

COURSE OVERVIEW PE0882
Refining Processes & Petroleum Products
(E-Learning Module)

Course Title

Refining Processes & Petroleum Products (E-Learning Module)

Course Reference

PE0882

Course Format & Compatibility

SCORM 1.2. Compatible with IE11, MS-Edge, Google Chrome, Windows, Linux, Unix, Android, IOS, iPadOS, macOS, iPhone, iPad & HarmonyOS (Huawei)

Course Duration

30 online contact hours
 (3.0 CEUs/30 PDHs)



Course Description



This course is designed to provide participants with a detailed and up-to-date overview of refining processes and petroleum products. It covers the basic chemistry, crude oil price, chemical reaction and kinetic molecular theory; the three basic states of matter, physical and chemical property and pure substances versus mixtures; the separation methods; the composition of petroleum, molecular weight for polymers and refinery infrastructure; the characterization of crude oils; the unit operations, distillation column classification and typical chemical process; the reactor design; and the different types of reactors including bubble columns, heat transfer, boilers, fuel gas burner, furnace and heat exchangers.

Further, the course will also discuss the filters, separators, pumps, compressors, valves and piping; the financial planning of feed stock, crude feed scheduling, refinery processes, CDU process, crude distillation, hydrotreating, catalytic reforming and isomerization; the catalytic cracking, alkylation, hydrocracking, product blending and storage, fuel blending, product storage and types of tank mixer; the natural gas processing, amine gas sweetening unit, natural gas processing, sulphur removal and recovery and hydrogen purification; and the steam requirements, API oil/water separator, plate interceptors, air flotation principles, wastewater treatment and environmental control measures.

During this interactive course, participants will learn the lubricating oil production, base oil classification, solvent refining process, lubricating oil blending stocks, automotive lubricants and lubricants additives; the petrochemicals from ethylene, propylene, butadiene and xylenes; the recycling codes for common thermoplastics, processing of polymers, safety and environmental considerations, bird triangle for accidents and the importance of engineering control; the hierarchy of risk control; and the HIRA procedure, tools for safer design and risk assessment.

Course Objectives

After completing the course, the employee will:-

- Apply and gain a comprehensive knowledge on refining processes and petroleum products
- Provide broad technical information on refining processes and petroleum products, enabling rapid immersion in the refining industry
- Discuss the basic chemistry, crude oil price, chemical reaction and kinetic molecular theory
- Identify the three basic states of matter, physical and chemical property and pure substances versus mixtures
- Illustrate separation methods and discuss the composition of petroleum, molecular weight for polymers and refinery infrastructure
- Characterize crude oils and apply unit operations, distillation column classification and typical chemical process
- Illustrate reactor design and identify the different types of reactors including bubble columns, heat transfer, boilers, fuel gas burner, furnace and heat exchangers
- Recognize filters, separators, pumps, compressors, valves and piping
- Apply financial planning of feed stock, crude feed scheduling, refinery processes, CDU process, crude distillation, hydrotreating, catalytic reforming and isomerization
- Discuss catalytic cracking, alkylation, hydrocracking, product blending and storage, fuel blending, product storage and types of tank mixer
- Illustrate natural gas processing, amine gas sweetening unit, natural gas processing, sulphur removal and recovery and hydrogen purification
- Discuss steam requirements, API oil/water separator, plate interceptors, air flotation principles, wastewater treatment and environmental control measures
- Carryout lubricating oil production, base oil classification, solvent refining process, lubricating oil blending stocks, automotive lubricants and lubricants additives
- Discuss petrochemicals from ethylene, propylene, butadiene and xylenes
- Recognize the recycling codes for common thermoplastics, processing of polymers, safety and environmental considerations, bird triangle for accidents and the importance of engineering control
- Explain the hierarchy of risk control and apply HIRA procedure, tools for safer design and risk assessment

Who Should Attend


This course provides an overview of all significant aspects and considerations of refining processes and petroleum products for personnel who have limited refinery process or operating experience, who are involved in supporting operations or who interact with refinery personnel. Engineers and supervisory personnel from the production and/or pipeline branches of oil companies should find a great deal of beneficial information, particularly if they have the need to gain an overview of the entire refinery.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations: -


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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, VA 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.

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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.

Training Methodology

This Trainee-centered course includes the following training methodologies:-

- Talking presentation Slides (ppt with audio)
- Simulation & Animation
- Exercises
- Videos
- Case Studies
- Gamification (learning through games)
- Quizzes, Pre-test & Post-test

Every section/module of the course ends up with a Quiz which must be passed by the trainee in order to move to the next section/module. A Post-test at the end of the course must be passed in order to get the online accredited certificate.

