COURSE OVERVIEW PE1015
AI in Crude Oil Processing

Course Title
AI in Crude Oil Processing

Course Date/Venue
Session 1: April 14-18, 2025/Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: October 19-23, 2025/Tamra Meeting Room, Al Bandar Rotana Creek, Dubai UAE

Course Reference
PE1015

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 Artificial Intelligence in Crude Oil Processing. It covers the fundamentals of AI in oil refining and processing and the AI-powered data analytics for refining operations; the AI for feedstock characterization and quality prediction, distillation and fractionation optimization, process control and real-time monitoring; the AI for predictive maintenance of refinery equipment, heat exchanger and boiler efficiency optimization; and the AI in catalytic cracking and hydroprocessing optimization, pump and compressor health monitoring and pipeline and storage tank monitoring.

Further, the course will also discuss the AI for crude oil blending optimization, hydrogen and sulfur recovery units (SRU) and desalting and water management in refining; the AI for refinery energy efficiency and emissions reduction and the aromatics, gasoline, and diesel production; the hazard identification in refineries and machine learning for accident prediction and prevention; the AI-powered real-time gas detection and leak prevention, AI-assisted emergency response and safety drills; and the AI-driven predictive analytics for greenhouse gas emission and machine learning for refinery air quality monitoring.

During this interactive course, participants will learn the AI-powered real-time monitoring of volatile organic compounds (VOCs) and AI-assisted compliance with environmental regulations; the digital twin and AI in in advanced control systems and process automation, smart refinery management and AI-driven decision making; the future AI trends in refining and crude oil processing; and the AI for AI-driven predictive analytics in oil refining, reducing operational costs and increasing efficiency.

Course Objectives

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

- Apply and gain a comprehensive knowledge on artificial intelligence in crude oil processing
- Discuss the fundamentals of AI in oil refining and processing and apply AI-powered data analytics for refining operations
- Carryout AI for feedstock characterization and quality prediction, distillation and fractionation optimization and process control and real-time monitoring
- Employ AI for predictive maintenance of refinery equipment, heat exchanger and boiler efficiency optimization
- Illustrate AI in catalytic cracking and hydroprocessing optimization, pump and compressor health monitoring as well as pipeline and storage tank monitoring
- Apply AI for crude oil blending optimization, hydrogen and sulfur recovery units (SRU) and desalting and water management in refining
- Implement AI for refinery energy efficiency and emissions reduction including aromatics, gasoline, and diesel production
- Apply hazard identification in refineries and machine learning for accident prediction and prevention
- Carryout AI-powered real-time gas detection and leak prevention as well as AI-assisted emergency response and safety drills
- Employ AI-driven predictive analytics for greenhouse gas emission and machine learning for refinery air quality monitoring
- Describe AI-powered real-time monitoring of volatile organic compounds (VOCs) and AI-assisted compliance with environmental regulations
- Discuss digital twin and apply AI in in advanced control systems and process automation, smart refinery management and AI-driven decision making
- Explain the future AI trends in refining and crude oil processing and apply AI for AI-driven predictive analytics in oil refining, reducing operational costs and increasing efficiency

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 artificial intelligence in crude oil processing for project managers, operations and plant managers, engineers (process, chemical, and mechanical), data scientists & AI specialists, technicians and maintenance personnel, quality control and assurance professionals, research and development teams, energy consultants and analysts, supply chain and logistics professionals, it and automation professionals, environmental and safety experts, executives and decision makers.

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)

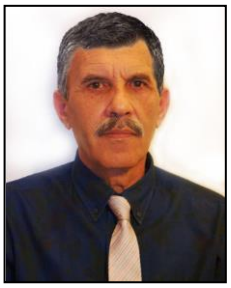
  Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** 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. Mike Poulos, MSc, BSc, is a **Senior Process Engineer** with over **35 years** of industrial experience within the **Utilities**, **Refinery**, **Petrochemical** and **Oil & Gas** industries. His expertise lies extensively in the areas of **Process Equipment Design & Troubleshooting**, **Petroleum Processing**, **Process Design Specifications**, **Process Calculation Methods**, **Equipment Sizing & Selection**, **Safety Consideration** Inspection & Maintenance in Plant Operations, **Effective Writing** of **Operation & Maintenance** Procedures and Validation, **PHA** of Operating Procedures Skills, **Piping**, **Pumps**, **Compressors**, **Heat Exchangers**, **Air Coolers**, **Direct-Fired Heaters**, **Process Vessels**, **Fractionator Columns**, **Reactors, Ancillary Equipment**, **Mechanical & Safety Aspects**, **Cost Estimation**, **Commissioning & Start-Up**, **Production & Cost Reduction**, Reactor Building Ventilation System, **PVC** Initiators Storage Bunkers, **PVC** Modernization & Expansion, **PVC** Reactor, **PVC** Plant Reactors Pre-Heating, **PVC** Plant Start-Up & Commissioning, **PVC** Plant Shutdown, **PVC** Driers Automation, **VC**M Recovery, **VCM** Sphere Flooding System, **VCM** Storage Tanks, Steam Tripping Facilities, Solvents Plant Automation Commissioning & Start-Up and Inferential Properties System. Further, he is also well-versed in Advanced Process Control Technology, Designing Process Plant Fail-Safe Systems, Quantitative Risk Assessment, On-Line Statistical Process Control, Principles and Techniques of Contemporary Management, Rosemount RS3, Polymer Additives, Polymer Reaction Engineering, Polymer Rheology and Processing, GRID Management and Batch Process Engineering.

