COURSE OVERVIEW LE0082

Lab and Pilot Testing

Course Title
Lab and Pilot Testing

Course Date/Venue
Session 1: April 28-May 02, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: September 07-11, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
LE0082

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

Course Description

This practical and highly-interactive course includes real-life case studies and exercises where participants will be engaged in a series of interactive small groups and class workshops.

This course is designed to provide participants with a detailed and up-to-date overview of Lab and Pilot Testing. It covers the importance of lab and pilot testing in the petroleum industry and its objectives in process development; the difference between lab testing versus pilot testing; the lab testing setup and equipment and the key components of a pilot plant setup; the factors influencing pilot plant design and safety considerations in pilot testing operations; the safety and compliance in lab and pilot testing as well as quality assurance and control in testing; and the crude oil and hydrocarbon analysis, water and wastewater analysis in petroleum operations, gas analysis and composition testing.

During this interactive course, participants will learn the fluid rheology and flow behavior testing, corrosion and scale testing in petroleum systems and catalytic and reaction testing in petroleum processing; the design and setup of pilot plants, process simulation and modeling in pilot testing and enhanced oil recovery (EOR) pilot testing; the hydroprocessing and refinery pilot testing, flow assurance and pipeline transport testing and environmental impact assessment in pilot testing; the data collection and interpretation in lab and pilot testing, process optimization through pilot testing and troubleshooting common issues in lab and pilot testing; and the risk management in pilot testing operations and advanced analytical techniques for lab and pilot testing.

Course Objectives

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

- Apply ang gain an in-depth knowledge on lab and pilot testing
- Discuss the importance of lab and pilot testing in the petroleum industry and its objectives in process development
- Differentiate lab testing versus pilot testing and apply lab testing setup and equipment
- Identify the key components of a pilot plant setup, factors influencing pilot plant design and safety considerations in pilot testing operations
- Carryout safety and compliance in lab and pilot testing as well as quality assurance and control in testing
- Apply crude oil and hydrocarbon analysis, water and wastewater analysis in petroleum operations, gas analysis and composition testing
- Employ fluid rheology and flow behavior testing, corrosion and scale testing in petroleum systems and catalytic and reaction testing in petroleum processing
- Illustrate the design and setup of pilot plants, process simulation and modeling in pilot testing and enhanced oil recovery (EOR) pilot testing
- Carryout hydroprocessing and refinery pilot testing, flow assurance and pipeline transport testing and environmental impact assessment in pilot testing
- Employ data collection and interpretation in lab and pilot testing, process optimization through pilot testing and troubleshooting common issues in lab and pilot testing
- Apply risk management in pilot testing operations and advanced analytical techniques for lab and pilot testing

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 lab and pilot testing for project manager, test engineers/technicians, product designers/developers, quality assurance (QA) specialists, subject matter experts (smes), end-users or focus groups (for pilot testing), regulatory and compliance specialists, data analysts, safety officers and other technical staff.

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.

  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.

- 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.

Course Fee

US$ 5,500 per Delegate + **VAT**. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

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. **Nikolas Karnavos**, MSc, BSc, is a **Senior Analytical Chemist** with over **35 years** of extensive experience within the **Oil**, **Gas**, **Refinery** and **Petrochemical** industries. His expertise widely covers **Gas & Liquid Chromatograph Process Analysers**, **Process Analyzer Techniques** (**Online** & **Offline**), Laboratory Information Management System (**LIMS**), **Data & Method Validation in Analytical Laboratories**, Laboratory **Automation Techniques**, **Practical Problem Solving in Chemical Analysis**, **Practical Statistical Analysis of Lab Data**, **Chemical Laboratory**, **Analytical Laboratory & Instrumentation**, Laboratory **Health & Safety**, **GLP**, Laboratory **Quality Management** (**ISO 17025**), **ISO 9001** and Medical Laboratory Quality Management (**ISO 15189**). Further, he is also well-versed in Environmental **Online Analyzers** (**Air** & **Water**), **Gas Chromatography** and various instrumental methods of analysis such as **Water Analysis & Quality Control**, **Water and Wastewater Chemical** Analysis, **Statistical Data and Laboratory Analysis**, **Gas** Analysis, **Qualitative Fuel** Analysis, **Environmental Chemical** Analysis, **Laboratory Environmental** Analysis including Water Quality Testing, Process Water and **Wastewater Effluents**, Oily **Sludge Treatment**, Atomic Absorption and Spectroscopic Methods in Analytical Chemistry, **Analytical Method Development** and **Methods of Environmental Measurements** (**Water**, **Air**, **Liquid** & **Solid Wastes**).

