

Petroleum Refinery Processes and Operations Fundamentals Course

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Overview

Petroleum Refinery Processes and Operations Fundamentals Course is a one-week foundation course for early-career process, operations, maintenance, project, planning, and technical-support personnel who leave with a Refinery Process and Operations Fundamentals Workbook. Participants connect petroleum refining fundamentals, crude distillation, refinery conversion processes, treating and sulfur recovery, refinery utilities, product blending, process safety, and refinery economics through process maps and operating records. Agile Leaders Training Center presents petroleum refinery processes and operations.

Who Should Attend

- Process functions responsible for unit flows, balances, yields, and technical support
- Operations functions responsible for routine monitoring, operating boundaries, and handovers
- Maintenance and reliability functions responsible for equipment interfaces and work coordination
- Project and engineering functions responsible for scope, design reviews, and refinery interfaces
- Planning and commercial-support functions responsible for feed, products, capacity, and margin context

The course assumes participants can read basic process diagrams and operating information, and it leaves out operator qualification, detailed equipment design, licensor calculations, advanced troubleshooting, and detailed thermal-cracking or coking practice.

Departments and Industries

The course supports departments and industries that process hydrocarbon feeds, operate continuous plants, or coordinate refinery products and services.

- Petroleum refining and fuels production
- Integrated refinery and petrochemical sites
- Process engineering, operations, and production planning
- Maintenance, reliability, inspection, and instrumentation
- Terminals, product blending, laboratories, and supply chains

Learning Objectives

By the end of this course, participants will be able to:

- Build a crude-to-products refinery process map
- Analyze crude properties, distillation cuts, and unit routing
- Compare conversion, treating, and upgrading processes
- Use material, energy, utility, and product-blend records
- Evaluate operating, safety, reliability, and emissions interfaces
- Prioritize refinery production and economic decisions

Course Agenda

Day 1: Map Crude and Refinery Configuration

- Crude Assay, Density, Sulfur, and Contaminant Profile Sheet
- Simple, Conversion, and Complex Refinery Configuration Map
- Feed Receipt, Tank Farm, Desalting, and Preheat Flow Diagram
- Refinery Process Flow Diagram Symbol and Stream Register
- Crude-to-Products Material Balance Framework

Day 2: Separate Crude into Fractions

- Atmospheric Distillation Furnace and Column Flow Map
- Boiling Range, Side-Draw, Reflux, and Product-Cut Sheet
- Vacuum Distillation Ejector, Column, and Residue Diagram
- Heat Integration and Energy Balance Worksheet
- Distillation Control, Startup, Shutdown, and Operating-Limit Checklist

Day 3: Compare Conversion and Upgrading Routes

- Fluid Catalytic Cracking Reactor-Regenerator Concept Map
- Hydrocracking Feed, Hydrogen, Conversion, and Product Matrix
- Catalytic Reforming and Octane Improvement Flow Sheet
- Alkylation and Gasoline-Component Pathway Diagram
- Visbreaking, Coking, and Residue-Upgrading Selection Table

Day 4: Integrate Treating, Utilities, and Products

- Hydrotreating, Amine, Sour-Water, and Sulfur-Recovery Map
- Hydrogen, Fuel Gas, Steam, Power, Water, and Air Utility Network
- Gasoline, Diesel, Jet Fuel, and Fuel-Oil Blending Sheet
- Product Specification, Laboratory, Tankage, and Dispatch Register
- Process Safety, Reliability, Emissions, and API RP 754 Indicator Board

Day 5: Practice Refinery Process Decisions

- Suggested Exercise: Route a Crude Assay through Refinery Units
- Suggested Exercise: Close a Distillation and Utility Balance
- Suggested Exercise: Compare Conversion and Treating Options
- Suggested Exercise: Build a Product Blend and Margin Bridge
- Capstone Exercise: Complete the Refinery Process and Operations Fundamentals Workbook

Practical Exercises

The course uses suggested activities to connect refinery process flows, operating evidence, products, safety, and economics.

- Suggested activity: classify a crude feed and map its path through separation, conversion, treatment, blending, and storage.
- Suggested activity: interpret process-flow, material-balance, energy, utility, control, and operating-limit information.
- Suggested activity: compare unit routes against feed quality, desired products, hydrogen, energy, and capacity constraints.
- Suggested activity: assemble product, safety, reliability, emissions, and margin evidence in the course workbook.

FAQs

Who suits petroleum refinery processes and operations fundamentals training, and what does it assume?

Petroleum refinery processes and operations fundamentals training suits early-career process, operations, maintenance, project, planning, laboratory, and support functions. It assumes participants can read basic process diagrams and operating information.

How do petroleum refining fundamentals differ from advanced refinery troubleshooting training?

Petroleum refining fundamentals explain unit purposes, normal flows, products, utilities, controls, safety, and economics. Advanced troubleshooting training tests competing causes across process, equipment, instruments, utilities, and connected units during abnormal conditions.

What are the main stages of petroleum refining?

The main stages are separation, conversion, and treatment, supported by storage, utilities, blending, laboratory control, safety systems, and product dispatch.

How does crude oil quality affect refinery processes?

Crude quality affects distillation yield, contaminant removal, hydrogen demand, conversion severity, corrosion exposure, energy use, product quality, and the units needed to upgrade heavy or sulfur-rich fractions.

Why are refinery utilities important to process operations?

Refinery utilities supply steam, power, fuel gas, cooling water, process water, air, nitrogen, and hydrogen. Their availability and balance influence unit capacity, control, safety, energy performance, and recovery from interruptions.

Conclusion

Participants take back a Refinery Process and Operations Fundamentals Workbook containing crude profiles, process maps, balances, unit comparisons, utility networks, product blends, safety indicators, and economic links. The workbook changes separate unit descriptions into a traceable crude-to-products system. It supports onboarding, shift coordination, project reviews, planning discussions, and decisions about further specialist training.

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