During his career life, Mr. Poulos held significant positions as the **Chemical Plants Technology Engineer**, **PVC Plant Production Engineer**, **PVC Plant Shutdown Coordinator**, **PVC Plant/CC Solvents Plants Acting Section Head** and **Chemical Distribution Section Head** from Hellenic Petroleum, wherein he was responsible for the development of integrated system.

Mr. Poulos has **Master's** and **Bachelor's** degrees in **Chemical Engineering** from the **University of Massachusetts** and **Thessaloniki Polytechnic** respectively. Further, he is a **Certified Instructor/Trainer, a** and a **member** of the **Greek Society of Chemical Engineers** and **Greek Society of Engineers**.

Accommodation

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

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.

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.

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	***Fundamentals of AI in Oil Refining & Processing*** *What is Artificial Intelligence (AI)? • Role of AI in Refining & Crude Oil Processing • AI versus Traditional Process Control Methods • Key AI Technologies (Machine Learning, Deep Learning, IoT, Digital Twins)*
0930 – 0945	*Break*
0945 – 1030	***AI-Powered Data Analytics for Refining Operations*** *Importance of Big Data in Crude Oil Processing • AI-Driven Real-Time Data Interpretation • AI-Powered Decision-Making in Refineries • Case Studies of AI-Driven Analytics in Oil Processing*
1030 – 1130	***AI for Feedstock Characterization & Quality Prediction*** *AI-Based Crude Oil Composition Analysis • Machine Learning for Predicting Crude Quality Variations • AI-Assisted Crude Blending Optimization • AI-Driven Forecasting of Crude Behavior in Refining Processes*
1130 – 1215	***AI in Distillation & Fractionation Optimization*** *AI-Powered Optimization of Crude Distillation Units (CDU) • Machine Learning for Predicting Distillation Column Efficiency • AI-Driven Fraction Yield Optimization • AI for Identifying Distillation Process Inefficiencies*
1215 – 1230	*Break*
1230 – 1330	***AI for Process Control & Real-Time Monitoring*** *AI-Driven Predictive Process Control • Machine Learning for Detecting Anomalies in Refining Operations • AI-Assisted Real-Time Process Optimization • AI-Powered Early Fault Detection in Refining Units*
1330 – 1420	***Hands-On: AI-Based Data Analysis for Refining Operations*** *Implementing AI Models for Crude Oil Property Prediction • AI-Driven Process Monitoring in Distillation Units • Machine Learning for Fraction Yield Optimization • AI-Powered Crude Blending Optimization*
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	***AI for Predictive Maintenance of Refinery Equipment*** *AI-Driven Predictive Failure Detection in Processing Units • Machine Learning for Refinery Asset Condition Monitoring • AI-Powered Maintenance Scheduling for Critical Equipment • Case Studies of AI-Driven Maintenance in Refineries*
0830 – 0930	***AI for Heat Exchanger & Boiler Efficiency Optimization*** *AI-Assisted Heat Exchanger Fouling Prediction • Machine Learning for Optimizing Boiler Performance • AI-Powered Efficiency Monitoring in Thermal Units • AI-Driven Predictive Maintenance for Heat Exchangers*
0930 – 0945	*Break*
0945 – 1100	***AI in Catalytic Cracking & Hydroprocessing Optimization*** *AI-Based Optimization of Fluid Catalytic Cracking (FCC) • Machine Learning for Hydrocracking Process Improvements • AI-Driven Catalyst Performance Prediction • AI for Hydrogen Consumption Forecasting in Hydroprocessing*
1100 – 1215	***AI for Pump & Compressor Health Monitoring*** *Machine Learning for Pump Failure Prediction • AI-Powered Vibration Analysis for Rotating Equipment • AI-Driven Compressor Performance Monitoring • AI-Assisted Predictive Maintenance for Critical Refinery Equipment*
1215 – 1230	*Break*
1230 – 1330	***AI for Pipeline & Storage Tank Monitoring*** *AI-Based Pipeline Leak Detection Systems • Machine Learning for Corrosion and Crack Prediction • AI-Driven Real-Time Monitoring of Crude Oil Storage Tanks • AI-Powered Tank Level and Inventory Optimization*
1330 – 1420	***Hands-On: AI for Predictive Maintenance & Equipment Health*** *AI-Based Vibration Analysis for Rotating Machinery • Machine Learning Models for Refinery Pump Failure Prediction • AI-Driven Predictive Maintenance for Heat Exchangers • AI-Powered Efficiency Monitoring in Refinery Boilers*
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	***AI for Crude Oil Blending Optimization*** *AI-Driven Crude Oil Compatibility Analysis • Machine Learning for Optimal Crude Blending Strategies • AI-Powered Viscosity and API Gravity Predictions • AI-Assisted Real-Time Blending Control*
0830 – 0930	***AI in Hydrogen & Sulfur Recovery Units (SRU)*** *AI-Driven Hydrogen Demand Forecasting • Machine Learning for Sulfur Recovery Efficiency Improvement • AI-Powered Optimization of Tail Gas Treatment Processes • AI-Assisted Predictive Modeling of Claus Unit Performance*
0930 – 0945	*Break*
0945 – 1100	***AI for Desalting & Water Management in Refining*** *AI-Based Crude Desalting Optimization • Machine Learning for Wastewater Treatment in Refineries • AI-Driven Corrosion Risk Assessment in Desalting Units • AI-Powered Real-Time Monitoring of Water Quality*