Mr. Karnavos was the **Laboratory Manager** of **Exxon** wherein he was responsible for **ISO 17025 certification**, upgrading laboratory equipment in **refinery**, **petrochemical** and **polypropylene** plants, upgrading and extending LIMS, handling the transition plan process of the existing laboratory to a new as well as formulating and executing the plans for applied research and technology transfer. During his career life, he had occupied several significant positions as the **Laboratory Analyst**, **Laboratory Professor**, **Quality Manager**, **Partner & Managing Director**, **Environmental Engineer**, **Process Engineer**, **Environmental Management Corporate Department Head** and **Quality Control & Plastics Application Head** with different international companies like the **AQUACHEM**, **Hellenic Petroleum** (**EXXON**) and **Technological Institute**.

Mr. Karnavos holds a **Master** degree in **Chemical Engineering** and **Bachelor** degrees in **Mechanical Engineering** and **Petroleum Engineering** from the **Aristotelian University of Thessaloniki**, **Technological Institute** and **KATEE Kavala** respectively. He is an **Accredited Trainer** for the Organization for the Certifications & Vocational Guidance (**EOPPEP**), a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**), a **Certified Instructor/Trainer** and an **Accredited Environmental Auditor** from the **IEMA**. Further, he is the **President** of Greek **Association of Chemical Engineers** and an active member of various professional engineering bodies internationally like the **IEMA**, **Technical Chamber** of Greece and the **CONCAWE**. He also **published numerous books** and **scientific papers** and delivered various trainings 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 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 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0930	***Introduction to Lab & Pilot Testing*** *Definitions & Importance in Petroleum Industry • Differences Between Lab-Scale, Bench-Scale, & Pilot-Scale Testing • Objectives of Lab & Pilot Testing in Process Development • Lab & Pilot Testing for Oil & Gas Applications*
0930 - 0945	*Break*
0945 – 1045	***Lab Testing versus Pilot Testing: Key Differences*** *Scale Differences & Objectives of Each Approach • Cost, Time, & Resource Considerations • Data Extrapolation from Lab to Pilot Scale • Case Studies Comparing Lab & Pilot Testing Results*
1045 - 1145	***Lab Testing Setup & Equipment*** *Common Lab Testing Equipment Used in Petroleum Research • Sample Preparation Techniques & Quality Control • Chemical Analysis Methods & Instrumentation • Laboratory Best Practices for Accurate Testing*
1145 - 1230	***Pilot Testing Facility Design & Operations*** *Key Components of a Pilot Plant Setup • Factors Influencing Pilot Plant Design (Scalability, Process Parameters) • Safety Considerations in Pilot Testing Operations • Transitioning from Lab to Pilot-Scale Testing*
1230 – 1245	*Break*
1245 – 1330	***Safety & Compliance in Lab & Pilot Testing*** *HSE Standards for Lab & Pilot Testing • Handling Hazardous Materials & Chemicals • PPE Requirements & Best Practices for Laboratory Safety • Emergency Response Planning for Pilot-Scale Testing*

1330 - 1420	***Quality Assurance & Control in Testing*** *Role of QA/QC in Lab & Pilot Testing • Standard Operating Procedures (SOPs) for Accurate Testing • Data Validation & Documentation Requirements • Compliance with International Standards (ASTM, API, ISO)*
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	***Crude Oil & Hydrocarbon Analysis*** *API Gravity, Density, & Specific Gravity Measurements • Sulfur Content & Total Acid Number (TAN) Testing • Hydrocarbon Composition Analysis (GC-MS, FTIR) • Quality Control Measures for Crude Oil Testing*
0830 – 0930	***Water & Wastewater Analysis in Petroleum Operations*** *Produced Water Testing & Composition Analysis • Detection of Contaminants (Salinity, Heavy Metals, Hydrocarbons) • pH, Total Dissolved Solids (TDS), & Conductivity Measurements • Approach to Water Treatment & Discharge Regulations*
0930 - 0945	*Break*
0945 – 1130	***Gas Analysis & Composition Testing*** *Methods for Analyzing Natural Gas Composition • Determination of Hydrogen Sulfide (H_2S) & CO_2 Levels • Calorific Value & Heating Potential Analysis • Gas Chromatography Techniques for Hydrocarbon Fractions*
1130 - 1230	***Fluid Rheology & Flow Behavior Testing*** *Viscosity & Shear Rate Measurement Techniques • Emulsion Stability & Phase Behavior Analysis • Impact of Temperature & Pressure on Fluid Properties • Lab Simulation of Pipeline Flow Conditions*
1230 - 1245	*Break*
1245 - 1330	***Corrosion & Scale Testing in Petroleum Systems*** *Causes & Prevention of Corrosion in Oilfield Operations • Corrosion Inhibitor Testing Methods • Scale Deposition Tendency & Scale Inhibitor Efficiency Testing • Corrosion Monitoring Strategies*
1330 - 1420	***Catalytic & Reaction Testing in Petroleum Processing*** *Lab-Scale Catalyst Evaluation Techniques • Reaction Kinetics & Conversion Efficiency Testing • Coke Formation & Catalyst Deactivation Analysis • Case Studies on Catalytic Testing for Refinery Processes*
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	***Design & Setup of Pilot Plants*** *Factors Affecting Pilot Plant Design • Scale-Up Considerations from Lab to Pilot Plant • Process Control & Automation in Pilot Plants • Case Studies on Pilot Plant Implementations*
0830 – 0930	***Process Simulation & Modeling in Pilot Testing*** *Use of Computational Models in Pilot-Scale Testing • Aspen HYSYS & Other Simulation Software for Process Design • Validation of Simulation Results with Pilot Plant Data • Challenges in Scaling from Pilot to Full-Scale Operations*

