COURSE OVERVIEW DE1072
Applied Structural Geology: Magnetic and Gravity Methods

Course Title
Applied Structural Geology: Magnetic and Gravity Methods

Course Reference
DE1072

Course Duration/Credits
Five days/3.0 CEUs/30 PDHs

Course Date/Venue

Session(s)	Date	Venue
1	June 16-20, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	August 10-14, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	October 06-10, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	December 14-18, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

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 on Applied Structural Geology: Magnetic and Gravity Methods. It covers the structural geology, basics of rock magnetism and density and gravity and magnetic methods; the structural controls detectable by potential fields; the survey design and acquisition principles; the gravity anomaly types and corrections, data processing and gridding techniques; the forward modeling in gravity interpretation, inversion techniques for gravity data and structural mapping with gravity data; the magnetic anomalies and reduction techniques; and the filtering and enhancement techniques and magnetic forward modelling.

During this interactive course, participants will learn the magnetic inversion and depth estimation, structural mapping using magnetics and integration of gravity and magnetic data; the structural lineament mapping and structural geology workflows with potential field data; the correlation with seismic and well data, tectonic setting reconstruction and advanced software tools and platforms; the hydrocarbon exploration, mineral exploration, geothermal and groundwater applications and carbon capture & storage structure suitability; the 3D structural modeling from geophysical data, uncertainty and risk in structural interpretation and project-based geophysical interpretation; linking structure to stratigraphy; and the basin fill and deformation timing, control on migration and trap formation and inputs to petroleum systems modelling.

Course Objectives

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

- Apply and gain an in-depth knowledge on applied structural geology using magnetic and gravity methods
- Discuss structural geology, basics of rock magnetism and density and gravity and magnetic methods
- Identify structural controls detectable by potential fields and explain survey design and acquisition principles
- Recognize gravity anomaly types and corrections and apply data processing and gridding techniques
- Illustrate forward modeling in gravity interpretation, inversion techniques for gravity data and structural mapping with gravity data
- Carryout magnetic anomalies and reduction techniques, filtering and enhancement techniques and magnetic forward modeling
- Apply magnetic inversion and depth estimation, structural mapping using magnetics and integration of gravity and magnetic data
- Describe structural lineament mapping and structural geology workflows with potential field data
- Explain correlation with seismic and well data, tectonic setting reconstruction and advanced software tools and platforms
- Discuss hydrocarbon exploration, mineral exploration, geothermal and groundwater applications and carbon capture & storage structure suitability
- Illustrate 3D structural modeling from geophysical data, uncertainty and risk in structural interpretation and project-based geophysical interpretation
- Link structure to stratigraphy and apply basin fill and deformation timing, control on migration and trap formation and inputs to petroleum systems modelling

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 applied structural geology: magnetic and gravity methods for geologists and structural geologists, geophysicists, exploration geoscientists, graduate students and early career researchers, geotechnical and engineering geologists.

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: -

- 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.

- 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:

