



PB INSTITUTE OF RESEARCH AND TECHNOLOGY

P.O Box 21457-00100

Nairobi - Kenya

Mobile: +254 721 214 795

Email: info@pebblesinstitute.org

Advanced Petrel Geophysical Interpretation & Velocity Modeling Training Course

Duration: 10 days

On-Site

01 Who Should Attend

- This course is ideal for:
- Geophysicists
- Geologists and geoscientists
- Reservoir engineers
- Petroleum engineers
- Exploration managers
- Petrel software specialists
- Seismic data analysts
- Subsurface modeling professionals
- Oil and gas consultants
- Data scientists in geophysics
- Graduate students in geophysics and petroleum engineering



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02 About the Course

Geophysical interpretation plays a crucial role in reservoir characterization, exploration, and development, providing the insights necessary to make informed decisions in the oil and gas industry. Petrel software offers an advanced platform for integrating seismic data, geological information, and engineering workflows to build accurate subsurface models. This training course focuses on seismic data processing, velocity model building, and advanced interpretation of horizons and faults using Petrel, ensuring participants acquire practical skills that can be applied directly to exploration and field development projects.

The program combines theory with hands-on exercises, enabling participants to process seismic data, generate velocity models, and accurately interpret structural and stratigraphic features. By mastering advanced techniques in seismic visualization, attribute analysis, and fault/horizon interpretation, attendees will be equipped to deliver robust geophysical interpretations that enhance reservoir understanding. The course also emphasizes the integration of velocity models into static and dynamic workflows for improved reservoir modeling and forecasting.

03 Workshop Objectives

- Understand the fundamentals of geophysical interpretation in Petrel
- Process seismic data for interpretation and modeling
- Build and validate velocity models for subsurface imaging
- Interpret horizons and stratigraphic frameworks
- Analyze faults and structural features using seismic data
- Apply seismic attributes for reservoir characterization

04 Module Topics

Module 1: Introduction to Geophysical Interpretation

- Overview of geophysical interpretation workflows
- Role of seismic data in reservoir characterization
- Integration of geological and geophysical data
- Overview of Petrel geophysics tools
- Case study examples



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Module 2: Fundamentals of Seismic Data Processing

- Basics of seismic acquisition and processing
- Data quality control techniques
- Noise removal and filtering methods
- Seismic migration principles
- Preparing data for interpretation

Module 3: Seismic Visualization Techniques

- Display options in Petrel
- 2D and 3D seismic visualization
- Color mapping and scaling methods
- Volume rendering techniques
- Best practices in visualization

Module 4: Seismic Attribute Analysis

- Introduction to seismic attributes
- Amplitude, phase, and frequency analysis
- Attributes for fault detection
- Attributes for lithology and fluid prediction
- Case examples of attribute workflows

Module 5: Velocity Modeling Fundamentals

- Role of velocity in seismic imaging
- Building velocity models in Petrel
- Depth vs time conversion principles
- Using well and check-shot data
- Case study on velocity integration

Module 6: Advanced Velocity Model Building



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- Layer-based velocity modeling
- Anisotropy in velocity models
- Horizon-constrained velocity building
- Incorporating seismic velocities
- Validation of velocity models

Module 7: Horizon Interpretation Techniques

- Identifying key horizons in seismic data
- Manual vs automated horizon picking
- Linking horizons to well data
- Structural and stratigraphic interpretation
- Case studies in horizon analysis

Module 8: Fault Interpretation and Analysis

- Principles of fault identification
- Manual fault picking in Petrel
- Using attributes for fault detection
- Fault network modeling
- Visualization of structural features

Module 9: Seismic-to-Well Tie Workflows

- Principles of well-to-seismic calibration
- Check-shot and VSP data integration
- Creating synthetic seismograms
- Improving interpretation accuracy
- Case studies on seismic-to-well ties

Module 10: Depth Conversion Methods



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- Time-to-depth conversion principles
- Velocity model integration
- Depth imaging workflows
- Managing uncertainties in depth conversion
- Practical exercises in depth conversion

Module 11: Integration with Well Log Data

- Combining well logs and seismic data
- Cross-plotting techniques
- Enhancing reservoir property interpretation
- Seismic inversion basics
- Practical applications

Module 12: Structural Modeling with Seismic Data

- Building structural frameworks in Petrel
- Incorporating horizons and faults
- Grid design for structural models
- Linking seismic to reservoir models
- Case examples in structural modeling

Module 13: Advanced Interpretation Tools in Petrel

- Multi-attribute analysis
- Machine learning applications in seismic interpretation
- Automation in horizon/fault picking
- Quantitative interpretation techniques
- Future of seismic interpretation

Module 14: Case Studies in Velocity and Interpretation



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- ▶ Module 14: Case Studies in Velocity and Interpretation
- ▶ Interpretation of complex structural settings
- ▶ Lessons learned from field applications
- ▶ Peer-reviewed group discussions
- ▶ Best practices for project success

Module 15: Reporting and Visualization Outputs

- ▶ Creating interpretation maps in Petrel
- ▶ 3D visualization for stakeholders
- ▶ Preparing technical reports and dashboards
- ▶ Communicating uncertainties in interpretation
- ▶ Delivering outputs for reservoir teams