JUPITER PRIME

Consulting • Training • Advisory

جوبيتر برايم للاستشارات والتدريب

COURSE BROCHURE

3D Seismic Attributes for Reservoir Characterization Course

7 – 11 March 2027
Doha

3D Seismic Attributes for Reservoir Characterization Course

Ref: 1750_64202 **Date:** 7 – 11 March 2027 **Location:** Doha **Fees:** 6500 GBP

3D Seismic Attributes for Reservoir Characterization is a 1-week training course for geophysicists and reservoir geoscientists who turn seismic volumes into quantitative reservoir property estimates, and it ends with an attribute-driven porosity and net-to-gross map. Appraisal and infill drilling now depend on predicting rock quality between sparse wells, and attribute work narrows that uncertainty before rigs are committed. The course is delivered by Jupiter Prime Training.

Why 3D Seismic Attributes Matter Now

Three forces shape attribute work today. Mature fields need infill targets in thinner, heterogeneous sands and carbonates. Fast workstations now produce dozens of attributes in minutes, so the risk has shifted to spurious correlation. And asset managers expect geophysical predictions to arrive with stated confidence rather than a single coloured map. A property map that is calibrated honestly to well control helps a field team avoid dry appraisal wells; one built on chance correlations sends capital to the wrong fault block.

Who Gains Most from 3D Seismic Attributes

- Geophysicists responsible for conditioning seismic volumes and extracting horizon and volume attributes
- Reservoir geoscientists who convert seismic evidence into porosity, facies and thickness estimates
- Petrophysicists who supply the well log targets used to calibrate attribute relationships
- Reservoir modellers who need seismic trends to guide property distribution between wells
- Development geologists who rank infill locations and appraisal targets

Subsurface asset teams gain most when a geophysicist, a petrophysicist and a modeller attend together, because attribute calibration sits exactly where their responsibilities meet.

3D Seismic Attributes Capabilities

Participants move from reflection amplitudes and waveform shape to calibrated rock property estimates with known error bars.

- Assess whether a seismic volume has the bandwidth, phase and noise level that attribute extraction requires — data conditioning decisions
- Apply amplitude, spectral and geometric attributes to isolate channels, fractures and tuning effects — prospect and infill targeting
- Calculate AVO intercept and gradient and test them against fluid substitution models — hydrocarbon indicator screening
- Test attribute-to-log correlations for statistical significance before using them — reservoir modellers and asset managers
- Build a calibrated porosity and net-to-gross estimate from multiple attributes — field development drilling choices
- Communicate prediction uncertainty with cross-validation results and probability maps — appraisal budget holders

Key 3D Seismic Attributes Terms

- Seismic attribute — any quantity measured or derived from seismic data, such as amplitude, frequency, phase or dip, used to infer rock properties.
- Spectral decomposition — transforming a seismic trace into frequency components to reveal thin beds and tuning not visible in full-band data.
- Curvature — a geometric attribute measuring how sharply a horizon or reflector bends, often used to highlight faults and fracture corridors.
- AVO — amplitude variation with offset, the change of reflection strength with source-receiver distance that responds to fluid and lithology.
- Tuning thickness — the bed thickness at which top and base reflections interfere most strongly, distorting amplitude-based thickness estimates.
- Cross-validation — withholding wells from a calibration and predicting them to measure how reliable an attribute relationship really is.

3D Seismic Attributes Day by Day

Day 1: Seismic Data Fitness and Attribute Families

- Bandwidth and Phase Assessment — Suitability of Volumes for Attribute Work
- Structure-Oriented Filtering — Noise Removal Without Smearing Fault Edges
- Attribute Classification Schemes — Choosing Physical Over Cosmetic Measures
- Synthetic Seismograms at Key Wells — Polarity and Wavelet Confirmation
- Horizon Versus Volume Extraction Windows — Bias in Mapped Values

Day 2: Amplitude and Frequency Attributes

- RMS and Envelope Amplitude Maps — Bright Spot and Sand Body Recognition
- Wedge Modelling of Tuning Effects — Correcting Thin-Bed Amplitude Bias
- Spectral Decomposition Volumes — Channel Edges and Bed Thickness Trends
- Instantaneous Frequency and Phase — Lateral Lithology Change Detection
- RGB Frequency Blending — Visual Ranking of Depositional Elements

Day 3: Geometric Attributes and Fracture Indicators

- Coherence and Variance Volumes — Fault Network and Channel Outline Mapping
- Most-Positive and Most-Negative Curvature — Fracture Corridor Prediction
- Dip and Azimuth Attributes — Structural Trend and Compartment Boundaries
- Fault Likelihood Enhancement — Sealing Versus Leaking Fault Screening
- Carbonate Karst and Reef Geometry — Examples From Two Producing Basins

Day 4: AVO and Calibration to Wells

- Gassmann Fluid Substitution — Expected Response of Brine, Oil and Gas
- AVO Intercept and Gradient Crossplots — Class Recognition and Fluid Screening
- Attribute-to-Log Crossplots — Correlation Strength and Physical Justification
- Multi-Attribute Regression and Neural Estimators — Porosity Prediction Choices
- Leave-One-Out Cross-Validation — Rejecting Spurious Attribute Relationships

Day 5: Practising the Attribute-Driven Reservoir Property Map

- Conditioning and Attribute Selection on a Field Dataset — Input Choices
- Tuning-Corrected Amplitude and Spectral Inputs — Thin Reservoir Handling
- Calibrated Multi-Attribute Porosity Estimate — Validation Against Blind Wells
- Probability Maps for Net-to-Gross Thresholds — Infill Location Ranking
- Attribute-Driven Porosity and Net-to-Gross Map — Peer Challenge and Sign-Off

Applying 3D Seismic Attributes After the Course

- Rerun the calibration of an existing attribute map with leave-one-out cross-validation and report which relationships survive.
- Apply wedge modelling to the thinnest producing interval and issue tuning-corrected thickness estimates to the reservoir modelling group.

3D Seismic Attributes Questions FAQ

What are 3D seismic attributes and why do they matter now?

3D seismic attributes are measurements derived from seismic volumes that indicate rock and fluid properties. They matter now because infill and appraisal wells target thinner, more variable reservoirs, and calibrated attributes reduce the chance of drilling poor rock between existing wells.

Which roles gain most from 3D seismic attributes training?

Geophysicists and reservoir geoscientists gain most, followed by petrophysicists and reservoir modellers who supply calibration targets or distribute porosity in models.

How does a 3D seismic attributes course differ from a general seismic interpretation course?

It focuses on quantitative rock property prediction rather than horizon picking and structural mapping. You spend the week on attribute physics, tuning, AVO, statistical calibration and validation, assuming you can already pick and map the main reflectors.

What do you bring back from 3D seismic attributes training?

You bring back a calibrated porosity and net-to-gross map with stated uncertainty, plus a repeatable workflow for selecting and validating attributes.

3D Seismic Attributes: The Way Forward

The attribute-driven porosity and net-to-gross map first informs where the next infill or appraisal well is placed. Modellers use it to steer property distribution and geologists to rank targets. After the first well is drilled against it, revisit the calibration with the new log data and check whether the selected attributes still predict what was found.