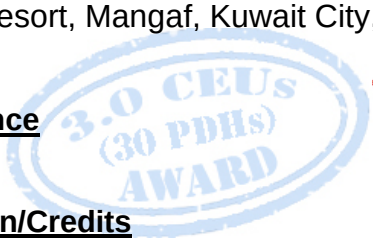
COURSE OVERVIEW PE0787
Refinery & Petroleum Products Quality Specifications, Blending, Mixing, Optimization, Operational Planning, Quality Control & Profitability

Course Title
Refinery & Petroleum Products Quality Specifications, Blending, Mixing, Optimization, Operational Planning, Quality Control & Profitability

Course Date/Venue
October 12-16, 2025/TBA Meeting Room, Hilton Kuwait Resort, Mangaf, Kuwait City, Kuwait



Course Reference
PE0787

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 the "MS Excel" applications.

This course is designed to provide delegates with a detailed and up-to-date overview of refinery and petroleum products quality specifications, blending, mixing, optimization, operational planning, quality control and profitability. It covers the general and organic chemistry and physical and chemical properties of hydrocarbons and petroleum cuts; the petroleum and main non-energy products including the different refinery process technologies; the chemical used in refinery processes; and the product blending, troubleshooting refinery operations and practical problems.

During this interactive course, participants will learn the importance of measurement in refinery mass balance and the density measurement require to convert volume to mass; the movement's qualities and tolerances and the list of frequent movements; the refinery optimization, operations planning, equipment optimization and process optimization; the process operations and the concepts of refinery operational; the planning objectives, planning tools, key crude and product qualities as well as crude and product pricing; and the practical refinery modeling, performance measures and rules of thumb for process engineers.

Course Objectives

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

- Apply and gain an in-depth knowledge on refinery and petroleum products quality specifications, blending, mixing, optimization, operational planning, quality control and profitability
- Discuss general and organic chemistry and physical and chemical properties of hydrocarbons and petroleum cuts
- Identify petroleum and main non-energy products including the different refinery process technologies
- Recognize the chemical used in refinery processes as well as carryout product blending, troubleshooting refinery operations and practical problems
- Discuss the importance of measurement in refinery mass balance and the density measurement require to convert volume to mass
- Calculate and store movement's qualities and tolerances and provide the list of frequent movements
- Apply refinery optimization, operations planning, equipment optimization and process optimization
- Optimize process operations and identify the concepts of refinery operational
- Carryout planning objectives, planning tools, key crude and product qualities as well as crude and product pricing
- Illustrate practical refinery modeling, performance measures and rules of thumb for process engineers

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 refinery and petroleum products quality specifications, blending, mixing, optimization, operational planning, quality control and profitability for planning engineers, process engineers, production engineers, scheduling engineers, marketing engineers and estimation engineers. Further, finance managers, commercial managers, estimation managers, section heads, supervisors and refineries/process plant consultants will gain an excellent knowledge from the operational aspects of this course.

Course Fee

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.

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: -

- 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.

- 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.

