COURSE OVERVIEW PE0621
Petrochemical Manufacturing Process & Troubleshooting

Course Title
Petrochemical Manufacturing Process & Troubleshooting

Course Reference
PE0621

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

Course Date/Venue

Session(s)	Date	Venue
1	May 18-22, 2025	Meeting Plus 9, City Centre Rotana, Doha Qatar
2	August 18-22, 2025	Glasshouse Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	November 16-20, 2025	Crowne Meeting Room, Crowne Plaza Al Khobar, KSA

Course Description

This hands-on, 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

Natural gas and crude distillates such as naptha from petroleum refining are used as feedstocks to manufacture a wide variety of petrochemicals that are in turn used in the manufacture of consumer goods. The basic petrochemicals manufactured by cracking, reforming and other processes include olefins (such as ethylene, propylene, butylenes and butadiene) and aromatics (such as benzene, toluene and xylenes). The capacity of naptha crackers is generally of the order of 250,000-750,000 metric tons per year (tpy) of ethylene production. Some petrochemical plants also have alcohol and oxo-compound manufacturing units on site. The base petrochemicals or products derived from them, along with other raw materials, are converted to a wide range of products.

This course is designed to cover the manufacturing process of petrochemicals and the monitoring and troubleshooting of such process. It covers petrochemicals and petrochemical complex, aromatics, olefins, synthesis gas (syngas), methanol synthesis, formaldehyde, methanol manufacturing and sources of olefinic and aromatic hydrocarbons.

Further, the course will also cover the treatment of olefenic C_4 and C_5 cuts and the treatment of aromatic gasolines including acetylene, monomers for the synthesis of elastomers, ethylene and propylene oxides, acetic derivatives, alcohols, phenol, acetone and methyl ethyl ketone, vinyl monomers, monomers for polyamide synthesis, monomers for polyester synthesis, monomers for polyurethane synthesis and olefin production from methanol.

Course Objectives

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

- Apply systematic techniques on petrochemical manufacturing process and troubleshooting
- Discuss petrochemicals and petrochemical complex that includes downstream units and petrochemicals' hub
- Determine aromatics, olefins, synthesis gas (syngas), methanol synthesis and formaldehyde
- Carryout methanol manufacturing as well as recognize the sources of olefinic and aromatic hydrocarbons
- Perform proper treatment of olefenic C_4 and C_5 cuts as well as the treatment of aromatic gasolines
- Describe acetylene, monomers for the synthesis of elastomers, ethylene and propylene oxides
- Identify the acetic derivatives, alcohols, phenol, acetone, methyl ethyl ketone and vinyl monomers
- Differentiate monomers for polyamide synthesis, monomers for polyester synthesis, monomers for polyurethane synthesis and olefin production from methanol

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 petrochemical manufacturing process and troubleshooting for process, chemical, operation, maintenance and design and production engineers and technical staff. Further, the course is suitable for environmental, laboratory, R&D and R&T staff including chemists, scientists, analysts, technologist, technicians and environmental professionals.

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.

- USA International Association for Continuing Education and Training (IACET)