Mr. Stan Constantino, MSc, BSc, is a **Senior Petroleum & Reservoir Engineer** with over **30 years** of **Offshore & Onshore** extensive experience within the **Oil, Gas & Petroleum** industries**.** His area of expertise include **Reserves & Resources**, **Reserves Estimation & Uncertainty**, **Reservoir** Characterization, **Unconventiona**l **Resource & Reserves** Evaluation, **Oil & Gas Reserves** Estimation, Methods for **Aggregation of Reserves & Resources**, **Fractured Reservoir** Classification & Evaluation, **Sequence Stratigraphy**, **Petrophysics & Rock** Properties, **Seismic** Technology, **Geological** Modelling, **Water Saturation**, **Crude Oil & Natural Gas** Demand, **Exploration Agreements & Financial** Modelling, **Seismic Survey** Evaluation, **Exploration Well** Identification, **Field Production** Operation, **Field Development** Evaluation, Crude Oil Marketing, **Core & Log Data** Integration, **Core Logging**, Advanced **Core & Log Integration**, **Well Logs & Core Analysis**, Advanced Petrophysics/Interpretation of **Cased Hole Logs**, **Cased Hole Formation Evaluation**, **Cased Hole Formation** Evaluation, **Cased Hole Evaluation**, **Cased-Hole Logging**, Applied **Production Logging & Cased Hole & Production Log** Evaluation, **Cased Hole Logging & Formation** Evaluation, Open & Cased Hole Logging, Screening of Oil Reservoirs for **Enhanced Oil Recovery**, **Enhanced Oil Recovery**, **Enhanced Oil Recovery** Techniques, **Petroleum Economic** Analysis, **Oil Industry** Orientation, **Oil Production & Refining**, **Crude Oil Market**, **Global Oil Supply & Demand**, **Global Oil Reserves**, **Crude Oil** Types & Specifications, **Oil Processing**, **Oil Transportation-Methods**, **Oil & Gas** Exploration and Methods, **Oil & Gas** Extraction, Technology Usage in Industrial Security; **Upstream**, **Midstream** & **Downstream Operations**; **Oil Reservoir** Evaluation & Estimation, **Oil Supply & Demand**, **Oil Contracts**, **Government Legislation & Oil Contractual Agreements**, **Oil Projects** & Their Feasibility (revenue and profitability), **Water Flooding**, **Reservoir** Souring & Water Breakthrough, **Reservoir Performance** Using Classical Methods, **Fractured Reservoir** Evaluation & Management, **Reservoir Surveillance** & Management, **Reservoir Engineering** & Simulation, **Reservoir Monitoring**, **Pressure Transient** Testing & **Reservoir** Performance Evaluation, **Reservoir** Characterization, **Reservoir** Engineering Applications with ESP and Heavy Oil, **Reservoir** Volumetrics, Water Drive Reservoir, **Reserve** Evaluation, Rock & Fluid Properties, Fluid Flow Mechanics, PVT Analysis, Material Balance, Darcy's Law & Applications, Radial Flow, **Gas Well** Testing, Natural Water Influx, EOR Methods, Directional Drilling, **Drilling** Production & Operations, Field Development & Production of Oil & Gas, **Wireline Logging**, **Mud Logging**, **Cased Hole Logging**, **Production Logging**, **Slick Line**, **Coil Tubing**, Exploration Wells Evaluation, **Horizontal Wells**, **Well Surveillance**, **Well Testing**, **Design & Analysis**, **Well Testing & Oil Well Performance**, **Well Log Interpretation** (**WLI**), **Formation Evaluation**, **Well Workover Supervision**, **Pressure Transient Analysis** and **Petrophysical Log Analysis**. Currently, he is the **CEO** & **Managing Director** of **Geo Resources Technology** wherein he is responsible in managing the services and providing technical supports to underground energy related projects concerning **field development**, **production**, **drilling**, **reservoir engineering** and **simulation**.

Throughout his long career life, Mr. Stan has worked for many international companies such as the **Kavala Oil**, **North Aegean Petroleum Company** and **Texaco Inc.**, as the **Managing Director**, **Operations Manager**, **Technical Trainer**, **Training Consultant**, **Petroleum Engineering & Exploration Department Head**, **Assistant Chief Petroleum Engineer**, **Reservoir Engineer, Resident Petroleum Engineer**, **Senior Petroleum Engineer** and **Petroleum Engineer** wherein he has been managing the evaluation of exploration wells, reservoir simulation, development training, production monitoring, wireline logging and well testing including selection and field application of well completion methods.

Mr. Stan has a **Master**'**s** degree in **Petroleum Engineering** and a **Bachelor**'**s** degree in **Geology** from the **New Mexico Institute of Mining & Technology** (**USA**) and from the **Aristotelian University** (**Greece**) respectively. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership of Management (ILM**) and a member of the Society of Petroleum Engineers, USA (**SPE**), Society of Well Log Professional Analysts, USA (**SPWLA**) and European Association of Petroleum Geoscientists & Engineers (**EAGE**). Moreover, Mr. Stan published numerous scientific and technical papers and delivered various trainings, courses and workshops worldwide.

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 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.

Course Program

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

Day 1

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Structural Geology*** *Role in Resource Exploration and Development • Tectonic Settings and Structural Provinces • Common Structural Features (Faults, Folds, Joints) • Structural Geology's Integration with Geophysics*
0930 – 0945	*Break*
0945 – 1030	***Basics of Rock Magnetism & Density*** *Magnetic Susceptibility vs Remanent Magnetization • Density Contrasts in Subsurface Geology • Magnetic Minerals and Their Formation • Factors Affecting Magnetic and Gravity Signatures*
1030 – 1130	***Basics of Gravity Methods*** *Principles of Gravity Surveying • Gravity Anomalies and Bouguer Correction • Types of Gravity Surveys (Airborne, Land, Marine) • Resolution and Limitations*
1130 – 1215	***Magnetic Methods*** *Principles of Magnetic Surveying • Magnetic Anomalies: Total Field, Residual, Reduction to Pole • Diurnal Correction and IGRF • Survey Configurations (Airborne, Ground, Satellite)*
1215 – 1230	*Break*

