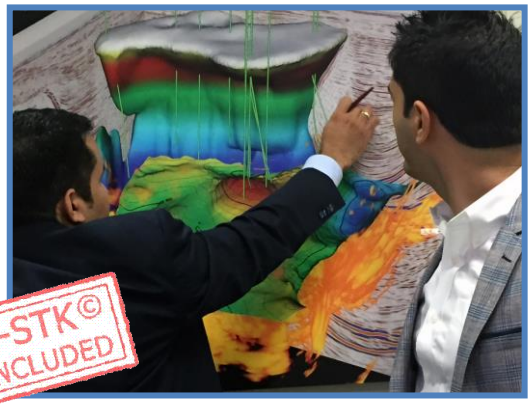
COURSE OVERVIEW DE1071
Advanced Pressure-Volume-Temperature (PVT) Simulation

Course Title
Advanced Pressure-Volume-Temperature (PVT) Simulation

Course Date/Venue
Please refer to page 3

Course Reference
DE1071

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.

This course is designed to provide participants with a detailed and up-to-date overview of Advanced Pressure-Volume-Temperature (PVT) Simulation. It covers the importance of PVT analysis, the role in reservoir characterization and applications in reservoir engineering; the basic thermodynamics of fluids, phase behavior in reservoir fluids and PVT data acquisition techniques; the PVT modeling fundamentals, EOS (equation of state) and complexities in EOS modelling; the PVT simulations for multi-phase systems and fluid characterization techniques; and the impact of PVT on reservoir performance and advanced techniques in PVT analysis.

During this interactive course, participants will learn the differences between black-oil and compositional models; the role of PVT in compositional simulation and calibration and validation of compositional models; the PVT data handling and integration, fluid behavior at varying pressures and temperatures, phase changes and their impact on reservoir performance; the effect of input uncertainty, sensitivity analysis on PVT parameters and the impact of uncertainty on reservoir predictions; the real-time PVT monitoring and data collection, PVT for CO2 sequestration and enhanced oil recovery (EOR); the high-pressure and high-temperature (HPHT) simulations, predicting fluid behavior over time and integrated PVT and reservoir modelling; and the PVT in field development planning and advances in PVT simulation technology.

Course Objectives

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

- Apply and gain an advanced knowledge on pressure-volume-temperature (PVT) simulation
- Discuss the importance of PVT analysis, the role in reservoir characterization and applications in reservoir engineering
- Recognize basic thermodynamics of fluids, phase behavior in reservoir fluids and PVT data acquisition techniques
- Explain PVT modeling fundamentals, EOS (equation of state) and complexities in EOS modeling
- Illustrate PVT simulations for multi-phase systems and fluid characterization techniques
- Identify the impact of PVT on reservoir performance and apply advanced techniques in PVT analysis
- Recognize the differences between black-oil and compositional models, the role of PVT in compositional simulation and calibration and validation of compositional models
- Carryout PVT data handling and integration, pressure-volume-temperature (PVT) simulations and modeling multi-phase flow
- Discuss fluid behavior at varying pressures and temperatures, phase changes and their impact on reservoir performance
- Identify the effect of input uncertainty, perform sensitivity analysis on PVT parameters and discuss the impact of uncertainty on reservoir predictions
- Employ real-time PVT monitoring and data collection as well as PVT for CO2 sequestration and enhanced oil recovery (EOR)
- Apply high-pressure and high-temperature (HPHT) simulations, predicting fluid behavior over time and integrated PVT and reservoir modeling
- Use PVT in field development planning and discuss advances in PVT simulation technology

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 advanced pressure-volume-temperature (PVT) for reservoir engineers, production engineers, petrophysicists, geoscientists, process and facilities engineers, laboratory technicians and chemists, field engineers and supervisors and other technical staff.

Course Date/Venue

Session(s)	Date	Venue
1	May 05-09, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
2	July 27-31, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE
3	September 22-26, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
4	November 16-20, 2025	Tamra Meeting Room, Al Bandar Rotana Creek, Dubai, UAE

