Training Course on Petrophysics for Complex and Unconventional Reservoirs

Professional Development Training Course Outline

Category	Oil and Gas	**Duration**	10 Days
Base Fee	$3,000 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

In today's dynamic energy landscape, understanding petrophysical behavior in complex and unconventional reservoirs has become a game-changer in maximizing hydrocarbon recovery and ensuring sustainable energy development. Training Course on Petrophysics for Complex & Unconventional Reservoirs is designed to provide professionals with a deep dive into advanced petrophysical interpretation techniques for challenging reservoirs including shale, tight gas, and fractured formations. The course integrates geological, geophysical, and engineering insights to equip learners with cutting-edge tools and methodologies tailored to today's most intricate subsurface challenges.

This course emphasizes data integration, reservoir characterization, and real-time analysis, incorporating field-proven strategies and emerging digital technologies such as AI-powered log interpretation and machine learning in reservoir analysis. Learners will engage with case-based learning, practical exercises, and interactive simulations to build real-world expertise and elevate decision-making capabilities in complex reservoir environments.

Programme Curriculum

Training Course on Petrophysics for Complex & Unconventional Reservoirs

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Course Objectives

1. Understand advanced petrophysical evaluation of unconventional reservoirs.
2. Apply multimodal log interpretation to complex lithologies.
3. Analyze shale gas and tight oil reservoir behavior using modern techniques.
4. Evaluate fluid saturations and porosity in fractured reservoirs.
5. Integrate geomechanical and petrophysical data for better field development.
6. Identify sweet spots using petrophysical and seismic data fusion.
7. Leverage machine learning for rock property prediction.
8. Assess well log responses in organic-rich formations.
9. Interpret NMR and dielectric logs in unconventional settings.
10. Optimize completion strategies using petrophysical insights.
11. Evaluate resistivity anisotropy and borehole image logs.
12. Conduct petrophysical uncertainty analysis in complex environments.
13. Interpret thin-bed and laminated reservoir data for production enhancement.

Target Audiences

1. Petroleum Engineers
2. Reservoir Engineers
3. Geologists & Geophysicists
4. Petrophysicists
5. Exploration & Production Analysts
6. Data Scientists in Oil & Gas
7. Subsurface Engineers
8. Graduate Students in Geosciences

Course Duration: 10 days

Course Modules

Module 1: Fundamentals of Petrophysics in Unconventional Reservoirs

- Core principles of petrophysical evaluation
- Key differences in conventional vs. unconventional reservoirs
- Introduction to shale, tight gas, and fractured systems
- Overview of mineralogy and lithological complexities
- Introduction to multi-scale rock property measurement
- **Case Study**: Petrophysical contrast between Bakken and Marcellus Shale

Module 2: Rock Typing and Reservoir Quality Assessment

- Techniques for rock classification in unconventional plays
- Porosity and permeability analysis in tight formations
- Core-log integration strategies
- Evaluating reservoir quality using thin section petrography
- Use of crossplots and advanced petrophysical templates
- **Case Study**: Rock typing challenges in Permian Basin

Module 3: Advanced Log Interpretation Techniques

- Gamma ray, resistivity, and density/neutron log interpretation
- Spectral gamma ray and elemental capture spectroscopy
- Complex mineralogy interpretation using cross-plotting
- Multimineral and multilinear inversion techniques
- AI-enhanced log analysis tools
- **Case Study**: Log interpretation in Haynesville Shale

Module 4: Porosity and Saturation Models in Complex Reservoirs

- Effective vs. total porosity in low-permeability systems
- Saturation height modeling and capillary pressure integration
- Archie's vs. non-Archie rock systems
- Introduction to dual porosity systems
- Methods to calibrate saturation models with core data
- **Case Study**: Porosity analysis in tight carbonate plays

Module 5: Fractured Reservoir Evaluation

- Natural vs. induced fracture identification
- Fracture density and orientation estimation using FMI
- Impact of fractures on permeability and flow
- Integration of image logs and core fracture data
- Fracture modeling and productivity prediction
- **Case Study**: Fractured reservoir in Kurdistan

