COURSE OVERVIEW PE0238
Introduction to Basic Petroleum Chemistry

Course Title
Introduction to Basic Petroleum Chemistry

Course Date/Venue
Session 1: June 23-27, 2025/Fujairah Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
Session 2: December 09-11, 2025/Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE

Course Reference
PE0238

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 Basic Petroleum Chemistry. It covers the composition of crude oil including physical and chemical properties of petroleum; the hydrocarbon structures and classifications as well as non-hydrocarbon components in crude oil; the crude oil measurement techniques and the basics of petroleum refining chemistry; the physical and chemical properties of crude oil fractions; and the thermal and catalytic cracking processes, reforming and isomerization chemistry as well as desulfurization and hydroprocessing technologies.

During this interactive course, participants will learn the petrochemical chemistry and feedstock processing including laboratory techniques in petroleum chemistry; the thermodynamics and reaction kinetics in petroleum chemistry; the polymerization and alkylation reactions in refining; the corrosion chemistry in oil and gas processing; the water chemistry and emulsions in oil production; the carbon capture and sustainable chemistry in oil & gas including air and water pollution from petroleum processing; handling and storing petroleum chemicals; the hazardous waste management in oil and gas industry; the fire and explosion chemistry in oil and gas facilities; and the future trends in petroleum chemistry.

Course Objectives

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

- Apply and gain a basic knowledge on petroleum chemistry
- Identify the composition of crude oil including physical and chemical properties of petroleum
- Recognize hydrocarbon structures and classifications as well as non-hydrocarbon components in crude oil
- Carryout crude oil measurement techniques and discuss the basics of petroleum refining chemistry
- Identify the physical and chemical properties of crude oil fractions
- Illustrate thermal and catalytic cracking processes, reforming and isomerization chemistry as well as desulfurization and hydro processing technologies
- Apply petrochemical chemistry and feedstock processing including laboratory techniques in petroleum chemistry
- Discuss thermodynamics and reaction kinetics in petroleum chemistry
- Describe polymerization and alkylation reactions in refining
- Determine corrosion chemistry in oil and gas processing as well as water chemistry and emulsions in oil production
- Discuss carbon capture and sustainable chemistry in oil & gas including air and water pollution from petroleum processing
- Handle and store petroleum chemicals and apply hazardous waste management in oil and gas industry
- Interpret fire and explosion chemistry in oil and gas facilities and the future trends in petroleum chemistry

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 to basic petroleum industry for oil and gas maintenance technicians, plant and facility operators, industrial cleaning specialists, pipeline and tank maintenance personnel, health, safety, and environment (HSE) officers, oil and gas engineers, shutdown and turnaround specialists, regulatory and compliance professionals 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.

- The International Accreditors for Continuing Education and Training (IACET - USA)

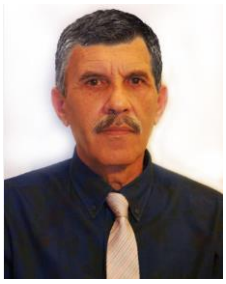
Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** 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**, **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**.

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 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.

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 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 Petroleum & Its Chemical Composition*** *Definition & Origin of Petroleum • Composition of Crude Oil (Hydrocarbons & Non-Hydrocarbons) • Physical & Chemical Properties of Petroleum • Classification of Crude Oil (Light, Medium, Heavy, Extra Heavy*
0930 – 0945	*Break*
0945 – 1030	***Hydrocarbon Structures & Classifications*** *Alkanes (Paraffins) – Straight & Branched Chains • Alkenes & Alkynes – Unsaturated Hydrocarbons • Aromatic Hydrocarbons (Benzene & Polycyclic Aromatics) • Naphthenes (Cycloalkanes) & Their Role in Petroleum*
1030 – 1130	***Non-Hydrocarbon Components in Crude Oil*** *Sulfur Compounds & Their Impact on Refining • Nitrogen & Oxygen Compounds in Petroleum • Heavy Metals & Their Environmental Concerns • Water and Salt Contamination in Crude Oil*
1130 – 1215	***Crude Oil Properties & Measurement Techniques*** *API Gravity & Its Significance • Viscosity & Flow Behavior of Petroleum Fluids • Pour Point, Flash Point & Autoignition Temperature • Thermal Stability & Oxidation Characteristics*
1215 – 1230	*Break*
1230 – 1420	***Basics of Petroleum Refining Chemistry*** *Role of Refining in Petroleum Processing • Fractional Distillation & Product Separation • Cracking Reforming & Hydroprocessing •Role of Additives & Catalysts in Refining*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day One*