  Haward Technology is an Authorized Training Provider by the International Association for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, Virginia 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 1-2013 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 1-2013 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 Association 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. Robert Harvey, MSc (Cum Laude), BSc is a **Senior Chemical Engineer** with over **30 years** of in-depth industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical**, **Mining** and **Power** industries. His expertise widely covers in the areas of **Fertilizer Manufacturing** Process Technology, **Fertilizer Storage** Management (Ammonia & Urea), **Petrochemical & Fertilizer** Plants, **Nitrogen Fertilizer** Production, **Petroleum Industry Process** Engineering, **Process Equipment** Design & Troubleshooting, **Process Equipment & Piping Systems**, **Fertilizer** Manufacturing Process Technology, **Production** Management, **Process Plant** Optimization & Continuous Improvement, **Revamping & Debottlenecking**, **Pressure Vessel** Operation, **Heat Mass Balance**, **Distillation-Column** Operation, & Troubleshooting, **Production Process** Optimization, **Debottlenecking**, **Unit Performance** Optimization, **Process Analyzers**, Real Time Online Optimization, **Operations Planning** Optimization, **Engineering Problem Solving**, **Bag Filters** Operation & Maintenance, **Process Equipment** Design, Chemical Reaction Engineering Application, **Phosphatic Industry**, **Diammonium Phosphate**, **Monoammonium Phosphate**, **NPK**, Troubleshooting Improvement, **Production** Management, **Distillation-Column** Operation & Troubleshooting, Vinyl Chloride Monomer (**VCM**) Manufacturing & Process Troubleshooting, **Monomer** Handling Safety, **Cement** Manufacturing Process Technology & Standards, Complex Operational Troubleshooting, Incident **Root Cause Analysis** & Corrective Action, **Process Equipment & Piping** System, **Fertilizer** Manufacturing, **Process Plant** Optimization & Continuous Improvement, **Process Plant** Performance & Efficiency, Continuous Improvement & Benchmarking, **Energy Efficiency** for Process Plants, **Pressure Vessel** Operation, **Reactors & Storage Tanks**, Dehydrating Columns, Heat & Material Balance, **Troubleshooting Process Operations**, Modern **Aluminium Production Processes**, **Cement Kiln Process**, **Process Engineer Calculations**, Steel Making Process, **P&ID** Reading & Interpretation, **Detailed Engineering Design**, **Process Diagrams** Review, Process Hazard Analysis (**PHA**), **HAZOP** Leadership, Project HSE Review (**PHSER**), Safe Handling of **Propylene Oxide & Ethylene Oxide**, Safety in **Process & Industrial Plants**, Environmental Impact Assessment (**EIA**) and Effective **Risk Assessment & HAZOP** Studies. Further, he is also well versed in Feasibility Studies Analysis & Evaluation, Project Gate System Procedures, Process Mapping, Change Management Skills, Change Management Strategy, Strategical Process Control in Process Industry, Developing Commercial Contracts, Project Management Skills, Project Scheduling & Cost Control, FIDIC & Other Model Contracts, EPC & EPCM Contracts, Knowledge Management, Job Evaluation, Creative Problems Solving & Innovation Skills, Problem Solving & Decision Making, Strategic Planning & Creative Thinking and Mind Mapping.

During his career life, Mr. Harvey has gained his practical and field experience through his various significant positions and dedication as the **Commercial Director**, **Manufacturing Director**, **Chief Operating Officer**, **Head Projects Division**, **Project Leader**, **Lead Technical Advisor/Consultant** and **Project Consultant** to various international companies such as the Trade and Industrial Policy Strategies (TIPS), PGBI Johannesburg, IDC Green Industries SBU/Arengo 316 Pty Ltd, Ferrum Crescent Limited, CEF Limited, Rio Tinto Alcan, Industrial Development Corporation of SA (IDC) and AECI Limited.

Mr. Harvey has **Master's** (**Cum Laude**) and **Bachelor's** degrees in **Chemical Engineering**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Assessor/Trainer** by the **Institute of Leadership & Management** (**ILM**) and has delivered various trainings, seminars, conferences, workshops and courses globally.

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

Doha	**US$ 6,000** per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Abu Dhabi	**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.
Al Khobar	**US$ 5,500** per Delegate. 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 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 – 0845	***Introduction of Petrochemicals*** *Feedstocks • Intermediates • Finished Products*
0845 – 0930	***Petrochemical Complex*** *Downstream Units • Petrochemicals' Hub*
0930 – 0945	*Break*
0945 – 1100	***Aromatics*** *Xylene and Polyester Chain • Toluene, Benzene, Polyurethane and Phenolic Chain • Benzene and Styrenic Chain, Derivatives*

1100 – 1215	***Olefins*** *Ethylene, Derivatives • Propylene, Derivatives • Butadiene, Butylenes, and Pygas, Derivatives*
1215 – 1230	*Break*
1230 – 1420	***Synthesis Gas (Syngas)*** *Methanol Based Products • Ammonia Based Products*
1420 – 1430	***Recap***
1430	*Lunch & End of Day One*