Module 6: Petrophysics of Shale Gas and Oil Reservoirs

- TOC estimation using log and core data
- Kerogen typing and maturity interpretation
- Gas-in-place and free vs. adsorbed gas models
- Brittleness index and mineralogy influence on fracking
- Shale log interpretation using NMR and dielectric tools
- **Case Study**: Shale characterization in Eagle Ford

Module 7: Tight Gas and Low-Permeability Reservoirs

- Challenges in petrophysical assessment of tight formations
- Well log interpretation in high-resistivity zones
- Micro-porosity and low flow zone identification
- Stimulation response prediction using petrophysics
- Workflow for tight gas reservoir evaluation
- **Case Study**: Log signature in Mesaverde Formation

Module 8: NMR and Dielectric Logging Applications

- Principles of NMR logging in unconventional rocks
- Bound vs. free fluid volume separation
- Dielectric log response in tight formations
- Comparison of NMR and resistivity-based porosity
- Calibration of NMR tools using lab data
- **Case Study**: NMR application in Barnett Shale

Module 9: Geomechanical-Petrophysical Integration

- Stress profiling and its impact on completion
- Mechanical properties from logs (UCS, Young's modulus)

- Poroelastic modeling using log data
- Correlation of geomechanical properties with brittleness
- Fracability prediction from petrophysical data
- **Case Study**: Integration in the Duvernay Formation

Module 10: Image Logs and Resistivity Anisotropy

- FMI, OBMI, and other borehole imaging tools
- Anisotropy detection using azimuthal resistivity
- Structural and sedimentary feature identification
- Fracture mapping and reservoir flow analysis
- Integration of image logs with dip and fracture data
- **Case Study**: Borehole imaging in horizontal Bakken wells

Module 11: Petrophysics for Thin-Bedded and Laminated Reservoirs

- Challenges in laminated sand-shale systems
- Advanced log analysis methods: LWD & multi-component
- High-resolution vertical petrophysical modeling
- Core-log-seismic data fusion
- Thin-bed reservoir production potential estimation
- **Case Study**: Laminated pay in the North Sea

Module 12: Digital Petrophysics & Machine Learning

- Introduction to digital core and log analytics
- Data preprocessing and feature extraction
- ML algorithms for porosity and permeability prediction
- Supervised vs. unsupervised models
- Cloud platforms and AI tools for petrophysical workflows
- **Case Study**: AI-driven petrophysics in a Middle East shale play

Module 13: Uncertainty Quantification and Risk Analysis

- Probabilistic log interpretation
- Sensitivity analysis in petrophysical workflows
- Monte Carlo simulation for property estimation
- Error propagation in complex models
- Decision making under uncertainty
- **Case Study**: Uncertainty analysis in the Utica Shale

Module 14: Completion Design Using Petrophysical Data

- Petrophysical indicators for stage spacing
- Perforation cluster design based on reservoir heterogeneity
- Optimization of proppant placement
- Predicting stimulated rock volume (SRV)
- Real-time petrophysics in completion operations
- **Case Study**: Completion optimization in STACK play

Module 15: Integrated Field Case Studies

- End-to-end reservoir evaluation workflow
- Role of petrophysics in field development planning
- Field-scale upscaling from logs to static models
- Production history matching with petrophysical inputs

- Lessons learned and best practices
- **Case Study**: Full field development in Vaca Muerta

Training Methodology

- Live interactive lectures with visual demonstrations
- Hands-on exercises using real field data
- Group-based problem-solving and simulation activities
- Quizzes and knowledge checkpoints after each module
- Final project: End-to-end petrophysical evaluation of a field
- Continuous feedback and 1-on-1 mentoring sessions

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Online	$2,000
23 Nov 2026	04 Dec 2026	Physical	$3,000
23 Nov 2026	04 Dec 2026	Physical	$6,000
23 Nov 2026	04 Dec 2026	Physical	$6,000

Start Date	End Date	Location	Price
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$9,000
23 Nov 2026	04 Dec 2026	Physical	$12,000
23 Nov 2026	04 Dec 2026	Physical	$12,000

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