



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

March 04-08, 2024/Camden 2 Meeting Room, London Marriott Hotel Regents Park, London, United Kingdom



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

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.

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 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: -

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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.

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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.

Course Fee

US\$ 8,800 per Delegate + **VAT**. This rate includes Participants Pack (Folder, Manual, Hand-outs, etc.), 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 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:



Dr. John Petrus, PhD, MSc, BSc, is a **Senior Process Engineer** with over **30 years** of **onshore & offshore** experience within the **Oil & Gas, Refinery and Petroleum** industries. His wide experience covers in the areas of **De-Sulfurization Technology, 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), Advanced Operational & Troubleshooting Skills, Principles of Operations Planning, Rotating Equipment Maintenance & Troubleshooting**. Further he is also well versed in **Rotating Machinery Principles & Applications, Rotating Equipment Selection, Operation, Maintenance, Inspection & Troubleshooting, Rotating Machine/Equipment in Industry, Control Valves & Actuators, PSV Maintenance & Testing, Pump Selection, Installation, Performance & Control, Screw Compressor Theory and Troubleshooting, Reliability-Centered Maintenance (RCM), Preventive & Predictive Maintenance, Spare Parts Planning & Inventory Management, Computerized Maintenance Management Systems (CMMS), Process Plant Shutdown & Turnaround, Maintenance Optimization & Best Practices, Reliability Centered Maintenance Principles & Application, Efficient Shutdowns, Turnaround & Outages, Effective Reliability Maintenance & Superior Maintenance Strategies, Integrity & Asset Management, Total Plant Reliability Maintenance, Vibration Measurement, Advanced Analytics in Oil & Gas, Business Intelligence Data Analytics, Audit Analytics & Computer-Assisted Audit Techniques (CAATs), Basic Database Concepts & Data Formats, Data Analysis Cycle & Best Practices, Data Importing & Integrity Verification, Advanced Analytics Tools in Auditing, Leveraging AI & Machine Learning in Audits, Data Mining Techniques for Auditors, Data Analytics for Managerial Decision Making, Business Process Analysis, Mapping & Modeling, Research Methods & Analysis, Statistical Data Needs Analysis, Oil & Gas Industry Business Environment & Competitive Intelligence Gathering & Analysis, Petroleum Economics & Risk Analysis, Certified Data Analysis, Risk Management & SWIFT Analysis, Best Practices Management System (BPMS), GIS System Management, Database Management, Strategic Planning, Best Practices and Workflow, Quality Management, Project Management and Risk Assessment & Uncertainty Evaluation**. Further, he is also well-versed in **seismic interpretation, mapping & reservoir modelling tools like Petrel software, LandMark, Seisworks, Geoframe, Zmap** and has extensive knowledge in **MSDos, Unix, AutoCAD, MAP, Overlay, Quicksurf, 3DStudio, Esri ArcGIS, Visual Lisp, Fortran-77 and Clipper**. Moreover, he is a world **expert in analysis and modelling of fractured prospects and reservoirs** and a **specialist and developer of fracture modelling software tools** such as **FPDM, FMX and DMX Protocols**.

During his career life, Dr. Petrus held significant positions and dedication as the **Executive Director, Senior Geoscience Advisor, Exploration Manager, Project Manager, Manager, Process Engineer, Mechanical Engineer, Maintenance Engineer, Chief Geologist, Chief of Exploration, Chief of Geoscience, Senior Geosciences Engineer, Senior Explorationist, Senior Geologist, Geologist, Senior Geoscientist, Geomodeller, Geoscientist, CPR Editor, Resources Auditor, Project Leader, Technical Leader, Team Leader, Scientific Researcher and Senior Instructor/Trainer** from various international companies and universities such as the **Dragon Oil Holding Plc., ENOC, MENA, ENI Group of Companies, Ocre Geoscience Services (OGS), Burren RPL, Ministry of Oil-Iraq, Eni Corporate University, Stanford University, European Universities, European Research Institutes, NorskHydro Oil Company, Oil E&P Companies**, just to name a few.