1230 – 1330	***Structural Controls Detectable by Potential Fields*** *Identifying Faults and Fold Systems • Mapping Intrusive and Basement Structures • Role in Sedimentary Basin Analysis • Applications in Crustal-Scale Tectonics*
1330 – 1420	***Survey Design & Acquisition Principles*** *Survey Objectives and Planning • Line Spacing, Altitude, and Orientation • Data Acquisition Parameters • Environmental and Logistical Considerations*
1420 – 1430	***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*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Gravity Anomaly Types & Corrections*** *Free-Air, Bouguer, and Terrain Corrections • Regional vs Residual Anomalies • Tidal and Drift Corrections • Correction Workflows*
0830 – 0930	***Data Processing & Gridding Techniques*** *Data Leveling and Tie Line Adjustments • Interpolation and Filtering • Upward and Downward Continuation • Gridding Best Practices (Kriging, Minimum Curvature)*
0930 – 0945	*Break*
0945 – 1100	***Forward Modeling in Gravity Interpretation*** *Constructing Simple Subsurface Models • Estimating Depth and Density Contrast • Modeling Faulted and Folded Layers • Software Tools for Forward Modeling*
1100 – 1215	***Inversion Techniques for Gravity Data*** *Concepts of Model Inversion • Constraints and Regularization • 2D and 3D Inversion Outputs • Interpreting Inversion Results Geologically*
1215 – 1230	*Break*
1230 – 1330	***Structural Mapping with Gravity Data*** *Basin Edge and Fault Zone Detection • Mapping Salt Domes and Basement Structures • High vs Low-Density Zones • Integrating with Seismic and Wells*
1330 – 1420	***Case Studies in Gravity Interpretation*** *Rift Basin Architecture • Basement Topography Mapping • Volcanic Terrain Investigations • Gravity Data in Tectonic Reconstructions*
1420 – 1430	***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*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Magnetic Anomalies & Reduction Techniques*** *Total Field and Residual Anomalies • Reduction to the Pole (RTP) and Equator (RTE) • Analytic Signal and Tilt Derivatives • Depth Estimation Techniques*
0830 – 0930	***Filtering & Enhancement Techniques*** *First and Second Vertical Derivatives • Horizontal Gradient and Tilt Angle Filters • Matched Filters and Wavelet Analysis • Highlighting Structural Trends*

0930 – 0945	*Break*
0945 – 1100	***Magnetic Forward Modeling*** *Building Layered and Block Models • Modeling Remanent vs Induced Magnetization • Synthetic Anomaly Generation • Validation Against Observed Data*
1100 – 1215	***Magnetic Inversion & Depth Estimation*** *Euler Deconvolution • Source Parameter Imaging (SPI) • Depth-to-Basement Methods • Model Constraints and Geology*
1215 – 1230	*Break*
1230 – 1330	***Structural Mapping Using Magnetics*** *Fault Delineation from Magnetic Trends • Intrusion Mapping (Dykes, Sills, Plutons) • Basement Depth and Tectonic Boundaries • Lineament Interpretation*
1330 – 1420	***Case Studies in Magnetic Applications*** *Craton Margin Mapping • Fault System Characterization in Sedimentary Basins • Archean Greenstone Belts • Magnetic Data in Petroleum System Evaluation*
1420 – 1430	***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*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0830	***Integration of Gravity & Magnetic Data*** *Benefits of Combined Interpretation • Joint Inversion Techniques • Complementary Anomaly Analysis • Cross-Validation with Structural Models*
0830 – 0930	***Structural Lineament Mapping*** *Remote Sensing and Geophysical Fusion • Directional Filtering for Trend Analysis • Regional Stress Field Inferences • Statistical Lineament Analysis*
0930 – 0945	*Break*
0945 – 1100	***Structural Geology Workflows with Potential Field Data*** *Data Conditioning and Enhancement • Horizon Flattening and Depth Slicing • Defining Structural Domains • Workflow for Integrated Basin Analysis*
1100 – 1215	***Correlation with Seismic & Well Data*** *Tying Anomalies to Structural Events • Basement and Top Structure Correlation • Linking Faults from Seismic and Magnetics • Improving Structural Cross-Sections*
1215 – 1230	*Break*
1230 – 1330	***Tectonic Setting Reconstruction*** *Large-Scale Gravity and Magnetic Interpretation • Orogenic Belts and Subduction Zones • Rift and Passive Margin Structure • Paleotectonic Mapping*

