COURSE OVERVIEW DE0403-3D
Petroleum Geostatistics - Integrating Data for Reservoir Modeling and Simulation

Course Title
Petroleum Geostatistics - Integrating Data for Reservoir Modeling and Simulation

Course Date/Venue
August 03-05, 2026/Al Reem 1 Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE

Course Reference
DE0403-3D

Course Duration/Credits
Three days/1.65 CEUs/16.5 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.

This course is designed to provide participants with a detailed and up-to-date overview of Petroleum Geostatistics - Integrating Data for Reservoir Modeling and Simulation. It covers the scope of geostatistics in petroleum engineering; the importance of geostatistics for reservoir modeling, applications in oil and gas exploration and development and integration with other disciplines; the fundamentals of reservoir data types covering geological data, geophysical data, reservoir production data and uncertainty and quality of data; and the concepts of heterogeneity and anisotropy, variogram theory, types of variograms and applications of variograms in reservoir modeling.

Further, the course will also discuss the data analysis techniques, histograms, cumulative distributions and cross-plots, normalization; the transformation of reservoir data and detecting outliers ad data inconsistencies; the geostatistical modeling tools and variogram analysis and modeling; the geostatistical data integration and kriging techniques for reservoir estimation; the methods of spatial interpolation in reservoirs; and the advantages and disadvantages of each method.

During this interactive course, participants will learn the sequential gaussian simulation (SGS) and its role in uncertainty quantification; the facies modeling, sequential indicator simulation (SIS) and lithology prediction from well logs; the seismic-to-facies transformations, stochastic and deterministic methods and incorporating seismic attributes into facies models; the fundamentals of multi-point geostatistics (MPS) for complex geological patterns; the petrophysical property modeling, conditional simulations and data conditioning techniques; quantifying and visualizing uncertainty in reservoir modes and probabilistic modeling approaches; the advanced geostatistical techniques, full-field reservoir modeling workflow, history matching and production data integration; validating reservoir models, the sensitivity analysis for model parameters and calibration using production and pressure data; the reservoir simulation workflows, linking static models to dynamic simulators and simulation outputs and interpretation; using geostatistical models for field development planning; the high-uncertainty zones for further exploration; and the risk assessment and mitigation strategies.

Course Objectives/Outcomes & Benefits for the Participants

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

- Apply and gain an in-depth knowledge on petroleum geostatistics and integrating data for reservoir modeling and simulation
- Define the scope of geostatistics in petroleum engineering and discuss the importance of geostatistics for reservoir modeling, applications in oil and gas exploration and development and integration with other disciplines
- Identify the fundamentals of reservoir data types covering geological data, geophysical data, reservoir production data and uncertainty and quality of data
- Discuss the concepts of heterogeneity and anisotropy, variogram theory, types of variograms and applications of variograms in reservoir modeling
- Explore data analysis techniques, apply histograms, cumulative distributions and cross-plots, normalize and transform reservoir data and detect outliers and data inconsistencies
- Identify geostatistical modeling tools and illustrate variogram analysis and modeling, geostatistical data integration and kriging techniques for reservoir estimation
- Apply methods of spatial interpolation in reservoirs and discuss the advantages and disadvantages of each method
- Explain sequential gaussian simulation (SGS) and its role in uncertainty quantification
- Illustrate facies modeling, sequential indicator simulation (SIS) and lithology prediction from well logs
- Explain seismic-to-facies transformations, differentiate stochastic versus deterministic methods and incorporate seismic attributes into facies models
- Discuss the fundamentals of multi-point geostatistics (MPS) for complex geological patterns and apply MPS in reservoir modeling
- Illustrate petrophysical property modeling, conditional simulations and data conditioning techniques

- Quantify and visualize uncertainty in reservoir modes and describe probabilistic modeling approaches
- Carryout advanced geostatistical techniques, full-field reservoir modeling workflow, history matching and production data integration
- Validate reservoir models, apply sensitivity analysis for model parameters and calibrate using production and pressure data
- Discuss reservoir simulation workflows, linking static models to dynamic simulators and simulation outputs and interpretation
- Use geostatistical models for field development planning, identify high-uncertainty zones for further exploration and carryout risk assessment and mitigation strategies

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 petroleum geostatistics - integrating data for reservoir modeling and simulation for reservoir engineers, geologists, geophysicists, petrophysicists, data scientists and analysts, production engineers, exploration and development teams and other technical staff.

