

COURSE OVERVIEW DE0893
**2D and 3D Seismic Pre and Post Stack Modeling and Synth-
 Methods and Tools**

Course Title

2D and 3D Seismic Pre and Post Stack Modeling and Synth-Methods and Tools

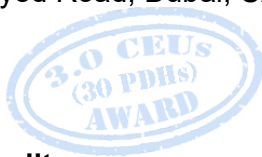
Course Date/Venue

Session 1: May 26-30, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
 Session 2: November 16-20, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE



Course Reference

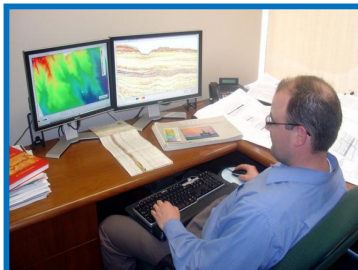
DE0893



Course Duration/Credits

Five days/3.0 CEUs/30 PDHs

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt will be applied using our state-of-the-art simulators.



The main objective of this course is to provide E&P professionals with the opportunity to develop hands-on experience of various seismic interpretation techniques using the Petrel software package. The course will cover the essential geological and geophysical information necessary to visualize and interpret seismic data. Participants of the course will gain a solid understanding of the applications and role of the seismic interpreter in studies that involve post-stack seismic attributes, AVO, seismic sequence stratigraphy, seismic geomorphology, 4D time-lapse seismic, and multidisciplinary integration.



A significant percentage of the course is dedicated to reinforcement and advancement of interpretation techniques using practical exercises – both on the Petrel software and by hand. This will guide the participants in the understanding that the integration of all available data into the seismic model will add value in the needed coherent and successful seismic predictions that result from an interpretation.

Further, this course will also discuss the seismic functionality in Petrel workflow tools; the random intersections, generating surface and variogram from attribute maps and importing check shots; the correct sonic log and establishing time – depth relation; generating wavelets and making synthetic seismogram; comparing seismogram with real well seismic; the seismic data interpretation using Petrel software; the applications, importing well seismic data, SEG-Y file parameters, well to seismic tie, seismic – data visualization and seismic data viewing; the advanced quantitative seismic interpretation and Petrel quantitative interpretation; and the synthetics generation, well to seismic matching and rock physics.

During this interactive course, participants will learn the Petrel advance geophysics, Petrel quantitative interpretation, accurate and comprehensive quantitative interpretation and direct hydrocarbon indicators (DHI) – fractured; the seismic attributes, spectral attributes, relative acoustic impedance supervised classification, spectral decomposition, reservoir thickness estimate and spectral attributes; the shear wave techniques, quantitative interpretation for inversion and simulation and contributions of seismic in Petrel reservoir modelling; the 3D structural modeling, 3D property modeling, facies modeling, and fracture modeling volume calculations; the data analysis and plotting; the Petrel user interface, visualization and statistics; importing well seismic data, data viewports, seismic data viewing and well correlation; the well templates well tops – flattening and interactive facies interpretation; and the seismic interpretation workflow, mapping, plotting and creating maps.

Course objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain an in-depth knowledge on 3D seismic horizon and fault interpretation
- Discuss seismic functionality in Petrel workflow tools and create random intersections
- Generate surface and variogram from attribute maps and import check shots
- Apply correct sonic log and establish time – depth relation
- Generate wavelets and make synthetic seismogram as well as compare seismogram with real well seismic
- Carryout seismic data interpretation using Petrel software
- Illustrate property applications, importing well seismic data, SEG-Y file parameters, well to seismic tie, seismic – data visualization and seismic data viewing
- Employ advanced quantitative seismic interpretation using Petrel quantitative interpretation
- Discuss synthetics generation, well to seismic matching and rock physics
- Determine Petrel advance geophysics, Petrel quantitative interpretation, accurate and comprehensive quantitative interpretation and direct hydrocarbon indicators (DHI)
- Explain seismic attributes, spectral attributes, relative acoustic impedance supervised classification, spectral decomposition, reservoir thickness estimate and spectral attributes
- Apply shear wave techniques, quantitative interpretation for inversion and simulation and contributions of seismic in Petrel reservoir modelling

- Illustrate 3D structural modeling, 3D property modeling, facies modeling, fracture modeling and volume calculations, data analysis and plotting
- Recognize Petrel user interface, visualization and statistics
- Import well seismic data and apply data viewports, seismic data viewing and well correlation
- Create and apply well templates covering well tops – flattening and interactive facies interpretation
- Illustrate the seismic interpretation workflow, mapping, plotting and creating maps

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**

Who Should Attend

This course provides an overview of all significant aspects and considerations of 3D seismic horizon and fault interpretation for geoscientists, organizations and individuals that are migrating to Petrel from Interpretation Window-focused software as well as staff that may be sheltering in a serial 2D approach to 3D interpretation. It can also be adapted to accommodate geoscientists without an interpretation background such graduates, geomodellers and processing geophysicists.

