

Refining Processes & Petroleum Products

5.00 days

RPC/RPPP

Overview

AUDIENCE

Professionals in the Oil & Gas industry or related sectors (in the technical, commercial, legal, finance, or HR departments) interested in oil refining.

PURPOSE

This course provides a broad technical information on refining processes and petroleum products, enabling a rapid immersion in the refining industry.

LEARNING OBJECTIVES

Upon completion of the course, participants will be able to:

- describe the composition, main characteristics and new trends of petroleum products,
- explain the role of various processing units in a refinery,
- describe the main manufacturing schemes encountered in oil refining,
- assess the economic environment of this industry.

PREREQUISITE

No prerequisites for this course.

WAYS AND MEANS

Detailed course material with a glossary of the main technical terms used in the refining industry.
Active participation of trainees through interactive games and quizzes to grasp the key points of the course.
A virtual visit of a refinery using the augmented reality gives an idea of the size of the equipment and units presented.
A summary per unit is built to highlight key process variables.

Agenda

PETROLEUM PRODUCTS

1.25 d

Energy and non-energy products and their main uses, CO₂ emissions and main regulated pollutants in the end use.

Principal components of petroleum products; general hydrocarbon classification and main impurities (sulfur, nitrogen, metals and asphaltenes, etc.).

Quality requirements imposed on petroleum products in view of their utilization: quality specifications measured by standard tests, characteristics related to the product composition, origin and processing routes.

New trends in market structure and product characteristics to European and worldwide scale, post-combustion depollution systems, biofuels (nature, alternative fuel pathways for transport, strengths and weaknesses).

REFINING PROCESSES

2.75 d

Crude oil fractionation:

Origin, overall characteristics and classification of crude oils.

Yields and properties of straight-run cuts obtained by distillation, potential destinations.

Industrial units: atmospheric distillation, vacuum distillation, light-ends fractionation.
Typical process scheme, operating conditions, energy consumption.
Catalytic reforming and isomerization:
Octane improvement of virgin naphthas.
Basics of processes, types of catalyst, product yields and hydrogen production.
Industrial units: process flowsheets, operating conditions, equipment, low pressure processes.
Hydrorefining processes:
Main features of impurities removal by catalytic hydrogen treatment.
Main refining applications.
Example of ULSD hydrotreatment unit: operating principles, operating conditions.
Scrubbing treatments: amine washing, sulfur production, treatment of residual gases from Claus units.
Conversion units:
Outline of conversion and various cracking processes.
Characteristics and origin of feeds for cracking.
Conversion by means of thermal cracking: visbreaker, various cokers.
Conversion by means of catalytic cracking: FCC and related units, gasoline sweetening and desulfurization, alkylation, production of MTBE, ETBE and propylene, hydrocracker and related units, hydrogen production (SMR, POX).
Recent developments in hydrotreatment and hydroconversion of heavy residues.
Hydrogen balance in the refinery, energy consumption per unit, CO₂ emissions at the outlet of the refinery.
Other processes for production of petroleum products: GTL, synthetic crude oils.

MANUFACTURING FLOWSHEETS

0.25 d

Main routes to major products.
Up to date refining schemes including the production of petrochemical intermediate products.
Impacts of the evolution of market demand and the quality of the products on manufacturing patterns.
Base lube oil manufacturing.
Virtual visit of a refinery using the augmented reality will enable the trainees to gain a direct understanding of the field life.

MAIN ECONOMIC FEATURES OF REFINERY OPERATION

0.75 d

Prices of crude oils and products, operating costs, economic margin of a refinery.
Examples of flexibility in operation and its economic consequences.