Day 2

0730 – 0815	***Methanol Synthesis*** *Preparation of Synthesis Gas • Thermodynamic Aspects of Methanol Synthesis • Kinetic Aspects of Methanol Synthesis • Processes • Economic Data • Uses and Producers*
0815 – 0930	***Formaldehyde*** *Direct Oxidation of Hydrocarbons • Methanol Oxidation • Economic Data • Uses and Producers*
0930 – 0945	*Break*
0945 – 1100	***Methanol Manufacturing*** *Lurgi MegaMethanol® Technology • Process Description*
1100 – 1215	***Sources of Olefinic and Aromatic Hydrocarbons*** *Steam Cracking • Catalylic Reforming • Other Sources of Olefinic Hydrocarbons • Other Sources of Aromatic Hydrocarbons*
1215 – 1230	*Break*
1230 – 1420	***The Treatment of Olefenic C_4 and C_5 Cuts*** *Upgrading of of C_4 Cuts • Upgrading of C_5 Cuts*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Two*

Day 3

0730 – 0915	***The Treatment of Aromatic Gasolines*** *Main Processing Schemes • Physical Methods for Separating Aromatics • Treatment of the Aromatic C_8 Cut • Aromatics Conversion Processes • Aromatic Loop, Simplified Balance • Uses & Producers*
0915 – 0930	*Break*
0930 – 1030	***Acetylene*** *Theoretical Considerations • Acetylene Manufacture from Coal Calcium Carbide Process • Acetylene Manufacture from Hydrocarbons, Thermal Processes with Direct Heat Transfer • Acetylene Manufacture from Hydrocarbons, Thermal Processes with Indirect Heat Transfer • Acetylene Manufacture from Hydrocarbons, Autothermal Processes • Acetylene Manufacture by Extraction from Steam-Cracked C_2 Cuts • Economic Data • Uses & Procedures*
1030– 1145	***Monomers for the Synthesis of Elastomers*** *Butadiene • Isobutene • Isoprene • Styrene • p-Methyl Styrene • Chloropene*
1145 – 1200	*Break*
1200 – 1420	***Ethylene and Propylene Oxides*** *Ethylene Oxide • Propylene Oxide • Ethylene Glycol • Propylene Glycol*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Three*

Day 4

0730 – 0930	***Acetic Derivatives*** *Acetaldehyde • Acetic Acid • Acetic Anhydride*
0930 – 0945	*Break*
0945 – 1115	***Alcohols*** *Ethanol • Isopropanol • Butanols • Higher Alcohols*
1115 – 1145	***Phenol, Acetone and Methyl Ethyl Ketone*** *Phenol • Acetone • Methyl Ethyl Ketone*
1145 – 1200	*Break*
1200 – 1420	***Vinyl Monomers*** *Vinyl Acetate • Vinyl Chloride • Acrylic Acid, Acrylates and Methacrylates • Acrylonitrile*
1420 – 1430	***Recap***
1430	*Lunch & End of Day Four*

Day 5

0730 – 0945	***Monomers for Polyamide Synthesis*** *Manufacture of Nylon-6,6, Adipic Acid and Hexamethylene Diamine • Manufacture of Nylon-6, Caprolactam • Manufacture of Nylon-11, 11-Aminoundecanoic Acid • Manufacture of Nylon-12, Laurolactam*
0945 – 1000	*Break*
1000 – 1100	***Monomers for Polyester Synthesis*** *Dimethyl Terephthalate and Terephthalic Acid • Maleic Anhydride • Phthalic Anhydride • 1,4-Butanediol • 1,4-Dimethylol Cyclohexane*
1100 – 1215	***Monomers for Polyurethane Synthesis*** *Main Monomers Used Industrially to Synthesize Polyurethanes • Synthesis of Tolylene Diisocyanate, TDI • Synthesis of Diphenymethane 4,4'-Diisocyanate MDI and Polymeric MDI • Polyether-Polyols*
1215 – 1230	*Break*
1230 – 1345	***Olefin Production from Methanol*** *Introduction • MTO Technology • Production Process • Economic Basis*
1345 – 1400	***Course Conclusion***
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

Practical Sessions

This hands-on, highly-interactive course includes real-life case studies and exercises:-

Course Coordinator

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