Accommodation

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

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. Mervyn Frampton is a **Senior Process Engineer** with over **30 years** of industrial experience within the **Oil & Gas**, **Refinery**, **Petrochemical** and **Utilities** industries. His expertise lies extensively in the areas of **Process Troubleshooting**, **Distillation Towers**, **Fundamentals of Distillation** for Engineers, **Distillation** Operation and Troubleshooting, **Advanced Distillation** Troubleshooting, **Distillation** Technology, Vacuum **Distillation**, **Distillation Column** Operation & Control, **Oil Movement** Storage & Troubleshooting, **Process Equipment** Design, Applied **Process Engineering** Elements, **Process Plant** Optimization, **Revamping & Debottlenecking**, **Process Plant** Troubleshooting & Engineering Problem Solving, **Process Plant** Monitoring, **Catalyst** Selection & Production Optimization, Operations Abnormalities & Plant Upset, **Process Plant** Start-up & Commissioning, **Clean Fuel** Technology & Standards, Flare, Blowdown & Pressure Relief Systems, **Oil & Gas Field Commissioning** Techniques, **Pressure Vessel** Operation, **Gas Processing**, **Chemical** Engineering, **Process Reactors** Start-Up & Shutdown, **Gasoline Blending** for Refineries, **Urea Manufacturing** Process Technology, Continuous Catalytic Reformer (**CCR**), **De-Sulfurization** Technology, Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, **Rotating Equipment** Maintenance & Troubleshooting, **Hazardous Waste Management & Pollution Prevention**, **Heat Exchangers & Fired Heaters** Operation & Troubleshooting, **Energy Conservation** Skills, **Catalyst Technology**, **Refinery & Process Industry**, **Chemical Analysis**, **Process Plant**, **Commissioning & Start-Up**, **Alkylation**, **Hydrogenation**, **Dehydrogenation**, **Isomerization**, **Hydrocracking & De-Alkylation**, **Fluidized Catalytic Cracking**, **Catalytic Hydrodesulphuriser**, **Kerosene Hydrotreater**, **Thermal Cracker**, **Catalytic Reforming**, **Polymerization**, **Polyethylene**, **Polypropylene**, Pilot Water Treatment Plant, **Gas Cooling**, **Cooling Water Systems**, Effluent Systems, Material Handling Systems, **Gasifier**, **Gasification**, Coal Feeder System, **Sulphur Extraction Plant**, **Crude Distillation Unit**, **Acid Plant Revamp** and **Crude Pumping**. Further, he is also well-versed in HSE Leadership, Project and Programme Management, Project Coordination, Project Cost & Schedule Monitoring, Control & Analysis, Team Building, Relationship Management, Quality Management, Performance Reporting, Project Change Control, Commercial Awareness and Risk Management.

During his career life, Mr. Frampton held significant positions as the **Site Engineering Manager**, **Senior Project Manager**, **Process Engineering Manager**, **Project Engineering Manager**, **Construction Manager**, **Site Manager**, **Area Manager**, **Procurement Manager**, **Factory Manager**, **Technical Services Manager**, **Senior Project Engineer**, **Process Engineer**, **Project Engineer**, **Assistant Project Manager**, **Handover Coordinator** and **Engineering Coordinator** from various international companies such as the **Fluor Daniel**, **KBR** South Africa, **ESKOM**, MEGAWATT PARK, CHEMEPIC, PDPS, CAKASA, **Worley Parsons**, Lurgi South Africa, **Sasol**, **Foster Wheeler**, **Bosch** & **Associates**, **BCG** Engineering Contractors, Fina Refinery, Sapref Refinery, Secunda Engine Refinery just to name a few.

Mr. Frampton has a **Bachelor's degree** in **Industrial Chemistry** from **The City University** in **London**. Further, he is a **Certified Instructor/Trainer**, a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management** (**ILM**) and has delivered numerous trainings, courses, workshops, conferences and seminars internationally.

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: ***Sunday, 12th of October 2025***

0730 – 0800	*Registration & Coffee*
0800 – 0815	*Welcome & Introduction*
0815 – 0830	***PRE-TEST***
0830 – 0900	***General Chemistry*** *Basic Material ● Basic Chemical Reaction ● Theory of Gases*
0900 – 0930	***Organic Chemistry*** *Structure of Organic Compounds ● Reaction of Organic Compounds ● Detail Study of Alkenes ● Alkenes ● Aromatics & Alcohol ●Nitrogen Compounds*
0930 – 0945	*Break*
0945 – 1100	***Physical & Chemical Properties of Hydrocarbons & Petroleum Cuts*** *General Hydrocarbon Classification ● Structure & Properties of Hydrocarbons ● Main Types of Organic Compounds ● Physical & Chemical Properties of Hydrocarbon Mixtures ● Characterization of Petroleum Cuts ● Molar Weight*
1100 – 1215	***Physical & Chemical Properties of Hydrocarbons & Petroleum Cuts (cont'd)*** *Volatility : TBP & ASTM Distillations ● Mean Average Temperature (Mav) ● Characterization Factor ● Vapor Pressure ● Specific Gravity ● Viscosity ● Critical Properties*
1215 – 1230	*Break*
1230 – 1330	***Petroleum Products*** *Properties, Characteristic & Formulation of Combustible Products ● For Each Chief Product; LPG, Automotive Gasoline, Jet Fuel, Automotive Diesel Fuel, Domestic Fuel Oil & Heavy Fuel Oils, the Following are Developed ● Market Trends – Volatility Characteristics – Combustion Properties ● Under Cold Conditions & Flow -Stability, Storage Behavior*
1330 – 1420	***Main Non-Energy Products*** *Bitumen ● The Different Types of Bitumen; Pure, Outbacks, Polymer Modified, Emulsion, etc ● Lubricants ● Function of Lubricants ● Composition of Lubricants ● Base Oils & Additives ● Formulation ● Engine Oils Industrial Oils*
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: ***Monday, 13th of October 2025***