Day 2

0730 – 0830	***Physical & Chemical Properties of Crude Oil Fractions*** *Light Distillates: Gasoline, Naphtha, Kerosene • Middle Distillates: Diesel, Jet Fuel Middle Distillates: Diesel, Jet Fuel • Heavy Distillates: Fuel Oils, Residuum • Impact of Fraction Composition on End-Use Applications*
0830 – 0930	***Thermal & Catalytic Cracking Processes*** *Overview of Cracking Mechanisms • Fluid Catalytic Cracking (FCC) Process • Hydrocracking for Heavy Oil Upgrading •Role of Zeolites & Catalysts in Cracking*
0930 – 0945	*Break*
0945 – 1100	***Reforming & Isomerization Chemistry*** *Catalytic Reforming & Aromatic Production • Isomerization of Light Hydrocarbons for Octane Enhancement •Hydrogenation Reactions in Refining • Role of Catalysts in Reforming & Isomerization*
1100 – 1215	***Desulfurization & Hydroprocessing Technologies*** *Hydrodesulfurization (HDS) for Sulfur Removal • Hydrodenitrogenation (HDN) & Hydrodeoxygenation (HDO) • Impact of Sulfur Removal on Environmental Regulations • Initiatives for Low-Sulfur Fuels*
1215 – 1230	*Break*
1230 – 1330	***Petrochemical Chemistry & Feedstock Processing*** *Overview of Petrochemical Production from Crude Oil• Steam Cracking for Ethylene & Propylene Production • Olefin & Aromatic Chemistry in Petrochemicals • Petrochemical Business & Key Products*
1330 – 1420	***Laboratory Techniques in Petroleum Chemistry*** *Spectroscopy Techniques (FTIR, NMR, UV-Vis) • Chromatographic Methods (GC, HPLC) • Elemental Analysis for Sulfur & Metals Detection • Quality Control & Standard Testing Procedures*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Two*

Day 3

0730 – 0830	***Thermodynamics & Reaction Kinetics in Petroleum Chemistry*** *Principles of Thermodynamics in Hydrocarbon Processing • Chemical Equilibrium & Phase Behavior • Kinetics of Hydrocarbon Reactions • Impact of Temperature & Pressure on Petroleum Reactions*
830 – 0930	***Polymerization & Alkylation Reactions in Refining*** *Polymerization of Olefins in Fuel Processing • Alkylation for High-Octane Fuel Production • Role of Acid Catalysts in Alkylation Reactions • Environmental Concerns & Alternatives in Alkylation*
0930 – 0945	*Break*
0945 – 1100	***Corrosion Chemistry in Oil & Gas Processing*** *Types of Corrosion in Petroleum Processing • Role of Sulfur & Acidic Compounds in Corrosion • Corrosion Prevention Techniques (Inhibitors, Coatings) • Corrosion Management Strategies*
1100 – 1215	***Water Chemistry & Emulsions in Oil Production*** *Formation of Water-Oil Emulsions & Treatment • Role of Surfactants in Emulsion Stability • Water Injection Chemistry in Enhanced Oil Recovery (EOR) • Produced Water Management Initiatives*

1215 – 1230	*Break*
1230 – 1420	***Carbon Capture & Sustainable Chemistry in Oil & Gas*** *CO_2 Capture & Utilization in Refining • Hydrogen Production & Fuel Cell Chemistry • Green Chemistry Approaches in Oil Refining •Sustainability & Decarbonization Goals*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Case Study: Advances in Petroleum Chemistry*** *Research in Petrochemical Innovations • Implementation of Advanced Refining Technologies • Role in Global Energy Transition • Future Trends in Chemical Research Initiatives*
0930 – 0945	*Break*
0945 – 1100	***Air & Water Pollution from Petroleum Processing*** *Emissions from Refining & Petrochemical Facilities • VOCs & Their Environmental Impact • Oil Spill Chemistry & Remediation Techniques • Environmental Protection Measures*
1100 – 1215	***Handling & Storage of Petroleum Chemicals*** *Safety Considerations for Crude Oil and Fuels • Hazardous Materials Classification & Regulations • Safety Protocols for Chemical Handling • Storage Tank Chemistry & Corrosion Control*
1215 – 1230	*Break*
1230 – 1330	***Hazardous Waste Management in Oil & Gas Industry*** *Classification of Hazardous Wastes in Petroleum Processing • Waste Treatment & Disposal Strategies • Recycling & Reuse of Refining Byproducts • Regulatory Compliance for Hazardous Waste Management*
1330 – 1420	***Fire & Explosion Chemistry in Oil & Gas Facilities*** *Chemistry of Hydrocarbon Fires & Explosions • Flash Points, Flammability Limits, & Fire Prevention • Fire Protection & Emergency Response Strategies • Case Study: Past Incidents & Lessons Learned*
1420 – 1430	***Recap*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today & Advise Them of the Topics to be Discussed Tomorrow*
1430	*Lunch & End of Day Four*

Day 5

0730 – 0930	***Role in Sustainable Development Goals (SDGs)*** *Initiatives for Emission Reduction • Renewable Energy Integration in Oil & Gas • Carbon Neutrality & Net-Zero Targets • Innovations in Energy Transition Strategy*
0930 – 0945	*Break*
0945 – 1100	***Workshop: Chemical Analysis of Petroleum Samples*** *Hands-on Training in Hydrocarbon Analysis • Laboratory Techniques for Quality Control • Interpretation of Petroleum Assay Data • Final Presentation & Results Discussion*

1100 – 1230	***Future Trends in Petroleum Chemistry*** *Emerging Technologies in Refining & Petrochemicals •Role of AI & Digitalization in Chemical Processing • Innovation Strategy in Petroleum Chemistry • Forecast for the Future of Hydrocarbon Chemistry*
1230 – 1245	*Break*
1245 – 1345	***Case Study: Advanced Chemical Research*** *Petrochemical R&D Programs • Implementation of New Refining Technologies • Collaboration with Global Research Institutes • Impact of Innovations on Market Trends*
1345 – 1400	***Course Conclusion***
1400 – 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