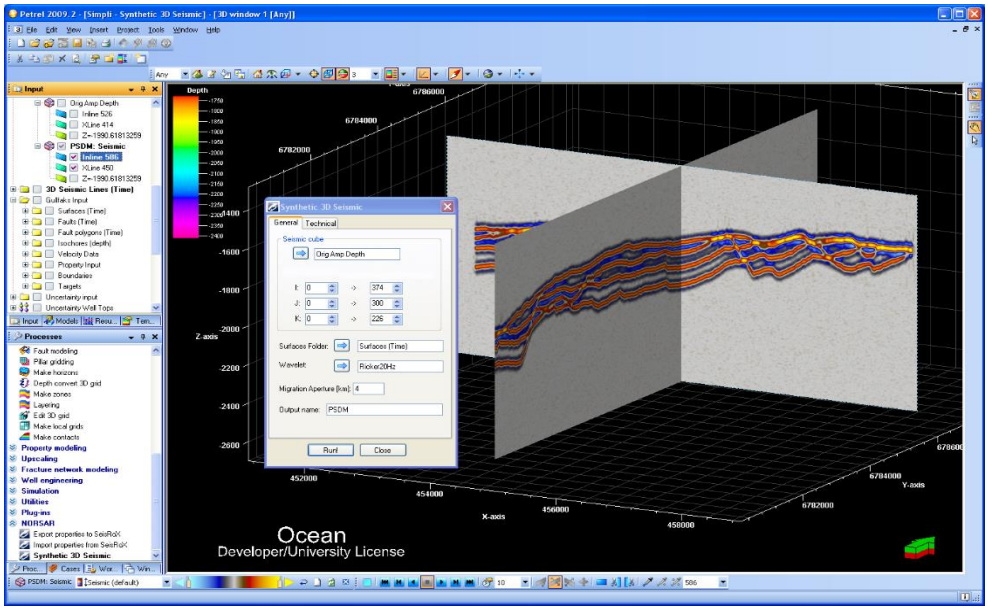
1330 – 1420	***Advanced Software Tools & Platforms*** *Geosoft Oasis Montaj Workflows • Petrel and Kingdom Integration • QGIS and ArcGIS Plugin Utilities • Machine Learning in Potential Field Interpretation*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

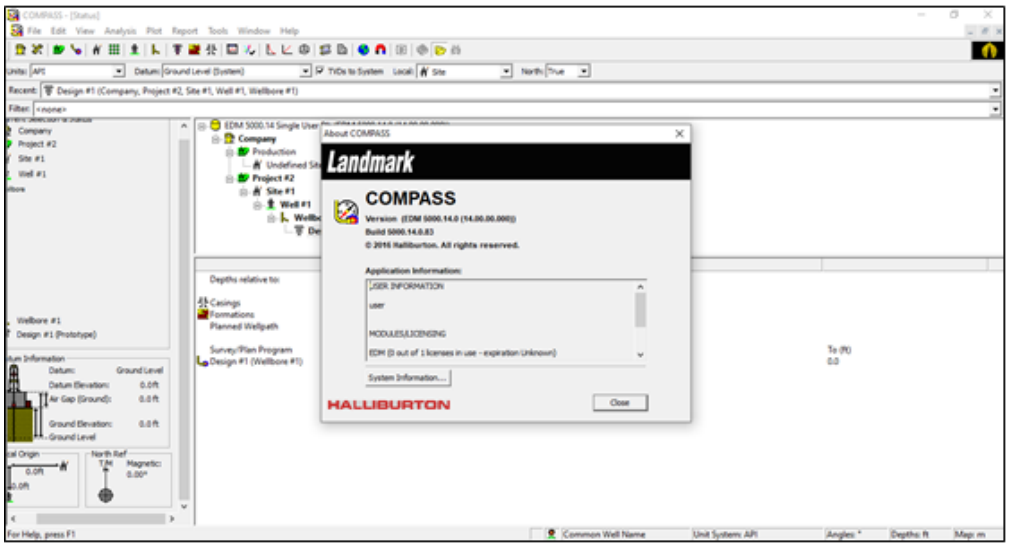
0730 – 0830	***Resource Exploration Applications*** *Hydrocarbon Exploration (Structural Traps) • Mineral Exploration (Magnetic Ore Bodies) • Geothermal and Groundwater Applications • CCS (Carbon Capture & Storage) Structure Suitability*
0830 – 0930	***3D Structural Modeling from Geophysical Data*** *Converting Potential Fields to Surfaces • 3D Fault and Horizon Modeling • Geological Cross-Sections from Profiles • Merging Data into Structural Models*
0930 – 0945	*Break*
0945 – 1100	***Uncertainty & Risk in Structural Interpretation*** *Sources of Geophysical Ambiguity • Managing Multiple Working Hypotheses • Sensitivity to Model Parameters • Communicating Uncertainty in Reports*
1100 – 1215	***Project-Based Geophysical Interpretation*** *Group Interpretation of Real Datasets • Defining Structural Frameworks • Mapping Faults, Domes, and Basement • Presentation of Results*
1215 – 1230	*Break*
1230 – 1345	***Structural Framework for Basin Modeling*** *Linking Structure to Stratigraphy • Basin Fill and Deformation Timing • Control on Migration and Trap Formation • Inputs to Petroleum Systems Modeling*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Simulator (Hands-on Practical Sessions)