Course Fee

US\$ 8,000 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Accommodation

Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.


Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology’s courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units** (CEUs) in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant’s involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant’s CEU and PDH Transcript of Records upon request.

Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Ms. Diana Helmy, PgDip, MSc, BSc, is a **Senior Petroleum & Geologist** with extensive years of experience within the **Oil & Gas, Refinery and Petrochemical** industries. Her expertise widely covers in the areas of **Petroleum System Modeling, Tubular & Pipe Handling, Tubular Strength, Casing & Tubing Design, Production/Injection Loads** for Casing Strings & Tubing, **Drilling Loads, Drilling & Production Thermal Loads, Well Architecture, Wellhead Integrity, Well Integrity & Artificial Lift, Well Integrity**

Management, Well Completion & Workover, Applied Drilling Practices, Horizontal Drilling, Petroleum Production, Resource & Reserve Evaluation, Reserves Estimation & Uncertainty, Methods for Aggregation of Reserves & Resources, Horizontal & Multilateral Wells, Well Completion & Stimulation, Artificial Lift System Selection & Design, Well Testing & Oil Well Performance, Well Test Design Analysis, Well Test Operations, Well Testing & Perforation, Directional Drilling, Formation Damage Evaluation & Preventive, Formation Damage Remediation, Drilling & Formation Damage, Simulation Program for The International Petroleum Business, Well Testing & Analysis, Horizontal & Multilateral Wells & Reservoir Concerns, Oil & Gas Analytics, Petrophysics & Reservoir Engineering, Subsurface Geology & Logging Interpretation, Petroleum Geology, Geophysics, Seismic Processing & Exploration, Seismic Interpretation, Sedimentology, Stratigraphy & Biostratigraphy, Petroleum Economy, Core Analysis, Well Logging Interpretation, Core Lab Analysis & SCAL, Sedimentary Rocks, Rock Types, Core & Ditch Cuttings Analysis, Clastic, Carbonate & Basement Rocks, Stratigraphic Sequences, Petrographically Analysis, Thin Section Analysis, Scanning Electron Microscope (SEM), X-ray Diffraction (XRD), Cross-Section Tomography (CT), Conventional & Unconventional Analysis, Porosity & Permeability, Geological & Geophysical Model, Sedimentary Facies, Formation Damage Studies & Analysis, Rig Awareness, 2D&3D Seismic Data Processing, Static & Dynamic Correction, Noise Attenuation & Multiple Elimination Techniques, Velocity Analysis & Modeling and various software such as Petrel, OMEGA, LINUX, Monte Carlo, OLGA, OpenFoam, Kingdom and Vista. She is currently a **Senior Consultant wherein she is responsible in different facets of **Petroleum & Process Engineering** from managing **asset integrity, well integrity process, pre-commissioning/commissioning and start up** onshore & offshore process facilities.**

During her career life, Ms. Diana worked as a **Reservoir Geologist, Seismic Engineer, Geology Instructor, Geoscience Instructor & Consultant** and **Petroleum Geology Researcher** from various international companies like the **Schlumberger, Corex Services for Petroleum Services, Petrolia Energy Supplies** and **Alexandria University**.

Ms. Diana has a **Postgraduate Diploma in Geophysics, Master's degree in Petroleum Geology and Geophysics** and a **Bachelor's degree in Geology**. Further, she is a **Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management (ILM)** and has delivered numerous trainings, courses, workshops, seminars and conferences internationally.

Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 – 0745	Registration & Coffee
0745– 0800	Welcome & Introduction
0800 – 0815	PRE-TEST
0815– 0830	<i>Seismic Functionality in Petrel Workflow Tools</i>
0830 – 0845	<i>Seismic Functionality Updates</i>
0845 – 0900	<i>Introduction to Seismic Updates</i>
0900 – 0930	<i>New Seismic Functionalities</i>
0930 – 0945	<i>Seismic Data Visualization in Base Map Window</i>
0945– 1000	<i>Create Random Intersections</i>
1000 – 1015	Break
1015 – 1030	<i>Optional Survey Manager</i>
1030 – 1045	<i>Optional; Miss -Tie Analysis</i>
1045 – 1100	<i>Attribute Maps</i>
1100 – 1200	<i>Generate Surface & Variogram from Attribute Maps</i>
1200 – 1215	<i>Synthetic Seismogram - Slides</i>
1215 – 1230	<i>Make Well Section</i>
1230 - 1245	Break
1245 – 1300	<i>Import Check Shots</i>
1300 – 1315	<i>Correct Sonic Log & Establish Time – Depth Relation</i>
1315 – 1330	<i>Make Acoustic Impedance Log & Reflection Coefficient Series</i>
1330 – 1345	<i>Generate Wavelets & Make Synthetic Seismogram</i>
1345 – 1400	<i>Compare Seismogram with Real Well Seismic</i>
1400 - 1420	<i>Manual Adjustment & Event Picking</i>
1420 – 1430	Recap
1430	Lunch & End of Day One

Day 2

0730 – 0800	<i>Display the Synthetic Trace in a 3D & Interpretation Window</i>
0800- 0830	<i>Non-Global Deal Functionalities</i>
0830 – 0900	<i>Introduction to Ant-Tracking</i>
0900 – 0930	<i>Generate the Structural Smoothing Attribute Cube</i>
0930– 0945	<i>Seismic Data Interpretation Using Petrel Software: Workflow Introduction • Project Setup • Types of Data • Petrel User Interface • Data Import, Export, Viewing & Q.C • Well Correlation (Geology & Synthetic Seismogram) • Seismic Data Interpretation • Mapping</i>
0945 - 1000	Applications <i>Seismic Data Loading • Well Data Loading (Well Head, Well Trajectory, Well Logs, Check – Shot & Well Tops) •Assigning Check – Shots to Well Data • Creating Synthetic Seismogram • Seismic Attributes • Depth Conversion of Horizon C & Applying Well Adjustment • Maps of Depth Surface</i>
1000 – 1015	Break

1015 - 1030	Import Well Seismic Data Well Velocity Survey • Check Shots & VSP (Using Petrel Software)
1030 - 1045	Seismic Data Import
1045 - 1100	SEG-Y File Parameters X & Y Coordinates of the Survey • Inline & Xline Position in the Header • CDP & SP Positions
1100 - 1200	Well to Seismic Tie Synthetic to Seismic Matching - Well Ties Using Petrel Software • Time Depth Table • Well Synthetic Seismograms • VSP & Well Seismic
1200 - 1215	Seismic - Data Visualization Random / Arbitrary Seismic Lines
1215 - 1230	Seismic Data Viewing
1230 - 1245	Break
1245 - 1300	Introduction to Seismic Interpretation
1300 - 1315	Seismic Interpretation Workflow Seismic Data Displaying • Generate Attribute Cubes • Automatic Fault Extraction Workflow • Manual Fault Interpretation • Horizon Interpretation • Time to Depth Conversion (Video) • Mapping & Plotting • Time to Depth Maps • Seismic Attributes (Coherence, Spectral Decomposition, Sweetness & DHI)
1315 - 1330	Import Data Well Survey • Formation Top • Check Shots & Seismic Survey (2D & 3D)
1330 - 1345	Display Data (2D & 3D) & QC
1345 - 1400	Reference Datum
1400 - 1420	Create Well Correlation (Data Conditioning)
1420 - 1430	Recap
1430	Lunch & End of Day Two

Day 3

0730 - 0800	Stratigraphy
0800- 0830	Create Synthetic Seismograms
0830 - 0900	Seismic Well Tie (Comparison Between Seismic & Well Data)
0900 - 0930	Attributes Attribute Generation Chaos • Structural Smoothing • Dip • Variance • Ant Tracking
0930- 0945	Seismic Data Interpretation (Horizons & Faults)
0945 - 1000	Automatic Fault Extraction
1000 - 1015	Break
1015 - 1030	Surface Attributes (Seismic Attribute Map)
1030 - 1045	Multi-Z Interpretation
1045 - 1100	Mapping (Surfaces)
1100 - 1200	Editing Surface & Contour
1200 - 1215	Domain Conversion (Depth Modeling)
1215 - 1230	Cross Section
1230 - 1245	Break

