Advanced Petrophysics for Reservoir Characterization Training Course

26 - 30 Oct 2026

Tokyo

5800 € (Per Person)

Ref: #OG9757_99877

Course Introduction / Overview:

This comprehensive course provides an in-depth exploration of petrophysics and its critical role in formation evaluation and reservoir characterization. It is designed to equip participants with the fundamental principles and advanced techniques required to accurately assess subsurface rock and fluid properties. The curriculum delves into the core concepts of petrophysics, from basic rock properties to the complexities of well log interpretation and data integration. Drawing upon foundational industry knowledge, such as the principles outlined in texts like "Petrophysics: Theory and Practice of Measuring Reservoir Rock and Fluid Properties" by Djebbar Tiab and Erle C. Donaldson, this program bridges the gap between theoretical understanding and practical application. Participants will learn to analyze various logging data, understand tool responses, and build robust petrophysical models for accurate hydrocarbon-in-place calculations. At BIG BEN Training Center, we focus on a hands-on approach, ensuring that professionals can confidently apply these skills to optimize exploration, development, and production strategies. This training is essential for anyone involved in characterizing conventional and unconventional reservoirs, providing the expertise needed to make informed decisions based on solid petrophysical analysis and integrated formation evaluation.

Target Audience / This training course is suitable for:

- Geologists and Exploration Geologists.
- Reservoir Engineers.
- Petro physicists and Log Analysts.
- Geophysicists.
- Production Technologists.
- Drilling Engineers.
- Asset Managers in the energy sector.
- Technical personnel new to subsurface characterization.
- Data Scientists working with subsurface data.

Target Sectors and Industries:

- Oil and Gas Exploration and Production Companies.
- Energy Service and Technology Providers.
- Consulting firms specializing in geoscience and reservoir engineering.
- National Oil Companies (NOCs).
- Governmental bodies and regulatory agencies in the energy sector.
- Research and academic institutions focused on earth sciences.

Target Organizations Departments:

- Exploration and Subsurface Departments.
- Reservoir Management and Development Teams.
- Production and Operations Departments.
- Geoscience and Engineering Departments.
- Research and Development (R&D) Divisions.
- Data Management and Analytics Teams.
- Well Operations and Planning Departments.

Course Offerings:

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

- Master the fundamental concepts of petrophysics and reservoir rock properties.
- Understand the principles behind various wireline and LWD logging tools.
- Perform quality control on acquired well log data.
- Interpret standard well logs to determine lithology, porosity, and fluid saturation.
- Apply shaly sand models for accurate evaluation in complex reservoirs.
- Analyze core data and integrate it with log data for calibration.
- Evaluate carbonate reservoirs using specialized petrophysical techniques.
- Build a comprehensive petrophysical model for reservoir characterization.
- Quantify uncertainties associated with petrophysical interpretations.
- Contribute effectively to integrated reservoir study teams.

Course Methodology:

The training methodology at BIG BEN Training Center is designed to foster a deep and practical understanding of petrophysics through a highly interactive and engaging learning environment. Our approach moves beyond traditional lectures by incorporating a balanced mix of theoretical instruction, real-world case studies, and hands-on practical exercises. Participants will work with actual well log data sets, applying interpretation techniques learned in class to solve realistic reservoir evaluation problems. Collaborative group discussions and teamwork activities are central to the learning process, allowing participants to share insights and tackle complex challenges together. The instructor will facilitate these sessions, providing expert guidance, personalized feedback, and encouraging critical thinking. Interactive workshops will focus on log analysis, cross-plotting techniques, and the integration of different data types. This immersive methodology ensures that participants not only grasp the theoretical principles of formation evaluation but also develop the confidence and competence to apply these skills directly to their professional roles upon completion of the course.

Course Agenda (Course Units):

Unit One: Fundamentals of Petrophysics and Reservoir Rocks

- Introduction to petrophysics and its role in the E&P lifecycle.
- Reservoir rock properties: porosity, permeability, and saturation.
- Rock composition, texture, and classification.
- Fluid properties: oil, gas, and water characteristics.
- Wettability and its impact on fluid distribution.
- Capillary pressure concepts and height-above-free-water-level.
- Fundamentals of core analysis: routine and special core analysis (SCAL).

Unit Two: Principles of Well Logging and Data Acquisition

- Overview of open-hole logging technologies and tools.
- Data acquisition processes and quality control (QC) procedures.
- Resistivity and conductivity logging principles.
- Nuclear logging: gamma ray, density, and neutron porosity tools.
- Acoustic and sonic logging for porosity and mechanical properties.
- Understanding logging environments and borehole corrections.
- Introduction to Logging While Drilling (LWD) and its applications.

Unit Three: Core Petrophysical Interpretation Techniques

- Log data preparation and environmental corrections.
- Lithology determination using single and multiple log indicators.
- Porosity calculation from density, neutron, and sonic logs.
- Archie's equation for water saturation in clean formations.
- Cross-plotting techniques for lithology and porosity determination.
- Identifying hydrocarbon-bearing zones versus water-bearing zones.
- Calculating net pay and summarizing reservoir properties.

Unit Four: Advanced Log Analysis and Special Cases

- Evaluation of shaly sand reservoirs.
- Waxman-Smits and Dual-Water models for water saturation in shales.
- Introduction to carbonate petrophysics and complex pore systems.
- Evaluation of thinly bedded and low-resistivity pay zones.
- Principles of Nuclear Magnetic Resonance (NMR) logging.
- Analysis of formation pressure data and fluid contacts.
- Introduction to cased-hole logging and production logging.

Unit Five: Integrated Formation Evaluation and Reservoir Characterization

- Integrating core data with log data for robust calibration.
- Rock typing and its application in reservoir modeling.
- Building a deterministic and probabilistic petrophysical model.
- Quantifying and managing uncertainty in petrophysical evaluation.
- The role of petrophysics in static and dynamic reservoir modeling.
- Case studies: integrating petrophysics for field development planning.
- Final project: a complete formation evaluation from raw data to reservoir summary.

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 might the integration of machine learning and AI transform traditional petrophysical interpretation workflows, and what are the potential pitfalls in relying on these automated systems for complex reservoir characterization?

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

This course distinguishes itself by offering a holistic and integrated perspective on formation evaluation, moving beyond the siloed teaching of individual logging tools or interpretation techniques. While many programs focus solely on the mechanics of log analysis, this curriculum emphasizes the critical thinking required to synthesize diverse datasets from core analysis and wireline logs to pressure data into a cohesive and reliable reservoir model. We prioritize the "why" behind the "how," ensuring participants understand the geological context and physical principles that govern tool responses and petrophysical calculations. The course content is built around real-world case studies that reflect the complexities and ambiguities encountered in actual exploration and development projects, including challenging shaly sand and carbonate reservoirs. Rather than just presenting formulas, we explore the assumptions and limitations of each model, empowering participants to select the most appropriate evaluation method and to quantify the associated uncertainties. This practical, problem-solving approach ensures that graduates are not just log analysts, but well-rounded geoscientists and engineers capable of making significant contributions to multidisciplinary reservoir characterization teams.