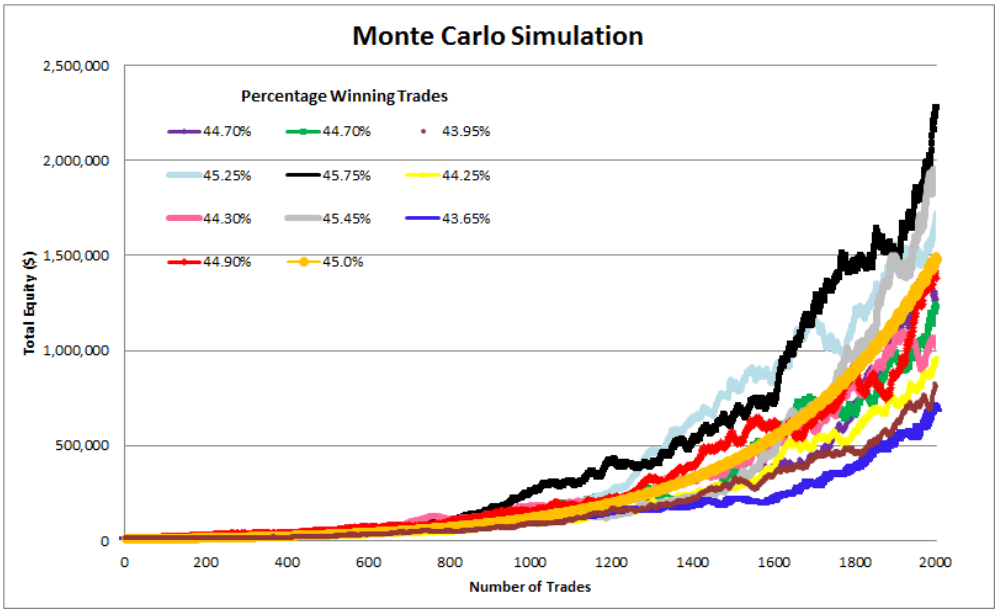
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Petrel Software", "COMPASS", "Monte Carlo", "KAPPA", "Interactive Petrophysics (IP)", "ECRIN", "PIPESIM", "Eclipse Software" and "PROSPER" software's.