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. Konstantin Zorbalas, MSc, BSc, is a **Senior Petroleum Engineer & Well Completions Specialist** with **30 years** of **offshore** and **onshore** experience in the **Oil** & **Gas**, **Refinery** & **Petroleum** industries. His wide expertise includes **OIP Estimation & Range** of **Uncertainty**, **Waterflood** Management, **Water Flooding**, **Water Flooding & Reservoir** Sourcing Issues, **Water Flooding**, **Reservoir** Souring & Water Breakthrough, **Well & Reservoir Management** and Monitoring, **Fishing Operations**, **Drilling & Work-Over Operations**, **Workover Best Practices**, Well Testing, Completion Design & Operation, Well Stimulation and **Workover**, **Well Stimulation & Workover** Planning, **Well Completion**, **Servicing & Work-Over** Operations, **Completions & Workover**, HSE in **Work-Over & Drilling** Operations, **Well Testing Completion & Workover**, Basic **Drilling**, **Completion & Workover** Operations, Advanced **Drilling**, **Completion & Workovers Fluids**, **Cementing** Integrity Evaluation, **Cementing** Design, **Cement** Integrity Assurance & Evaluation, Basic **Cementing** (Operations) & Basic Acidizing, **Advanced** Cementing Technology, **Casing & Cementing, Advanced** Cementing & Stimulation, **Artificial Lift** Systems, New Technology in **Artificial Lift Systems**, **Artificial Lift** Methods, **Crude Oil Artificial Lift** Operations, **Artificial Lift** Systems, **Artificial Lift** & Challenges, **Artificial Lift** Systems & Optimization Technology, Production Optimization with **Artificial Lift** System, **Well Integrity & Artificial Lift**, **Formation Damage** & Flow Assurance Issues, **Formation Damage** Evaluation, Prevention, Remediation & Control, **Formation Damage** (Causes, Prevention & Remediation), **Well Completion** Design & Operations, Crude **Oil Market**, Oil **Reserves**, Global Oil **Supply & Demand**, Government Legislation & Oil **Contractual** Agreements, Oil **Projects & Their Feasibility** (Revenue and Profitability), Oil & Gas **Exploration** and **Methods**, Oil & Gas **Extraction**, Oil **Production & Refining**, Technology Usage in Industrial Security; **Oil & Gas Economics** Modelling Evaluation Decision Making & Risk Analysis, **Economic Evaluation** & Global Profitability Criteria, **Petroleum Economics**, Fluid Properties & Phase Behaviour (**PVT**), **Workovers & Completions**, Acidizing Application in **Sandstone & Carbonate**, **Well Testing** Analysis, **Reserves** Evaluation, **Reservoir** Fluid Properties, **Reservoir** Monitoring, **Heavy Oil** Technology, Applied **Water Technology**, **X-mas Tree & Wellhead** Operations & Testing, **Artificial Lift** Systems (**Gas Lift**, **ESP**, and **Rod Pumping**), **Well Cementing**, **Well Completion** Design, **Slickline** Operations, **Cased Hole Logging** and **Production Logging**. Further, he is actively involved in **Project Management** with special emphasis in production technology and field optimization, performing conceptual studies, economic analysis with risk assessment and field development planning. He is currently the **Senior Petroleum Engineer & Consultant** of **Abu Dhabi National Oil Company** (**ADNOC**) Group of companies wherein he is involved in the mega-mature fields in the Arabian Gulf, predominantly carbonate reservoirs; designing the acid stimulation treatments with post-drilling rigless operations; utilizing CT with tractors and DTS systems; and he is responsible for gas production and preparing for reservoir engineering and simulation studies, well testing activities, field and reservoir monitoring, production logging and optimization and well completion design.

During his career life, Mr. Zorbalas worked as a **Senior Production Engineer**, **Well Completion Specialist**, **Production Manager**, **Project Manager**, **Technical Manager**, **Trainer**, **Technical Supervisor** & **Contracts Manager**, **Production Engineer**, **Production Supervisor**, **Production Technologist**, **Technical Specialist**, **Business Development Analyst**, **Field Production Engineer** and **Field Engineer**. He worked for many **world-class oil/gas companies** such as **ZADCO**, **ADMA-OPCO**, **Oilfield International Ltd**, **Burlington Resources** (later acquired by **Conoco Phillips**), **MOBIL E&P**, **Saudi Aramco**, **Pluspetrol E&P SA**, **Wintershall**, **Taylor Energy**, **Schlumberger**, **Rowan Drilling** and **Yukos EP** where he was in-charge of the **design and technical analysis** of a gas plant with capacity **1.8 billion m3/yr gas**. His achievements include **boosting oil production 17.2% per year** since 1999 using **ESP** and **Gas Lift systems**.

Mr. Zorbalas has **Master's** and **Bachelor's** degrees in **Petroleum Engineering** from the **Mississippi State University**, **USA**. Further, he is an **SPE Certified Petroleum Engineer**, **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), an active member of the Society of Petroleum Engineers (**SPE**) and has numerous scientific and technical publications and delivered innumerable training courses, seminars 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	***Overview of PVT Analysis*** *Definition and Importance of PVT Analysis • Role in Reservoir Characterization • Applications in Reservoir Engineering • Historical Development and Advances*
0930 – 0945	*Break*
0945 – 1030	***Basic Thermodynamics of Fluids*** *Thermodynamic Properties of Fluids • Phase Behavior and Critical Points • Ideal versus Non-Ideal Systems • Thermodynamic Equations of State*
1030 – 1130	***Phase Behavior in Reservoir Fluids*** *Bubble Point and Dew Point Determination • Immiscibility and Miscibility • Critical Properties and Reduced Properties • Phase Diagrams and Their Interpretation*
1130 – 1215	***PVT Data Acquisition Techniques*** *Laboratory Methods for PVT Testing • Equipment Used in PVT Analysis • Sample Collection and Preservation • Standards and Guidelines for PVT Data*
1215 – 1230	*Break*
1230 – 1330	***PVT Modeling Fundamentals*** *Overview of PVT Modeling Approaches • Types of PVT Models (Black Oil, EOS) • Choosing the Right PVT Model • Calibration of PVT Models*