0930 - 0945	*Break*
0945 – 1130	***Enhanced Oil Recovery (EOR) Pilot Testing*** *Lab & Pilot Testing of EOR Methods (Thermal, Chemical, Gas Injection) • Compatibility Testing of EOR Chemicals with Reservoir Fluids • Pilot-Scale Field Trials for EOR Feasibility Studies • Experience with EOR Pilot Projects*
1130 - 1230	***Hydroprocessing & Refinery Pilot Testing*** *Pilot-Scale Testing of Hydrocracking & Hydrotreating Processes • Catalyst Performance Evaluation Under Operating Conditions • Reaction Optimization for Improved Yield & Efficiency • Case Studies on Refinery Pilot Projects*
1230 - 1245	*Break*
1245 - 1330	***Flow Assurance & Pipeline Transport Testing*** *Pilot Testing for Wax, Asphaltene, & Hydrate Formation • Assessment of Drag Reducing Agents (DRA) & Flow Improvers • Evaluating Pipeline Pigging Strategies • Research on Flow Assurance Challenges*
1330 - 1420	***Environmental Impact Assessment in Pilot Testing*** *Monitoring Emissions & Effluents in Pilot Plants • Compliance with International Environmental Regulations • Waste Management & Disposal Strategies • Case Study on Sustainable Pilot Testing Practices*
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	***Data Collection & Interpretation in Lab & Pilot Testing*** *Importance of Real-Time Data Monitoring • Data Logging & Trend Analysis • Identifying Anomalies in Test Results • Case Study on Data Interpretation*
0830 – 0930	***Process Optimization Through Pilot Testing*** *Identifying Inefficiencies & Bottlenecks • Fine-Tuning Operating Parameters for Improved Performance • Scale-Up Challenges & How to Overcome Them • Case Study on Process Optimization Through Pilot Testing*
0930 - 0945	*Break*
0945 – 1130	***Troubleshooting Common Issues in Lab Testing*** *Equipment Calibration Errors & Impact on Results • Sample Contamination & Mitigation Techniques • Addressing Inconsistencies in Repeat Testing • Best Practices for Improving Lab Test Reliability*
1130 - 1230	***Troubleshooting Common Issues in Pilot Testing*** *Identifying Process Deviations & Root Cause Analysis • Equipment Failures & Maintenance Strategies • Handling Scaling, Fouling, & Pressure Fluctuations • Case Studies on Pilot Plant Troubleshooting*
1230 - 1245	*Break*
1245 - 1420	***Risk Management in Pilot Testing Operations*** *Identifying Potential Hazards in Pilot Plant Operations • Implementing Mitigation Measures for High-Risk Tests • Safety Protocols for Pilot-Scale Testing • Case Study on Risk Assessment in a Pilot Plant*
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 - 0930	***Case Studies on Successful Lab & Pilot Testing Projects*** *Lab & Pilot-Scale Testing • Lessons Learned from Past Successes & Failures • Industry Best Practices for Transitioning from Pilot to Full-Scale Operations • Future Innovations in Lab & Pilot Testing for the Petroleum Industry*
0930 - 0945	*Break*
0945 - 1130	***Hands-On Training: Lab Testing Procedures*** *Performing Viscosity, API Gravity, & Sulfur Content Tests • Gas Chromatography Demonstration for Hydrocarbon Analysis • Water Contamination & Corrosion Testing Exercise • Data Interpretation & Report Preparation*
1130 - 1230	***Hands-On Training: Pilot Plant Operations*** *Demonstration of Pilot-Scale Hydroprocessing & Refining • Flow Control & Pressure Monitoring in a Pilot Unit • Heat Exchanger & Reactor Efficiency Testing • Process Troubleshooting Exercises*
1230 - 1245	*Break*
1245 - 1300	***Advanced Analytical Techniques for Lab & Pilot Testing*** *Mass Spectrometry & Spectroscopy Applications • X-Ray Diffraction (XRD) for Material Analysis • Thermal Analysis Methods for Crude & Refined Products • Case Study on Advanced Testing Methods in Research*
1300 – 1315	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1315 – 1415	***POST TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This practical and highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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