1100 – 1215	***AI for Refinery Energy Efficiency & Emissions Reduction*** *AI-Driven Refinery Energy Consumption Forecasting • Machine Learning for Fuel Gas Optimization • AI-Powered Emissions Monitoring and Reduction Strategies • AI-Assisted Predictive Analytics for Carbon Footprint Reduction*
1215 – 1230	*Break*
1230 – 1330	***AI in Aromatics, Gasoline, and Diesel Production*** *AI for Gasoline Blending and Octane Number Prediction • Machine Learning for Diesel Sulfur Content Optimization • AI-Powered Optimization of Aromatics Production • AI-Assisted Predictive Analytics for Product Quality Assurance*
1330 – 1420	***Hands-On: AI-Based Process Optimization*** *AI-Driven Crude Blending Optimization Model • Machine Learning for Hydrogen Consumption Forecasting • AI-Powered Predictive Analytics for Sulfur Recovery Efficiency • AI-Assisted Refinery Emissions Monitoring System*
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	***AI for Refinery Safety & Risk Management*** *AI-Driven Hazard Identification in Refineries • Machine Learning for Accident Prediction and Prevention • AI-Powered Real-Time Gas Detection and Leak Prevention • AI-Assisted Emergency Response and Safety Drills*
0830 – 0930	***AI for Environmental Compliance & Emission Monitoring*** *AI-Driven Predictive Analytics for Greenhouse Gas Emissions • Machine Learning for Refinery Air Quality Monitoring • AI-Powered Real-Time Monitoring of Volatile Organic Compounds (VOCs) • AI-Assisted Compliance with Environmental Regulations*
0930 – 0945	*Break*
0945 – 1100	***AI-Powered Digital Twin Technology for Refineries*** *What is a Digital Twin? • AI-Driven Real-Time Refinery Simulation Models • Machine Learning for Process Optimization in Digital Twins • AI-Powered Predictive Analytics for Refinery Performance Monitoring*
1100 – 1215	***AI in Advanced Control Systems & Process Automation*** *AI-Assisted Distributed Control System (DCS) Optimization • Machine Learning for Advanced Process Control (APC) • AI-Driven Refinery-Wide Automation Strategies • AI-Powered Decision Support Systems for Operators*
1215 – 1230	*Break*
1230 – 1330	***AI for Smart Refinery Management & AI-Driven Decision Making*** *AI-Powered Real-Time Refinery Production Scheduling • Machine Learning for Refinery Economics Optimization • AI-Driven Supply Chain and Logistics Planning • AI-Assisted Refinery Margin and Profitability Forecasting*

1330 – 1420	***Hands-On: AI for Safety & Digital Twin Applications*** *AI-Driven Risk Prediction Model for Refinery Operations • Machine Learning for Environmental Compliance Monitoring • AI-Powered Refinery Digital Twin Simulation • AI-Assisted Refinery Production Scheduling Optimization*
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	***Future AI Trends in Refining & Crude Oil Processing*** *AI-Powered Self-Optimizing Refinery Systems • AI-Driven Autonomous Plant Operations • AI-Assisted Refinery Digital Transformation Strategies • AI for Sustainability and Circular Economy in Refining*
0930 – 0945	*Break*
0945 – 1100	***AI for AI-Driven Predictive Analytics in Oil Refining*** *AI-Powered Predictive Maintenance Evolution • AI-Driven Smart Refining Operations • AI-Assisted Refinery Workforce Optimization • AI-Powered Automated Process Troubleshooting*
1100 – 1215	***AI for Reducing Operational Costs & Increasing Efficiency*** *AI-Driven Refinery Profitability Optimization • Machine Learning for Cost Reduction in Crude Oil Processing • AI-Powered Energy Efficiency Improvement Models • AI-Assisted Fuel Blending Cost Minimization*
1215 – 1230	*Break*
1230 – 1345	***Hands-On: AI-Powered Refining Optimization Model*** *AI-Based Refinery Process Control Simulation • Machine Learning Model for Predictive Maintenance Strategy • AI-Powered Emissions Tracking and Compliance System • AI-Assisted Refinery Economics and Profitability Optimization*
1330 – 1345	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about t Topics that were Covered During the Course*
1345 – 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

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