1330 – 1420	***EOS (Equation of State)*** *Basic Concepts of EOS • Types of EOS (Peng-Robinson, Soave-Redlich-Kwong) • Parameter Estimation in EOS Models • Applications of EOS in PVT Simulation*
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	***Complexities in EOS Modeling*** *Dealing with Multiple Components in EOS • Fugacity Coefficients and Their Calculation • Binary and Multi-Component Systems • Non-Ideal Fluid Behavior*
0830 – 0930	***PVT Simulations for Multi-Phase Systems*** *Simulating Gas, Oil and Water Phases • Modeling Phase Separation • Role of Pressure, Temperature, and Composition • Coupling with Reservoir Simulation Tools*
0930 – 0945	*Break*
0945 – 1100	***Fluid Characterization Techniques*** *Detailed Fluid Characterization for Reservoir Conditions • Laboratory PVT Testing versus Simulation Data • Integration with Geological Models • Impact of Fluid Types on Reservoir Performance*
1100 – 1215	***Impact of PVT on Reservoir Performance*** *Fluid Behavior during Depletion and Injection • Gas-to-Oil Ratio (GOR) and Its Effect on Production • Phase Changes and Their Effect on Recoverable Reserves • Impact on Well and Reservoir Management*
1215 – 1230	*Break*
1230 – 1330	***Advanced Techniques in PVT Analysis*** *Combining Experimental Data with Modeling • Data Uncertainty Analysis • Sensitivity Analysis in PVT Simulation • Error Propagation in PVT Predictions*
1330 – 1420	***Basics of Compositional Simulation*** *Differences between Black-Oil and Compositional Models • Role of PVT in Compositional Simulation • Simulation of Multi-Component Fluid Systems • Calibration and Validation of Compositional Models*
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	***PVT Data Handling & Integration*** *Techniques for Managing Large PVT Datasets • Integration with Reservoir Simulators • Data Filtering and Optimization • Calibration and Validation of Field Data*
0830 – 0930	***PVT Simulation Software Overview*** *Popular PVT Simulation Tools (CMG, Eclipse, PVTsim) • Features and Capabilities of Software Platforms • Choosing the Right Simulation Tool • Hands-on Exercises Using Simulation Software*

0930 – 0945	*Break*
0945 – 1100	***Pressure-Volume-Temperature (PVT) Simulations*** *Setting up PVT Simulations in Software • Input Parameters and Simulation Parameters • Running Simulations and Interpreting Results • Troubleshooting and Error Handling*
1100 – 1215	***Modeling Multi-Phase Flow*** *Multi-Phase Flow in Porous Media • Simulating Multi-Phase Behavior with PVT Data • Multi-Phase Relative Permeability and Capillary Pressure • Integration with Well Production Models*
1215 – 1230	*Break*
1230 – 1330	***Simulating Reservoir Fluid Behavior*** *Fluid Behavior at Varying Pressures and Temperatures • Phase Changes and Their Impact on Reservoir Performance • Modeling of Compositional Gradients in Reservoirs • Field Case Studies and Simulation Examples*
1330 – 1420	***Sensitivity & Uncertainty Analysis in PVT Simulations*** *Understanding the Effect of Input Uncertainty • Performing Sensitivity Analysis on PVT Parameters • Impact of Uncertainty on Reservoir Predictions • Methods for Reducing Uncertainty in Simulation Models*
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	***Real-Time PVT Monitoring & Data Collection*** *Advanced Techniques for Real-Time Data Acquisition • Sensors and Field Measurement Techniques • Remote Monitoring Systems for PVT Parameters • Integration with SCADA and Reservoir Management Systems*
0830 – 0930	***PVT for CO_2 Sequestration & Enhanced Oil Recovery (EOR)*** *Role of PVT Analysis in CO_2 Injection • Modeling the Impact of CO_2 on Fluid Behavior • CO_2 Miscibility and Phase Behavior • PVT Simulations for Enhanced Oil Recovery*
0930 – 0945	*Break*
0945 – 1100	***High-Pressure & High-Temperature (HPHT) Simulations*** *Challenges of HPHT Reservoirs • Modeling Behavior under Extreme Conditions • Impact of Pressure and Temperature on PVT Properties • Field Case Studies of HPHT Reservoirs*
1100 – 1215	***Predicting Fluid Behavior over Time*** *Long-Term Predictions of Fluid Properties • Impact of Reservoir Depletion on PVT Properties • Dynamic Simulation of Fluid Behavior • Case Studies of Long-Term Reservoir Fluid Predictions*
1215 – 1230	*Break*
1230 – 1330	***Integrated PVT & Reservoir Modeling*** *Coupling PVT Data with Reservoir Simulation Models • Workflow for Integrated Simulation • Optimizing Production Strategies Using Integrated Models • Forecasting Future Reservoir Performance*