0730 – 0830	***Different Refinery Process Technologies*** *Parameters to be Monitored & Controlled in Different Processes & Their Use in Maintaining Product Specification*
0830 – 0930	***Chemical Used in Refinery Processes*** *Nature of Chemical ● Optimization Usage ● Chemical Hazards & Prevention ● Safe Storage of the Chemicals ● Petroleum Product Specification and Testing*
0930 – 0945	*Break*

0945 – 1100	*Product Blending* *Reid Vapor Pressure ● Octane Blending ● Blending for Other Properties ● Case-Study Problem: Gasoline Blending ● Case Study Problem: Diesel & Jet Fuel Blending*
1100 – 1215	*Troubleshooting Refinery Operations* *Crude Distillation ● Delayed Coking Cycles ● Delayed Coking Process ● Amine Regeneration & Scrubbing ● Sulfur Recovery ● Alkylation ● Fluid Catalytic Cracking Units ● FCCU Product Fractionation ● Saving Energy at Reduced Feed Rates*
1215 – 1230	*Break*
1230 – 1330	*Practical Problems* *Additional Distillation Problems ● Fouled Trays ● Dehydrating Light-Ends Towers ● Handling of Different Probable Emergencies ● Vapor-Liquid Separation ● Refinery Metallurgy for Novices ● Unusual Noises & Vibrations*
1330 – 1420	*Refinery Mass Balance* *Importance of Measurement • Accurate Crude Inputs are Critical • Fuel Measurement can be a Large, Unexpected Source of Error*
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: ***Tuesday, 14th of October 2025***

0730 – 0830	***Refinery Mass Balance (cont'd)*** *Density Measurement Required to Convert Volume to Mass • Refinery Evaluates Systems for Mass Balance Improvements • The Theory of Coriolis-Based Direct Mass Measurement*
0830 – 0930	***Material Movements*** *VM-PA Calculates & Stores Movement's Quantities • Calculate Movement Quantities and Tolerances*
0930 – 0945	*Break*
0945 – 1100	***Material Movements (cont'd)*** *Transfers can have a "Complete/Incomplete" Status • Provides the User with a List of Frequent Movements*
1100 – 1215	***Refinery Optimization*** *Definitions & Basic Optimization Tools • Breakeven Analysis • Graphical Solutions • Numerical Methods • Incremental Method • Linear Programming (LP) • Quadratic Programming (QP) • Non-Linear Optimization Techniques • Global & Local Optima*
1215 – 1230	*Break*
1230 – 1330	***Optimizing Operations Planning*** *Linear Programs (LP) & Non-Linear Models • Optimizing Unit Performance • Scheduling*
1330 – 1420	***Equipment Optimization*** *Heaters/Pumps/Compressors/Heat Exchangers • Critical Parameter Monitoring for Maximum Utilization & Optimization for each Specific Equipment • Resources Optimization like Catalyst/Chemicals/Utilities • Operation*

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: Wednesday, 15th of October 2025