Course Fee

As per proposal

Course Contents

- Introduction and Basic Chemistry
- Introduction
- Crude Oil Price
- History of Crude Oil Price
- Basic Chemistry
- Chemical Reaction (Formation of Water)
- Kinetic Molecular Theory
- Solid, Liquid, Gas: Three Basic States of Matter
- States (Phases) of Matter
- Physical Property
- Chemical Property
- Pure Substances versus Mixtures
- Separation Methods
- Composition of Petroleum
- Properties and Definitions
- Molecular Weight for Polymers
- Course Recap
- Refinery Infrastructure



- Characterizing Crude Oils
- Oil Assay
- Crude Oil Assay Example
- Manufacturing
- Schematic of Hydroskimming Refinery
- Schematic of Cat Cracking Refinery
- Schematic of Coking Refinery
- Petrochemical Complex
- Unit Operations
- Crude Fractionator (Atmospheric Column)
- Vacuum Column
- Distillation
- Distillation Column Classification
- Distillation Column Internals Classification
- Distillation Column Simplified Sketch
- Typical Chemical Process
- What's Involved in Reactor Design?
- Reactors
- Catalyst
- Different Types of Reactors
- Fixed Bed Reactors
- Radial Flow Reactor
- Single Bed Down Flow Reactor
- Fluidized Bed Reactors
- Stirred Tank Reactors
- Slurry Loop Reactors
- Bubble Columns
- Heat Transfer
- Boilers
- Fuel Gas Burner
- Furnace
- Heat Exchangers
- Types of Shell and Tube Exchangers



- Filters and Separators
- Filters
- Separators
- Gas/Oil Separation
- Pumps and Compressors
- Pumps
- Some Types of Centrifugal Pumps
- Compressors
- Compressor Casing
- Valves and Piping
- Process Valves
- Measurement and Control
- Refinery Feedstocks
- Introduction
- Financial Planning of Feed Stock
- Crude Feed Scheduling
- The Earth's Petroleum Reserves
- Oil Supply and Demand
- Gas Supply and Demand
- Refinery Processes -CDU Hydrotreating Reforming Isomerization
- Petrochemical Complex
- LPG from Crude Distillation Unit PFD
- CDU Process
- CDU Process: Process Schematics
- Crude Distillation
- Hydrotreating
- Hydrotreating: Process Schematic
- Catalytic Reforming
- Isomerization
- Refinery Processes – VDU, Coker, FCC, Alkylation, Hydrocracking
- Petrochemical Complex
- VDU Process
- VDU Process: Process Schematics

- Delayed Coking
- Delayed Coking: Process Schematics
- Process Description-Delayed Coking
- Fluidic Coking
- FCC
- Catalytic Cracking
- FCC: Process Schematic
- Alkylation
- HF Alkylation
- HF Alkylation: Process Schematic
- Hydrocracking
- Hydrocracking: Process Schematic
- Product Blending and Storage
- Fuel Blending
- Product Storage
- Cylinders
- Spheres
- Cone Roof Tanks
- Cone Roof Tanks – Diagram
- Types of Floating Roof Tank
- Floating Roof Tank
- Dome Roof Tanks
- Types of Tank Mixer
- In-line Blending
- Course Recap
- Refinery Supporting Processes
- Introduction
- Natural Gas Processing
- Chemical Reaction PFD
- Amine Gas Sweetening Unit
- Natural Gas Processing
- Sulphur Removal and Recovery
- Hydrogen Purification

- Supporting Processes
- Steam Requirements
- API Oil/Water Separator
- Plate Interceptors
- Air Flotation Principles
- Wastewater Treatment
- Environmental Control Measures
- Lubricating Oil Production
- Introduction
- Base Oil Manufacture
- Base Oil Classification
- Solvent Refining Process
- Lubricating Oil Blending Stocks
- Automotive Lubricants
- Lubricants Additives
- Greases
- Course Recap
- Petrochemicals
- Introduction
- Petrochemical Product Tree
- The Ethylene Chain
- Petrochemicals from Ethylene
- Petrochemicals from Propylene
- Petrochemicals from Butadiene
- Petrochemicals from Xylenes
- General Classes of Polymers
- Polyethylene at a Glance
- Recycling Codes for Common Thermoplastics
- Processing of Polymers
- Safety & Environmental Considerations
- Video: Piper Alpha
- Fortunately, that is NOT Safety
- Why Do Accidents Happen?

- Bird Triangle for Accidents
- Petroleum and the Environment
- Oil Pollution
- Air Pollution
- The Importance of Engineering Control
- Hierarchy of Risk Control
- HIRA Procedure
- Tools for Safer Design
- Risk Assessment
- “Chemistry of an Incident”
- Safety Depends on
- Course Recap