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.

Learning Design & Customization

This course can be customized to the exact requirements of clients. Haward Technology is so proud of our huge capabilities in tailoring our courses to the training needs of our valued clients.

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

Haward's certificates are accredited by the following international accreditation organizations: -

- British Accreditation Council (BAC)

  Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. Haward's certificates are internationally recognized and accredited by the British Accreditation Council (BAC). 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.

- 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 **1.65 CEUs** (Continuing Education Units) or **16.5 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 Geostatistics & Reservoir Characterization,** Static Reservoir Modeling & **Geostatistical** Modeling, Integrated Subsurface Data Analysis, **Reservoir** Modeling & Simulation, Petrel-Based **Reservoir** Modeling, Geoscience & **Reservoir** Data Integration, **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, 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 Fee

US$ 5,250 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation

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

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: ***Monday, 03rd of August 2026***

0800 – 0830	*Registration & Coffee*
0830 – 0845	*Welcome & Introduction*
0845 – 0900	***PRE-TEST***
0900 – 0915	***Overview of Petroleum Geostatistics*** *Definition & Scope of Geostatistics in Petroleum Engineering • Importance of Geostatistics for Reservoir Modeling • Applications in Oil & Gas Exploration & Development • Integration with Other Disciplines (Geology, Geophysics, Reservoir Engineering)*
0915 - 0930	***Fundamentals of Reservoir Data Types*** *Geological Data: Core Samples, Lithology & Facies Distribution • Geophysical Data: Seismic Attributes & Well Logs • Reservoir Production Data: Flow Rates & Pressures • Uncertainty & Quality of Data*
0930 – 0945	*Break*
0945 – 1000	***Spatial Variability & Continuity*** *Concepts of Heterogeneity & Anisotropy • Variogram Theory: Principles & Interpretation • Types of Variograms (Experimental, Directional, & Variogram Maps) • Applications of Variograms in Reservoir Modeling*
1000 – 1030	***Statistical Data Analysis for Reservoirs*** *Exploratory Data Analysis Techniques • Histograms, Cumulative Distributions & Cross-Plots • Normalization & Transformation of Reservoir Data • Detection of Outliers & Data Inconsistencies*
1030 - 1100	***Basics of Geostatistical Modeling Tools*** *Overview of Software Tools for Geostatistics (Petrel, GSLIB etc.) • Key Functionalities Relevant to Reservoir Modeling • Input Data Requirements for Modeling • Workflow Setup for Geostatistical Studies*
1100 - 1200	***Case Studies & Practical Exercises*** *Reviewing a Geostatistical Workflow in Petroleum Reservoirs • Hands-on Exercise: Exploratory Data Analysis Using Software • Discussion of Real-World Examples • Q&A & Wrap Up*
1200 – 1215	*Break*
1215 – 1300	***Variogram Analysis & Modeling*** *Importance of Variograms in Geostatistics • Techniques for Calculating & Modeling Variograms • Practical Challenges in Variogram Modeling • Exercises: Constructing Variograms from Sample Data*

1300 – 1330	***Geostatistical Data Integration*** *Role of Multi-Disciplinary Data Integration • Incorporating Geological, Geophysical & Engineering Data • Methods for Integrating Seismic & Well Log Data • Challenges in Combining Heterogeneous Datasets*
1330 – 1350	***Kriging Techniques for Reservoir Estimation*** *Introduction to Kriging & Its Types (Simple, Ordinary & Universal) • Kriging Assumptions & Limitations • Hands-On Exercise: Implementing Kriging for Porosity Estimation • Comparison of Kriging with Other Interpolation Methods*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*Lunch & End of Day One*