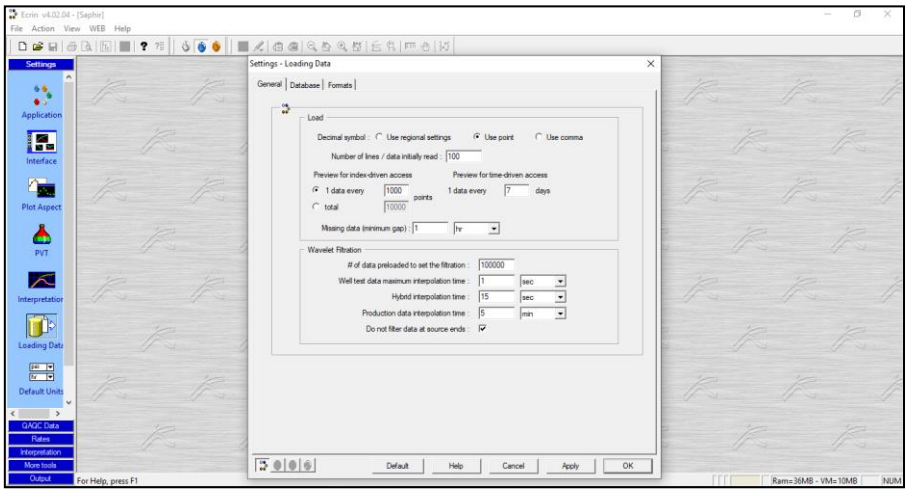
Petrel Software



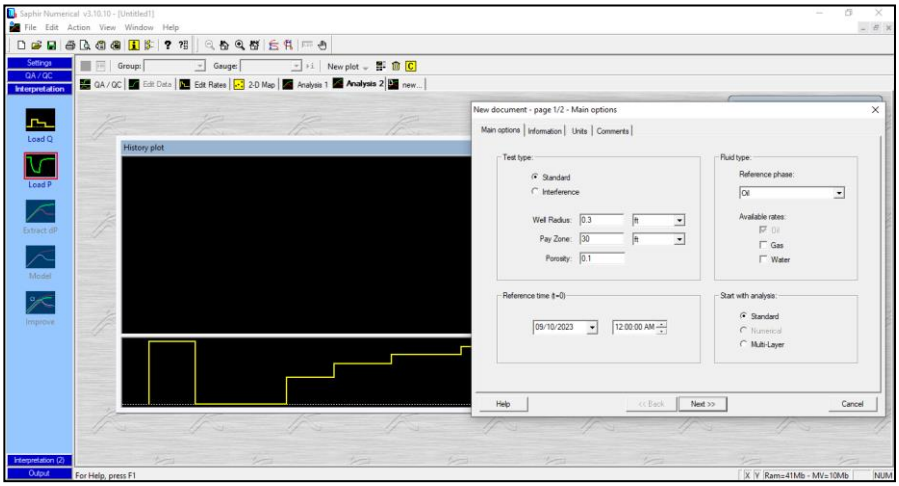
COMPASS



Monte Carlo Simulation



KAPPA Ecrin v4.02.04



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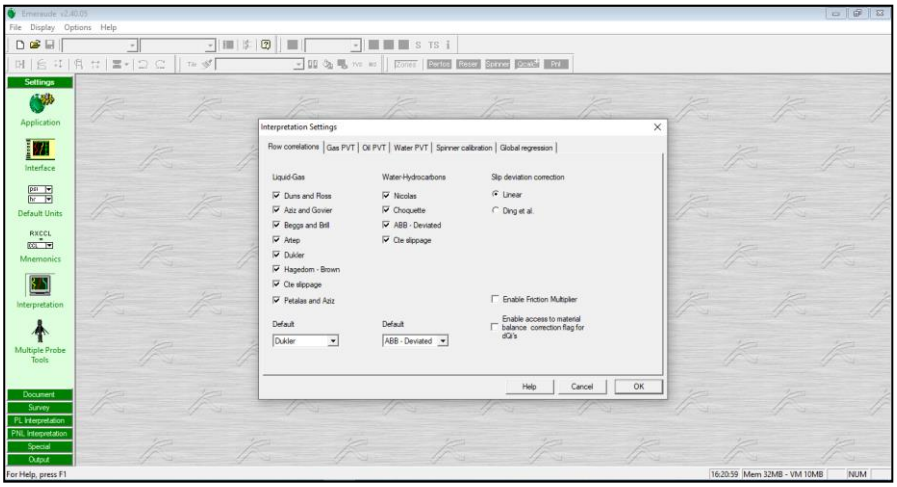

