We will emphasize the critical thinking required to troubleshoot modeling issues and interpret complex simulation outputs. Feedback sessions will be used to reinforce learning and provide constructive insights. BIG BEN Training Center is committed to providing a practical and applied learning experience that prepares participants for the technical demands of reservoir management.

Course Agenda (Course Units):

Unit One: Reservoir Engineering Fundamentals

- Basic principles of reservoir fluid properties.
- Understanding rock properties and petrophysics.
- Principles of fluid flow in porous media.
- Material balance and volumetric calculations.
- Introduction to static and dynamic models.
- Overview of reservoir engineering concepts.
- Case study: Volumetric assessment of an oil reservoir.

Unit Two: Static Reservoir Modeling

- Creating geological frameworks and structural models.
- Property modeling: porosity, permeability, and saturation.
- Geostatistical methods for property distribution.
- Integrating well log and seismic data into models.
- Review of geomodelling software.
- Uncertainty and sensitivity analysis.
- Workshop: Building a 3D geological model.

Unit Three: Introduction to Reservoir Simulation

- Fundamentals of black-oil and compositional simulation.
- Gridding and cell property assignment.
- Boundary conditions and well controls.
- Setting up a simulation run and defining initial conditions.
- Running and monitoring simulation jobs.
- Understanding simulation output files and reports.
- Practical exercise: Running a simple reservoir simulation model.

Unit Four: History Matching and Prediction

- Principles of history matching model validation.
- Using production data to refine model parameters.
- Sensitivity analysis for key reservoir parameters.
- Building prediction scenarios for future production.
- Evaluating different development strategies.
- Economic analysis of simulation results.
- Case study: History matches a field production history.

Unit Five: Advanced Simulation and Special Topics

- Simulating advanced recovery methods (waterflooding, gas injection).
- Modeling unconventional reservoirs.
- Simulating CO2 sequestration and geothermal systems.
- Uncertainty and risk analysis in simulation.
- Introduction to advanced simulation software features.
- Final project: Developing a field-scale simulation plan.
- Course summary and future trends.

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 reservoir simulation and modeling be used to effectively assess and mitigate the long-term geological and environmental risks associated with carbon capture and storage projects?

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

This training course is distinguished by its blend of rigorous academic theory and an intense focus on practical, real-world application. Rather than simply discussing abstract concepts, we immerse participants in the full workflow of building and using reservoir models and simulations. The curriculum goes beyond basic tool instruction to teach the underlying principles, enabling participants to troubleshoot complex problems and adapt to different software and data environments. This course focuses on developing the critical thinking skills needed to interpret simulation outputs and make data-driven decisions that are vital for effective reservoir management. The use of real-world case studies and project-based learning, guided by industry experts, ensures that participants gain a deep, functional understanding that they can immediately apply in their professional roles. We empower professionals not just to run a simulation, but to truly understand what the results mean and how to use them to create value.