1245 – 1300	Quantitative Interpretation
1300 – 1315	Create a Seismic Property
1315 – 1330	Advanced Quantitative Seismic Interpretation: Petrel Quantitative Interpretation Quantitative Seismic Interpretation Fundamentals • Recapitulation of Seismic Fundamentals • Statistics for Quantitative Interpretation • Log Data Preparation
1330 – 1345	Generation of Synthetics Log Editing • Treatment of Different Wavelets/Band Pass Filtering
1345 – 1400	Well to Seismic Matching Derivation of Seismic Wavelet • The White Approach to Matching • The Deconvolution Model
1400 - 1420	Rock Physics Elastic Moduli & Their Inter-Relations • Hashin-Shtrickman-Berryman Model • Eberhart-Phillips for Shaley Sandstones • The Xu-White Method for Estimation of Vs • The Gassmann Fluid Replacement Algorithm
1420 – 1430	Recap
1430	Lunch & End of Day Three

Day 4

0730 – 0800	Petrel Advance Geophysics
0800- 0830	Petrel Quantitative Interpretation
0830 – 0900	Accurate & Comprehensive Quantitative Interpretation Rock Physics • AVO / AVA • Post Stack Deterministic & Stochastic Inversion • Seismic Pore Pressure Prediction • DHI • 4-D Seismic (Time Lapse Analysis)
0900 – 0930	Direct Hydrocarbon Indications Direct Hydrocarbon Indicators (DHI) – Fractured Reservoirs & Fault Analysis • Automated Fault Mapping & Fault Attributes • Amplitude Versus Offset (AVO) – Avo Slope & Intercept
0930- 0945	Seismic Inversion Pre-Stack Versus Post-Stack • Sparse Spike Method • Model Based Inversion • Stochastic Inversion
0945 - 1000	Attributes Seismic Attributes
1000 – 1015	Break
1015 – 1030	Spectral Attributes
1030 – 1045	Relative Acoustic Impedance Supervised Classification
1045 – 1100	Spectral Decomposition
1100 – 1200	Reservoir Thickness Estimate & Spectral Attributes
1200 – 1215	Carbonate Case Study
1215 – 1230	Seismic Attributes The Barnes Classification • Coherency & Related Attributes • Geometrical Attributes • Pitfalls
1230 - 1245	Break

1245 – 1300	Uncertainties <i>Mathematical Derivation • Dependencies • Reserve Calculations</i>
1300 – 1315	Shear Wave Techniques <i>The Natih Multicomponent Survey • AVO Application • AVO In Practice • AVO Concept & Related Factors • AVO Pitfalls & Assumptions • Hydrocarbon Detection Using AVO • Processing for AVO Analysis • AVO Modelling & Inversion • Time Lapse (4D) Seismic</i>
1315 – 1330	Quantitative Interpretation for Inversion & Simulation <i>Fluid Substitution Pitfall • Fluid Substitution</i>
1330 – 1345	Contributions of Seismic in Petrel Reservoir Modelling <i>Introduction • Project Setup • Types of Data • Petrel User Interface • Data Import, Export, Viewing & Q.C • Well Correlation (Geology & Synthetic Seismogram) • Seismic Data Interpretation • Mapping • Application (Data)</i>
1345 – 1400	3D Structural Modeling (Horizons & Fault Model).
1400 - 1420	3D Property Modeling Based on Well Logs & Trend Data (Stochastic, Deterministic)
1420 – 1430	Recap
1430	<i>Lunch & End of Day Four</i>