Dr. Petrus has a **PhD in Geology and Tectonophysics** and **Master and Bachelor degrees in Earth Sciences** from the **Utrecht University, The Netherlands**. Further, he is a **Certified Instructor/Trainer, a Certified Trainer/Assessor/Internal Verifier** by the **Institute of Leadership & Management (ILM)**, a **Secretary and Treasurer of Board of Directors of Multicultural Centre, Association Steunfonds SSH/SSR** and **Founding Member of Sfera Association**. He has further published several scientific publications, journals, research papers and books and delivered numerous trainings, workshops, courses, seminars and conferences 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: Monday, 04th of March 2024

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: Tuesday, 05th of March 2024

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: Wednesday, 06th of March 2024

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: Thursday, 07th of March 2024

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: Friday, 08th of March 2024

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

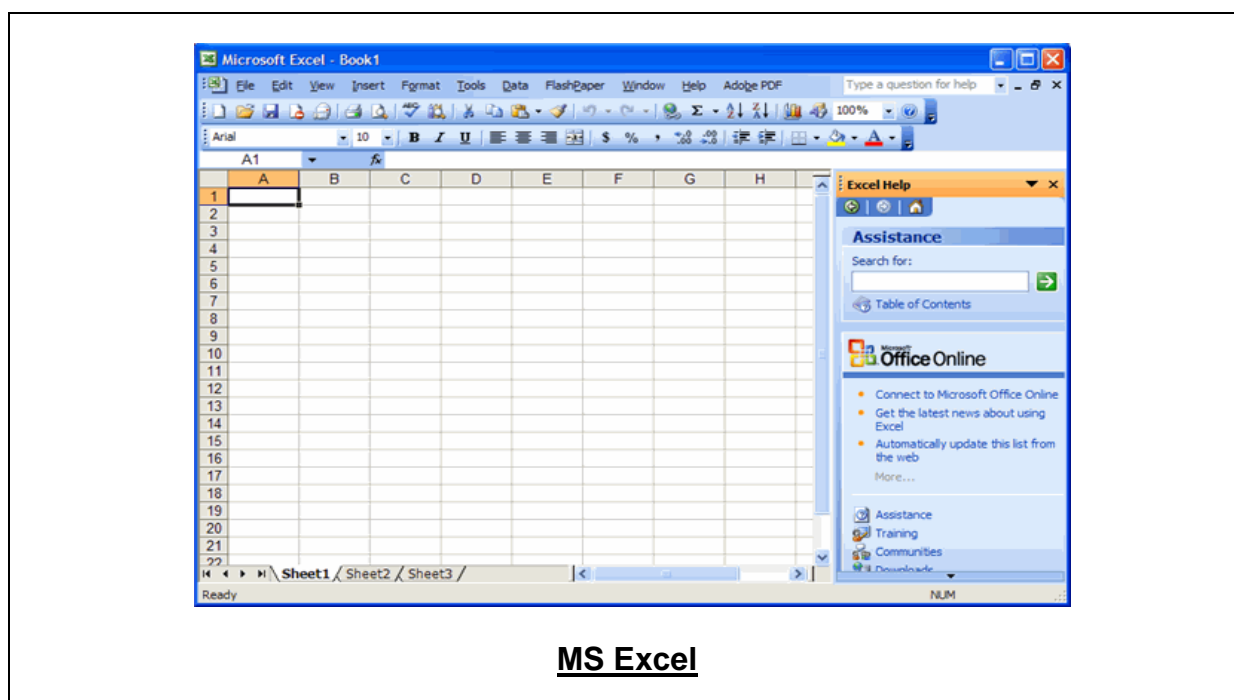




1300 – 1345	Rules of Thumb for Process Engineers (cont'd) <i>How to Make Field Measurements • Unit of Measurement Used in Petroleum Technology & Conversion Factors • The People Problem • Effect of Operation Parameters on Quality, Economy & Safety</i>
1345 – 1400	Course Conclusion <i>Using this Course Overview, the Instructor(s) will Brief Participants about the Course Topics that were Covered During the Course</i>
1400 – 1415	POST-TEST
1415 – 1430	<i>Presentation of Course Certificates</i>
1430	<i>Lunch & End of Course</i>

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.



Course Coordinator

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