Day 2: ***Tuesday, 04th of August 2026***

0800 – 0830	***Spatial Data Interpolation*** *Methods of Spatial Interpolation in Reservoirs • Weighted Average, Nearest Neighbor & Splines • Advantages & Disadvantages of Each Method • Practical Session on Choosing the Right Method for Specific Data*
0830 – 0900	***Sequential Gaussian Simulation (SGS)*** *Basics of SGS & its Role in Uncertainty Quantification • Workflow for Implementing SGS • Case Study: Generating Multiple Realizations of Reservoir Properties • Practical Demonstration of SGS Using Software Tools*
0900 – 0930	***Practical Exercises & Real-World Applications*** *Building a Variogram Model from Field Data • Hands-on Kriging & SGS Exercises • Review of Results & Group Discussions • Feedback Session on Learning Progress*
0930 – 0945	*Break*
0945 – 1030	***Overview of Facies Modeling*** *Importance of Facies Modeling in Reservoir Characterization • Classification of Facies Types • Linking Facies to Petrophysical Properties • Data Requirements for Facies Modeling*
1030 – 1100	***Sequential Indicator Simulation (SIS)*** *Basics of SIS for Facies Modeling • Workflow & Practical Considerations • Advantages & Challenges of SIS • Exercise: Implementing SIS for a Synthetic Dataset*
1100 - 1130	***Lithology Prediction from Well Logs*** *Interpretation of Well Logs for Lithology Classification •Cross-Plotting Techniques (Density versus Neutron Porosity) • Application of Machine Learning for Lithology Prediction • Hands-on Exercise: Lithology Prediction Using Real Data*
1130 - 1200	***Conditioning Facies Models to Seismic Data*** *Seismic-to-Facies Transformations • Stochastic versus Deterministic Methods • Incorporating Seismic Attributes into Facies Models • Practical Example Using Software Tools*
1200 – 1215	*Break*
1215 – 1230	***Multi-Point Geostatistics (MPS)*** *Fundamentals of MPS for Complex Geological Patterns • Training Image Generation & Selection • Applications of MPS in Reservoir Modeling • Case Study: Using MPS for Realistic Facies Representation*

1230 – 1300	***Practical Session*** *Building a Facies Model Using SIS • Integrating Facies & Lithology into a 3D Geological Model • Discussion of Outcomes & Lessons Learned • Q&A & Daily Wrap Up*
1300 - 1350	***Petrophysical Property Modeling*** *Importance of Petrophysical Models in Reservoir Simulation • Common Properties: Porosity, Permeability & Saturation • Approaches for Property Modeling (Deterministic versus Stochastic) • Exercise: Porosity Modeling Using Kriging & SGS*
1350 – 1400	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1400	*Lunch & End of Day Two*