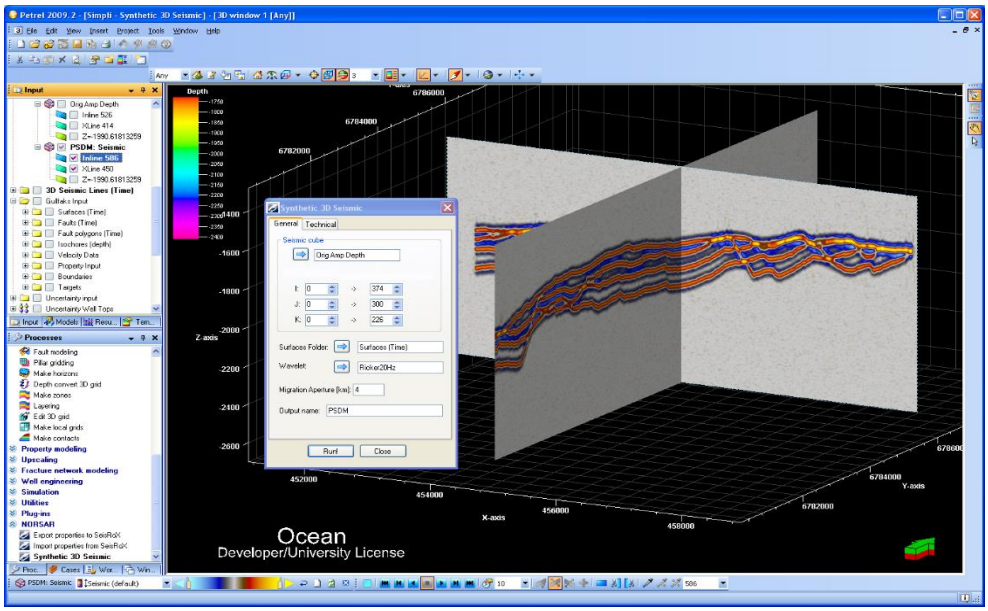
1330 – 1420	***Use of PVT in Field Development Planning*** *Planning Reservoir Management Strategies Using PVT Data • Impact of Fluid Properties on Well Placement and Spacing • Long-Term Reservoir Management and Optimization • Economic Implications of PVT Analysis in Development Planning*
1420 – 1430	***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

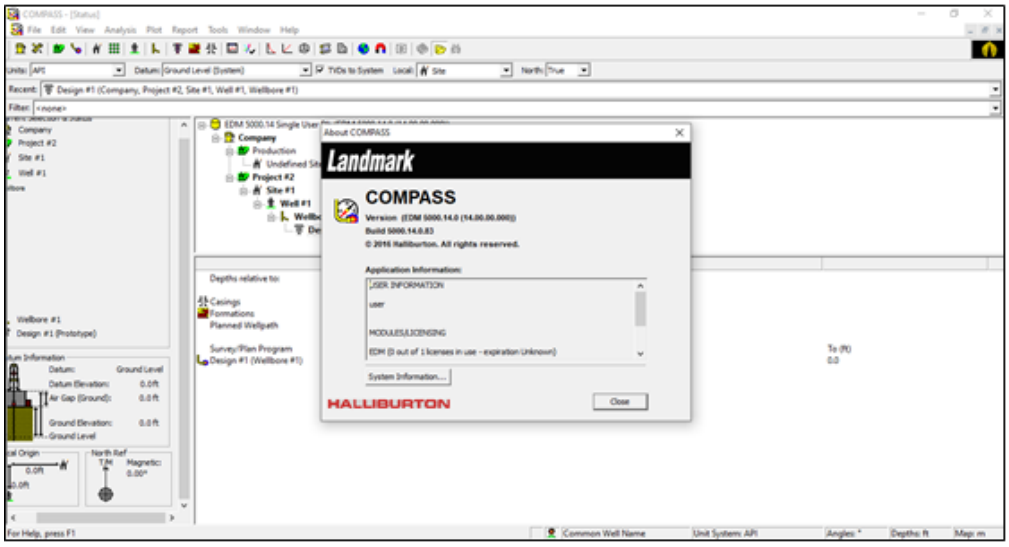
0730 – 0830	***Case Study: PVT in Offshore Fields*** *PVT Challenges in Offshore Oil and Gas Fields • Modeling Fluid Behavior in Offshore Reservoirs • Case Study of Successful Offshore PVT Simulations • Lessons Learned and Best Practices*
0830 – 0930	***Case Study: PVT in Tight & Shale Reservoirs*** *PVT Challenges in Unconventional Reservoirs • Fluid Behavior in Tight Gas and Shale Oil Reservoirs • Integration with Hydraulic Fracturing and Stimulation Models • Case Study and Analysis*
0930 – 0945	*Break*
0945 – 1100	***Advances in PVT Simulation Technology*** *Recent Technological Developments in PVT Analysis • Advances in EOS and Equation Models • Role of AI and Machine Learning in PVT Prediction • Next-Generation Simulation Tools and Platforms*
1100 – 1215	***Future Trends in PVT Simulation*** *Evolving Trends in Reservoir Simulation and PVT Analysis • Impact of Automation and Digital Twins in Fluid Modeling • Integration of PVT with Real-Time Decision-Making Systems • Future Challenges and Research Directions in PVT Modeling*
1215 – 1230	*Break*
1230 – 1345	***Practical Application Exercises*** *Hands-on Exercises Using PVT Simulation Software • Practical Case Study Evaluations • Group Discussion on Real-World Applications • Troubleshooting and Refining Simulation Models*
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)