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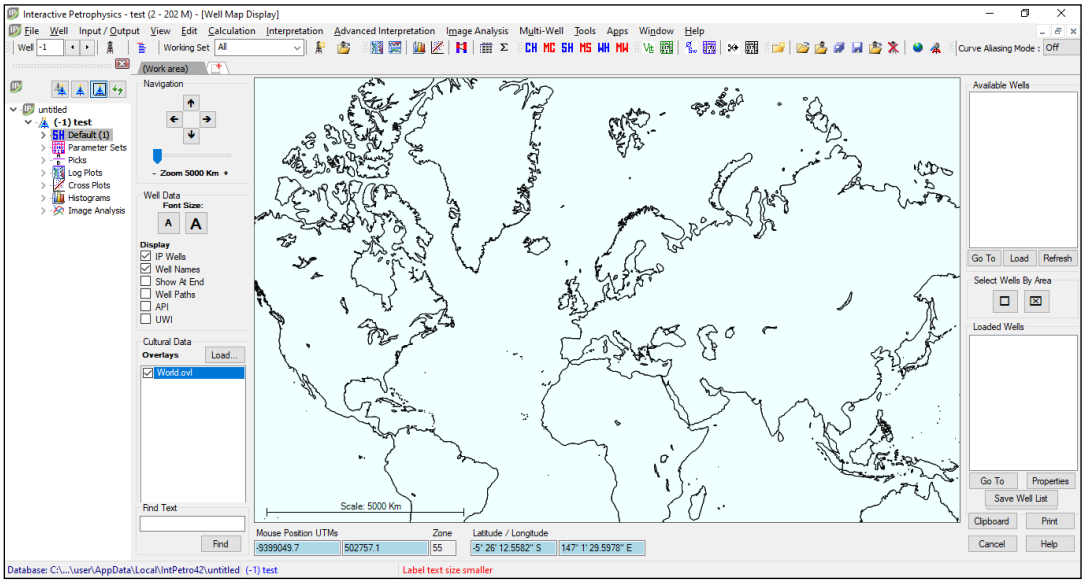
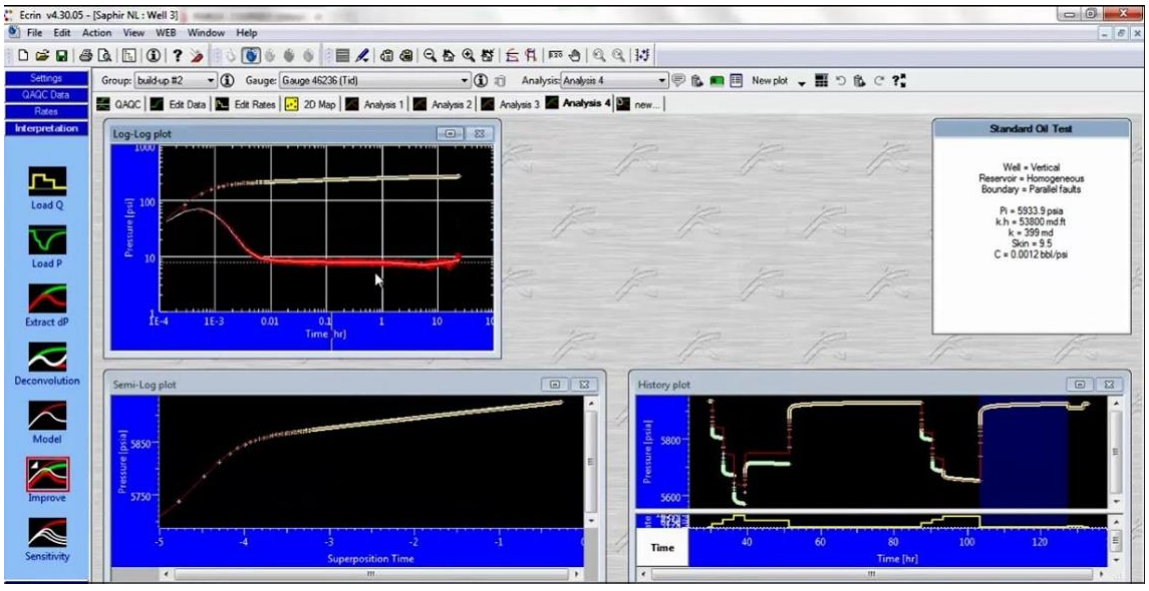
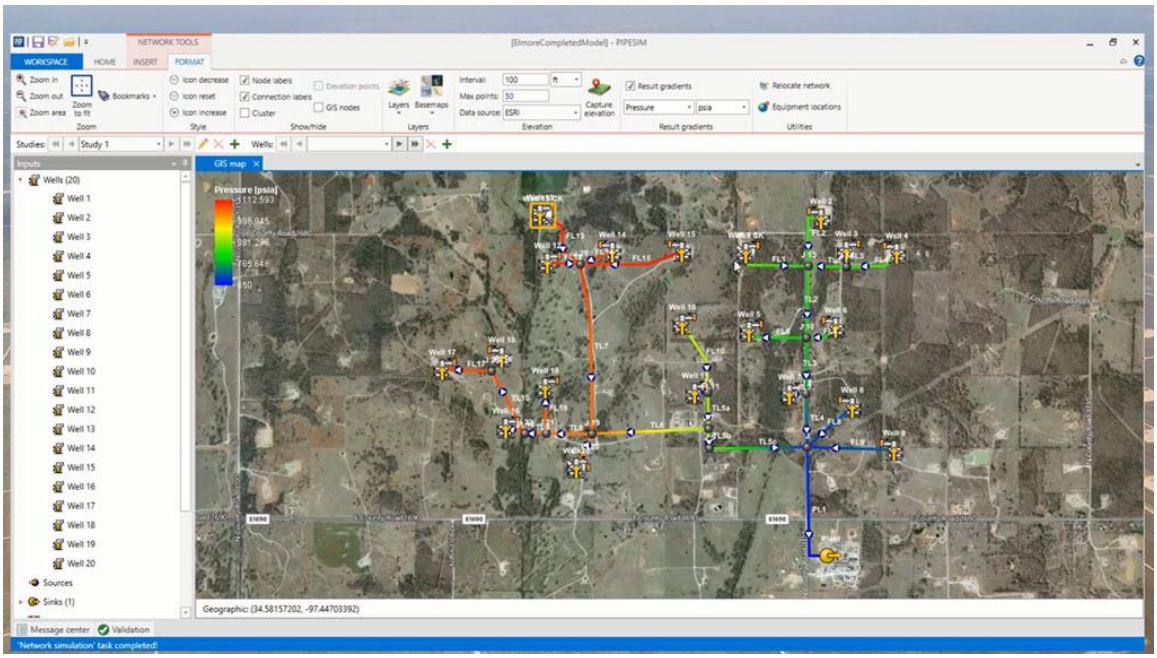