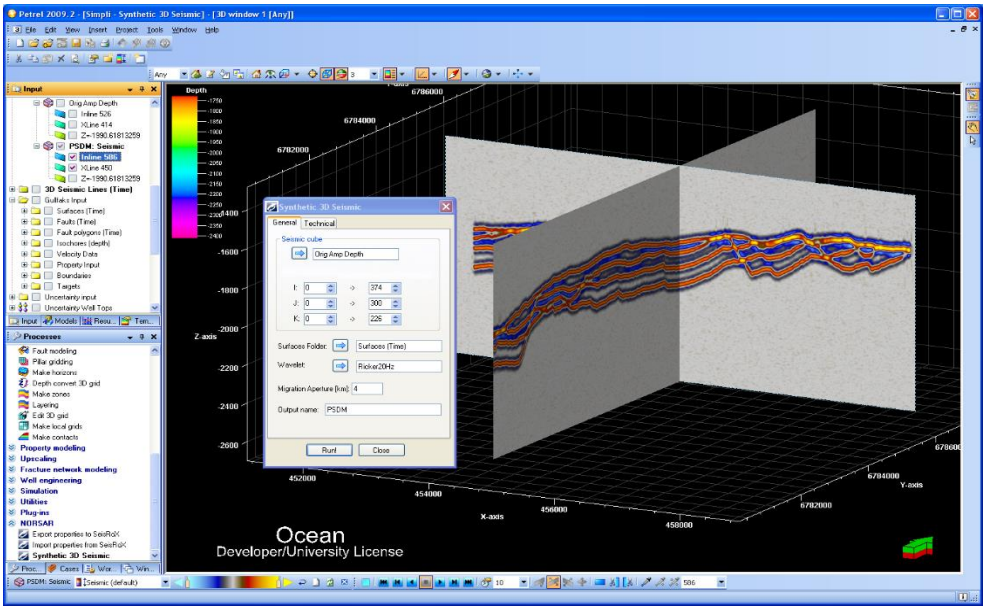
Day 3: Wednesday, 05th of August 2026

0800 – 0830	***Conditional Simulations*** *Definition & Types of Conditional Simulations • Workflow for Implementing Conditional Simulation • Case Study: Conditional Simulation for Porosity & Permeability • Benefits & Limitations of Conditional Approaches*
0830 – 0900	***Data Conditioning Techniques*** *Handling Sparse & Irregular Data • Conditioning to Hard & Soft Data • Incorporating Dynamic Data (Production History, Pressures) • Practical Example Using Industry Software*
0900 – 0930	***Uncertainty Quantification*** *Sources of Uncertainty in Reservoir Models • Methods for Quantifying & Visualizing Uncertainty • Probabilistic Modeling Approaches • Practical Session: Creating Uncertainty Maps*
0930 – 0945	*Break*
0945 – 1030	***Advanced Geostatistical Techniques*** *Co-Kriging & Co-Simulation • Bayesian Approaches for Reservoir Modeling • Data Assimilation Techniques • Comparison of Advanced Techniques with Conventional Methods*
1030 – 1100	***Hands-on Workshop*** *Building a Petrophysical Model from Start to Finish • Uncertainty Quantification on a Synthetic Dataset • Group Presentations & Feedback on Modeling Workflows • Open Q&A & Problem-Solving Session*
1100 - 1130	***Full-Field Reservoir Modeling Workflow*** *Overview of Integrated Reservoir Modeling • Combining Geological, Petrophysical & Dynamic Data • Steps for Building a Comprehensive Reservoir Model • Exercise: Review of a Full-Field Modeling Example*
1130 - 1200	***History Matching & Production Data Integration*** *Definition & Importance of History Matching • Techniques for Integrating Production Data into Models • Challenges in Dynamic Data Conditioning • Practical Session: History Matching with Software Tools*
1200 – 1215	*Break*

1215 – 1230	***Model Validation & Calibration*** *Techniques for Validating Reservoir Models • Sensitivity Analysis for Model Parameters • Calibration Using Production & Pressure Data • Case Study: Validating a Real Reservoir Model*
1230 – 1300	***Reservoir Simulation Basics*** *Introduction to Reservoir Simulation Workflows • Linking Static Models to Dynamic Simulators • Overview of Simulation Outputs & Interpretation • Exercise: Running a Basic Simulation from a Static Model*
1300 - 1315	***Decision-Making with Geostatistical Models*** *Using Geostatistical Models for Field Development Planning • Identifying High-Uncertainty Zones for Further Exploration • Risk Assessment & Mitigation Strategies • Case Study: Decision-Making Based on a Geostatistical Model*
1315 – 1330	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1330 – 1345	***POST-TEST***
1345 – 1400	*Presentation of Course Certificates*
1400	*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".



Petrel Software

Course Coordinator

Mari Nakintu, Tel: +971 2 30 91 714, Email: mari1@haward.org