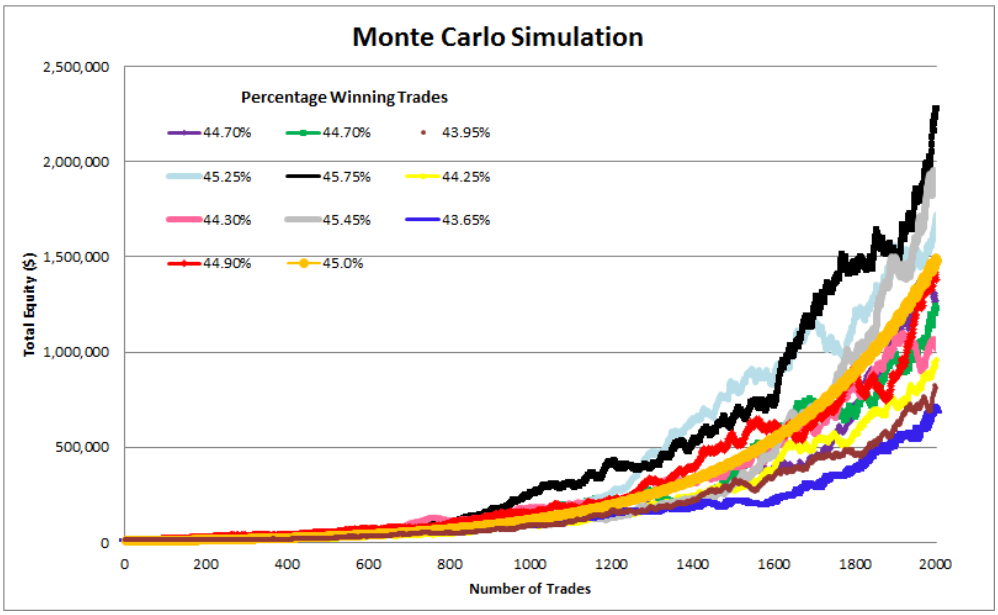
Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using the "Petrel Software", "COMPASS", "Monte Carlo", "KAPPA", "Interactive Petrophysics (IP)", "ECRIN", "PIPESIM", "Eclipse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