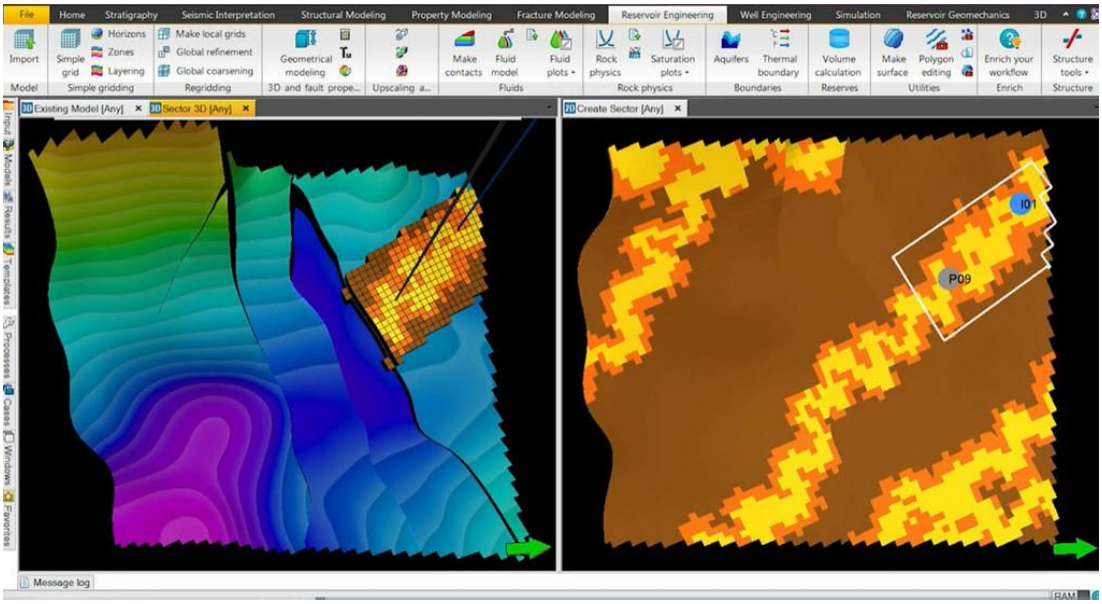
Interactive Petrophysics (IP) Software



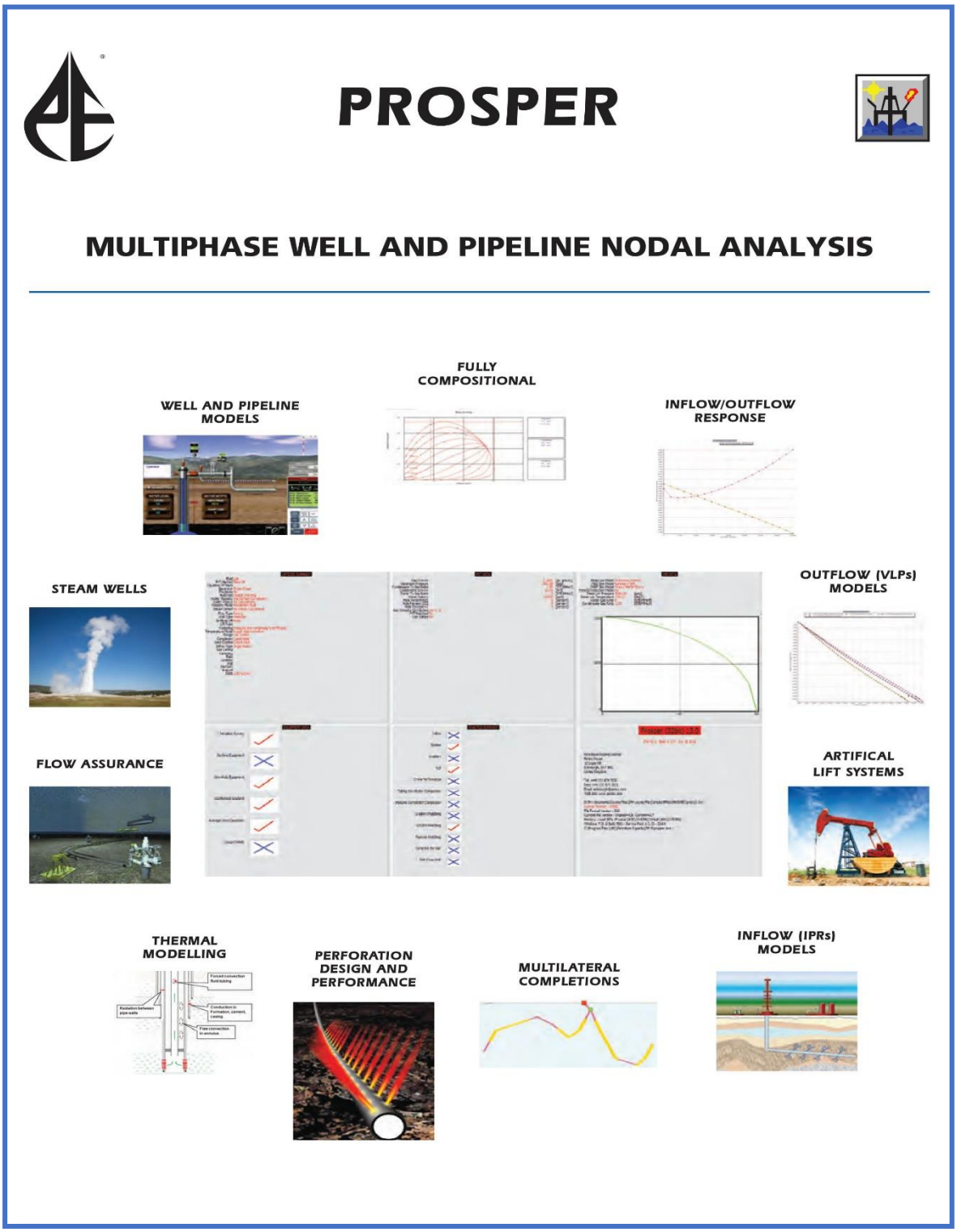
ECRIN Software



PIPESIM



Eclipse Software



Course Coordinator
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