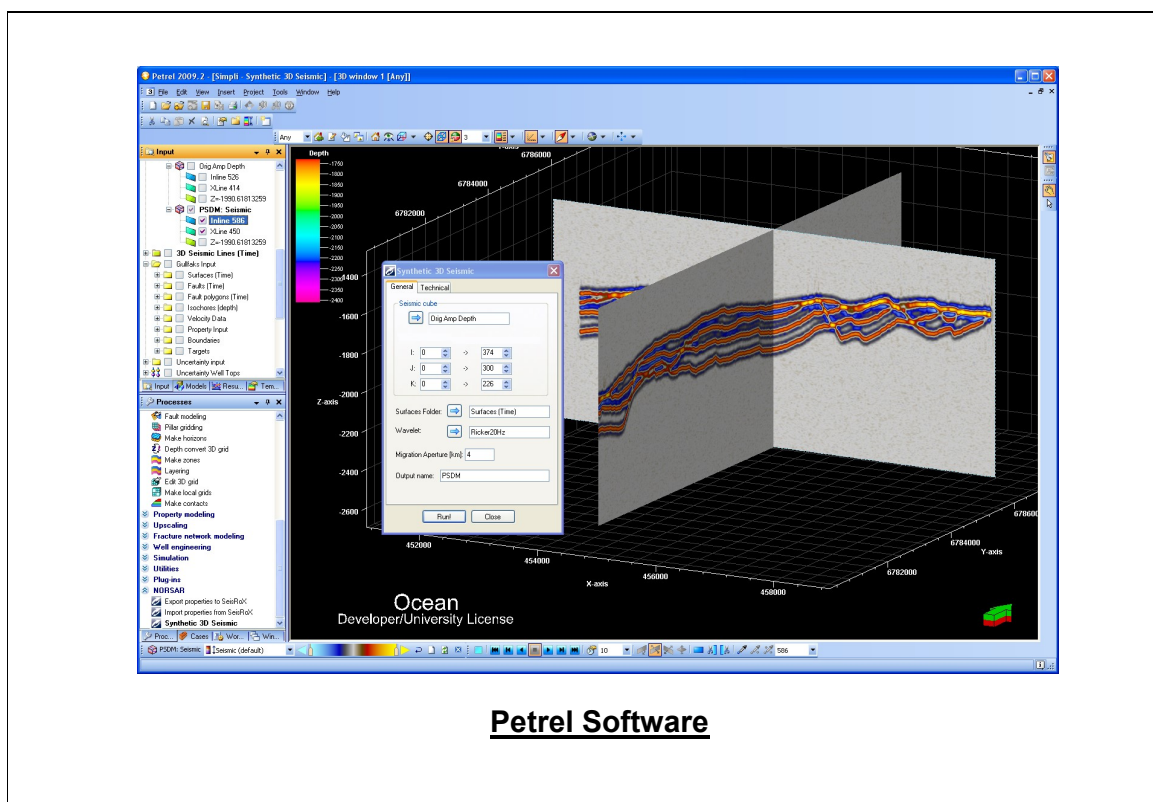
Day 5

0730 – 0800	Facies Modeling Using Stochastic & Deterministic Methods
0800- 0830	Fracture Modeling Using a Discrete Fracture Network Approach to Create Fracture Properties
0830 – 0900	Volume Calculations, Data Analysis & Plotting
0900 – 0930	Petrel User Interface <i>User Interface • Petrel Explorer Panes • Process Diagram & Function Bar • 3D Buttons • Petrel Menus</i>
0930– 0945	Visualization <i>3D Display Window • Create General Intersection</i>
0945 - 1000	Importing Data <i>Import Overview • File Types • Organization</i>
1000 – 1015	<i>Break</i>
1015 – 1030	Well Data Import <i>Process Overview • Well Heads Import • Importing Well Path / Deviation: • Well Logs Importing • Importing Well Tops (Formation Top) • Import Well Tops Overview</i>
1030 – 1045	Import Well Seismic Data <i>Well Velocity Survey – Check Shots & VSP • Seismogram Ell to Seismic Tie • Seismic – Synthetic Seismogram</i>
1045 – 1100	Well Correlation <i>Data Viewports • Seismic Data Viewing • Well Correlation</i>
1100 – 1200	Creating & Applying Well Templates <i>Well Tops – Flattening • Interactive Facies Interpretation</i>
1200 – 1215	Introduction to Seismic Interpretation
1215 – 1230	Seismic Interpretation Workflow <i>Input Seismic Data • Generate Volume Attributes • Pick the Faults “Using Automatic Extraction or by Manual Interpretation” • Tie the Well to Seismic • Map Your Horizons • Depth Convert for Horizons & All Seismic Volume</i>
1230 - 1245	<i>Break</i>

1245 - 1300	Mapping & Plotting Gridding • Creating Maps
1300 - 1315	Surface Polygons & Fault Polygons Fault Polygons
1315 - 1330	Creating Maps Two Way Time (TWT) Surface Map
1330 - 1345	Plotting Depth Map • Isochrone Map
1345 - 1400	Course Conclusion
1400 - 1415	POST-TEST
1415 - 1430	Presentation of Course Certificates
1430	Lunch & End of Course

Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the “Petrel” software.



Course Coordinator

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