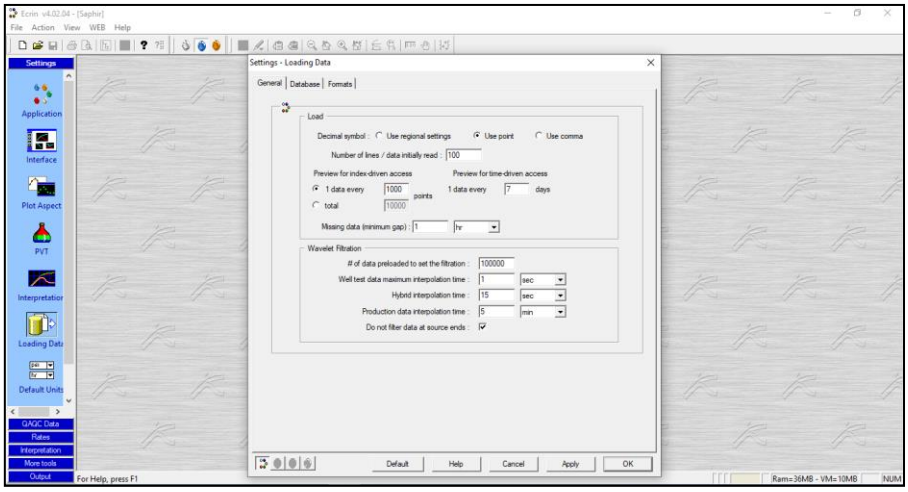
Petrel Software



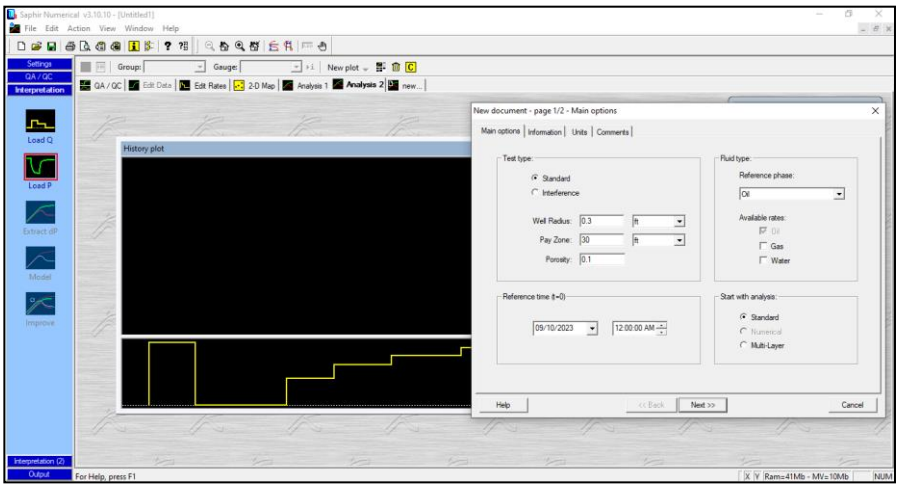
COMPASS



Monte Carlo Simulation



KAPPA Ecrin v4.02.04



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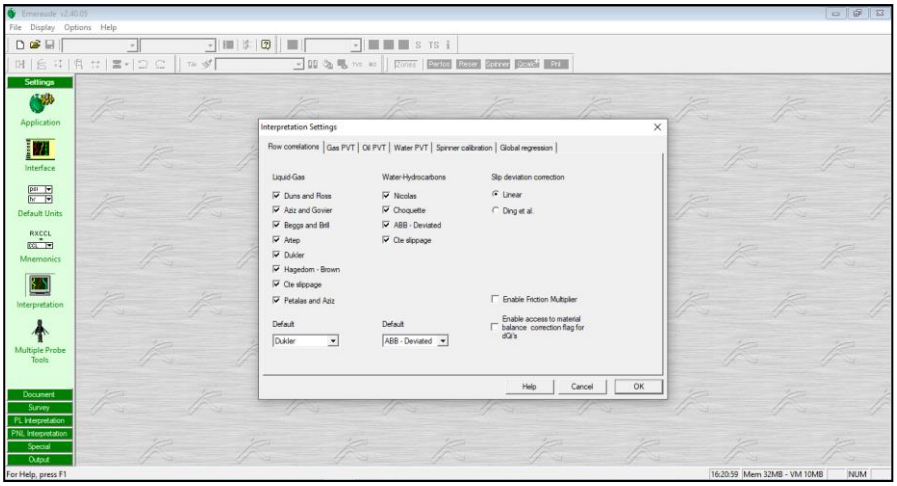