0730 – 0830	***Process Optimization*** *IOW • Key Process Parameter Monitoring & Controlling for Maximum Utilization & Optimization for each Area Process • Conversions Losses & Yield Monitoring • Interactions of the Key Parameters Between Processes • Improving Unit Reliability • Reducing Refinery Losses, Energy Conservation • Reducing Flare/Slop Process*
0830 – 0930	***Optimizing Process Operations*** *Key Parameters for Optimization • Crude Unit Cut Points • Reformer Severity • FCC Conversion • Other Key Parameters • Integrating Unit Performance • Utilities*
0930 – 0945	*Break*
0945 – 1100	***Concepts of Refinery Operational Profitability*** *Gross Refining Margin (GRM) ● Net Refining Margin ● Contribution Margin*
1100 – 1215	***Planning Objectives*** *Production Plans (Unit Operating Goals, Blending Operations) ● Feedstock Selection ● Feasibility ● Optimality (Minimum Cost, Maximum Profit) • Optimal Product Mix ● Marginal Economics ● Investment Opportunities ● Planning versus Scheduling*
1215 – 1230	*Break*
1230 – 1330	***Planning Tools*** *Blending Methods (Linear (Volume/Weight), Blending Indices, Interaction Coefficients) ● Process Models (Fixed Yield, Operational Modes, Simulation)*
1330 – 1420	***Planning Tools (cont'd)*** *Modeling Tools (Simple Stock Balances (Spreadsheet), Linear Programming (LP's), Feasibility, Linear Relationships, Non-Linear Programming (NLP's), Feasibility, Local Optima, Distributed Error Recursion & Integer Programming) ● Model Types (Blending, Single Refinery, Multi-Refinery and Distribution & Time Period)*
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*

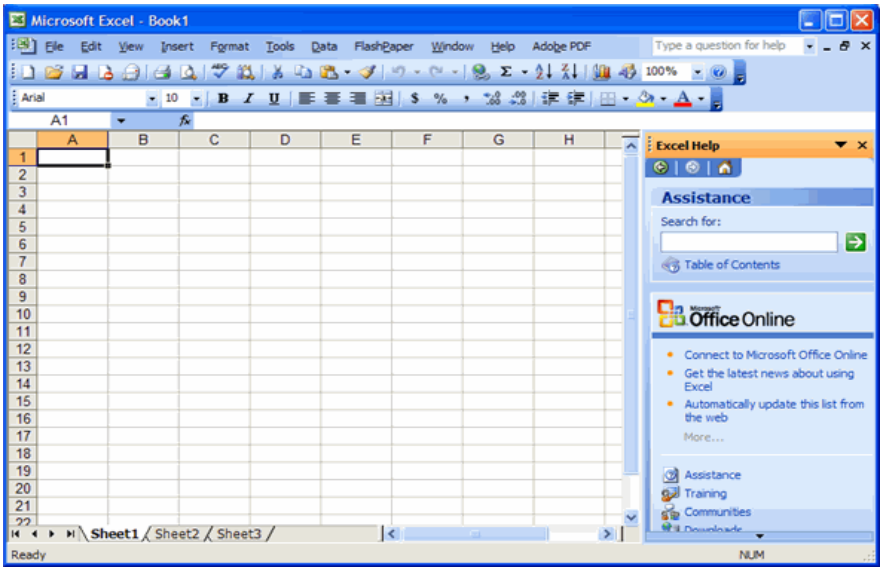
Day 5 : Thursday, 16th of October 2025

0730 – 0830	***Key Crude & Product Qualities*** *Sulfur & Gravity ● Other Properties • Environmental Regulations*
0830 – 0930	***Crude & Product Pricing*** *Pricing Basis (FOB, CIF & Import Parity)*
0930 – 0945	*Break*
0945 – 1100	***Practical Refinery Modeling*** *Constructing a Simple LP ● The Real World is Non-Linear (The Pooling Problem, Delta-Base Modeling & Convexity Constraints) ● Marginal Values or Shadow Prices ● Crude Ranking & Evaluation ● Weight versus Volume Basis*
1100 – 1215	***Performance Measures*** *Benchmark Margin Analysis ● Model Validation ● Back-Casting ● "The Farmer & the Bale of Hay"*

1215 – 1230	*Break*
1230 – 1300	***Rules of Thumb for Process Engineers*** *Suggestions for New Process Operating Engineers ● Planning a Performance Test ● Understanding Control Board Instruments ● Importance & Use of Instrumentation in Process Technology*
1300 – 1345	***Rules of Thumb for Process Engineers (cont'd)*** *How to Make Field Measurements ● Unit of Measurement Used in Petroleum Technology & Conversion Factors ● The People Problem ● Effect of Operation Parameters on Quality, Economy & Safety*
1345 – 1400	***Course Conclusion*** *Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course*
1400 – 1415	***POST-TEST***
1415 – 1430	*Presentation of Course Certificates*
1430	*Lunch & End of Course*

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 "MS-Excel" application.



MS Excel

Course Coordinator

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