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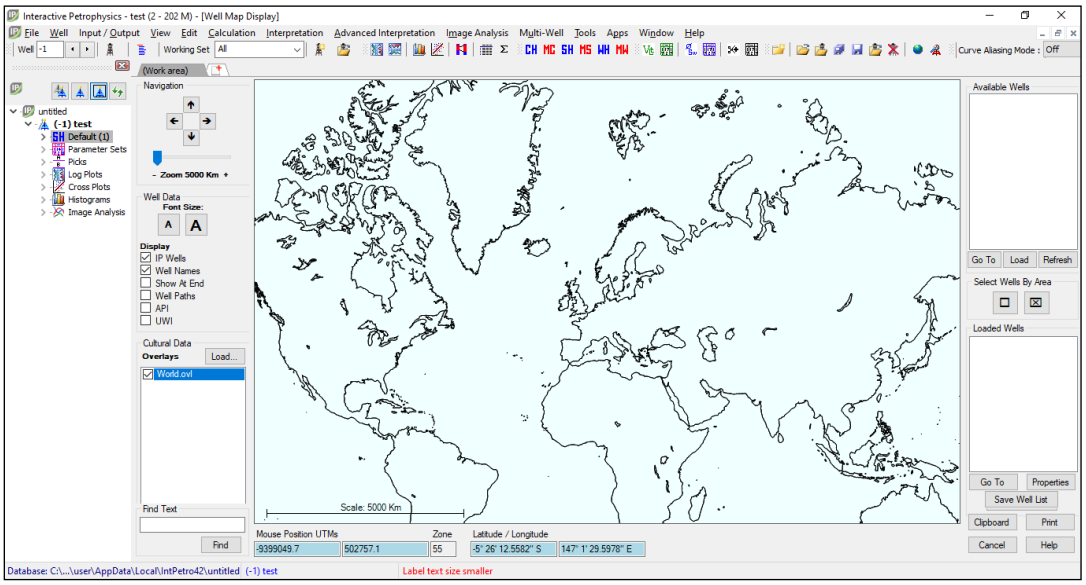
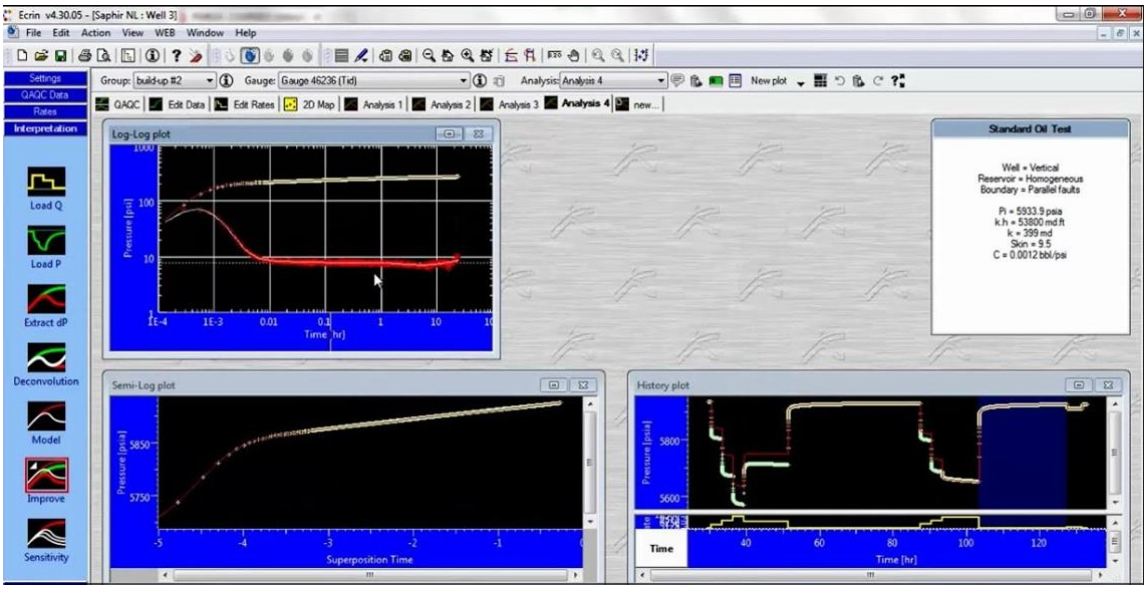
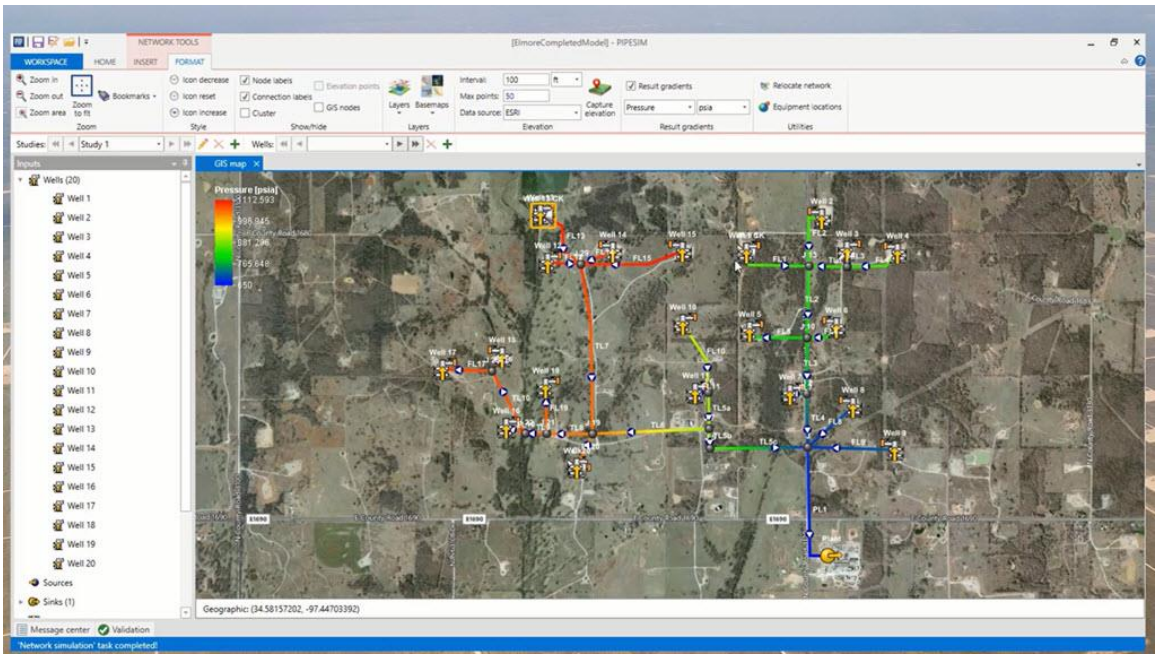


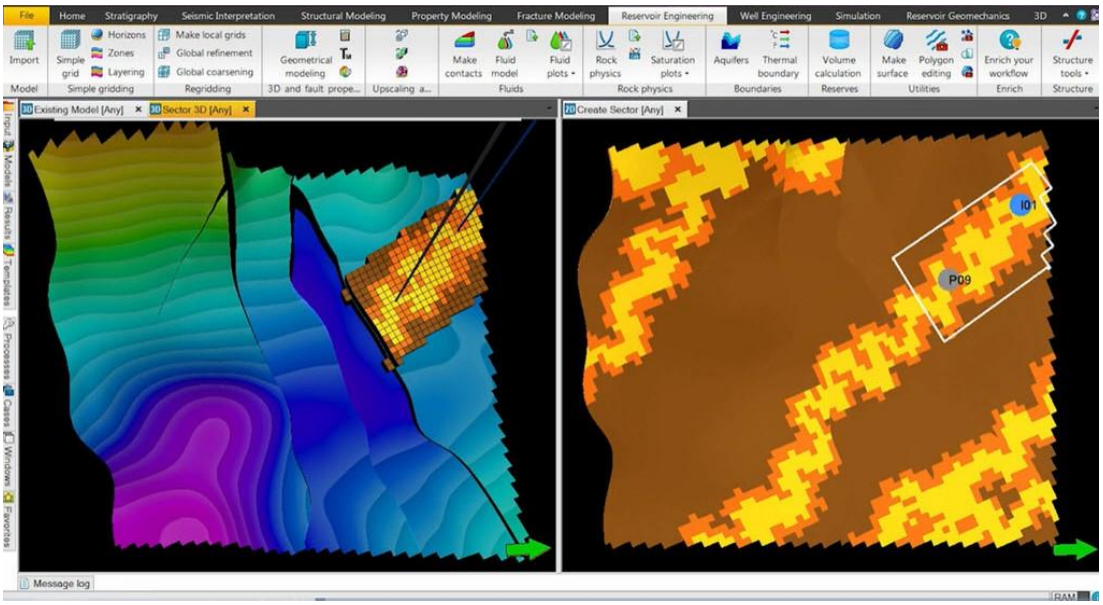
Interactive Petrophysics (IP) Software



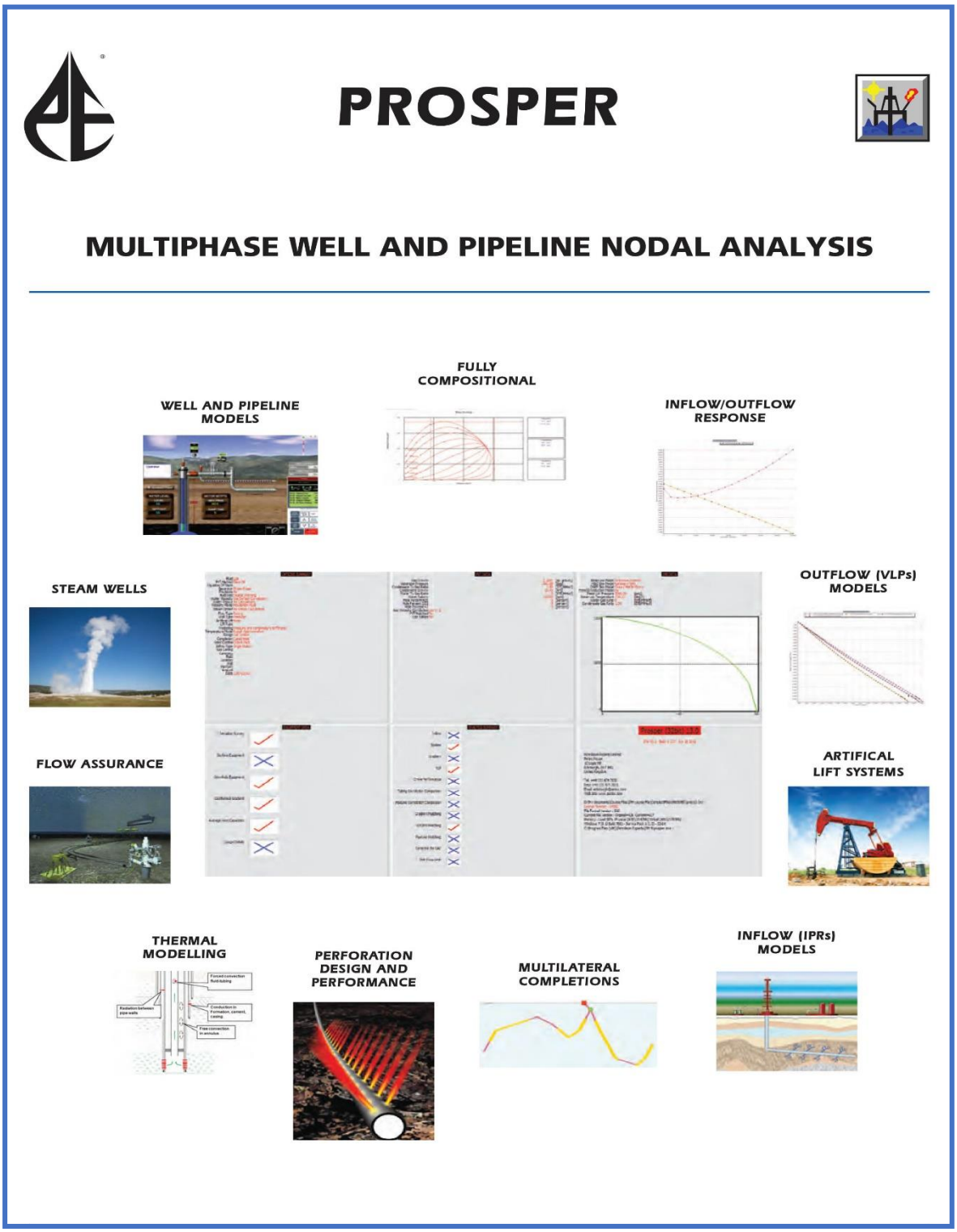
ECRIN Software



PIPESIM



Eclipse Software



Course Coordinator
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