

This course can be adapted to virtual classroom mode - Graduate Certificate

Petroleum Refining & Petrochemicals Certification

Processes, Equipment & Safety

85 days

PETREF-EN-A

Overview

LEVEL

Knowledge

PURPOSE

This certification aims to develop competencies in processes, equipment, operation, safety, and the economical aspects of petroleum refining and petrochemicals.

LEARNING OBJECTIVES

Upon certification, participants will be able to:

- understand the basics of refining techniques,
- analyze the performances of the processes concerned, and optimize them,
- select and design the main equipment of processing plants,
- comprehend the technology and operation of equipment,
- understand the main refining processes, their fundamental aspects and operation,
- recognize safety and environmental issues in operation of such units,
- explain economic industry issues.

WAYS AND MEANS

Case studies and applications related to industrial situations,
Dynamic simulators (CORYS IndissPlus simulators): equipment simulators and generic process units simulators,
Project: design of a distillation column using PROII/PROVISION.

LEARNING ASSESSMENT

Continuous assessment: individual quizzes for each module.
Mini-projects and final project.

PREREQUISITES

Engineering degree or equivalent professional experience within the Refining & Petrochemical industry.

WHY AN IFP TRAINING CERTIFICATION?

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Petroleum Refining & Petrochemicals Certification.
- Ready-to-use skills.

Agenda

PHYSICO-CHEMICAL PROPERTIES OF HYDROCARBONS & PETROLEUM CUTS

5 d

Organic compounds, crude oil and petroleum products.
Quality control - Standard tests - Blending rules.

APPLIED THERMODYNAMICS

5 d

Properties of pure substances.

Fluid properties: liquid-vapor equilibria of hydrocarbons mixtures, of non-ideal mixtures, of non-identified components.

K values from modern numerical methods.

DISTILLATION COURSE & PROJECT WITH PROII

10 d

Classical industrial column design, short cut methods.

Operating parameters, optimization, process control parameters.

Internal equipment.

Practice of PROII/PROVISION, process simulation, simplified design of equipment, economic evaluation and optimization.

HEAT TRANSFER EQUIPMENT

5 d

Heat transmission.

Heat exchangers: sizing and performances, operation.

Furnaces and boilers: performances, operating conditions, combustion, operation, safety.

FLUID FLOW - ROTATING MACHINERY

10 d

Characteristics of liquid and gas simple phase flow; gas compression laws, expansion.

Technology and operation of pumps, compressors, steam turbines, gas turbines, electrical motors.

INSTRUMENTATION & PROCESS CONTROL

5 d

Instrumentation, controllers, valves, control loops implementation.

PID tuning, monovaryable control limits, multivariable control.

REFINING PROCESSES - PRINCIPLES & OPERATION

20 d

Characteristics of feeds and products, principles of the processes used, operating and control parameters of the unit, analytical follow-up, typical incidents, concerning the following refining units:

Atmospheric and vacuum distillation of crude oil, Catalytic reforming, isomerization, hydrotreatment, sweetening of light cuts and sulfur recovery.

Conversion of heavy cuts and related units: visbreaking, coking, FCC, RFCC, distillate hydrocracking, residue hydrocracking.

Base oil refining.

PETROCHEMICAL PROCESSES - PRINCIPLES & OPERATION PRODUCTION OF OLEFINS & AROMATICS

12 d

Production of olefins and aromatics:

Sources, outlets and main industrial uses of olefinic and aromatic intermediaries.

Steam cracking and treatment of the cuts produced.

Fluid catalytic cracking (FCC) and production of aromatics.

Economics of petrochemicals.

Production of convenience polymers (PP, PE, PS, PVC, PET):

Nature and types of polymers.

Implementation principles and techniques.

Production of syngas:

Main processes: steam reforming, partial oxidation (POX).

Valuation of synthesis gas: combined cycles.

SAFETY - UTILITIES - ENVIRONMENT IN OPERATION

8 d

Process safety:

Product and equipment related risks, safety in process operation.

Hazard analysis in design and operation.

Utilities:

Steam networks.

Electricity generation and networks.

Production and distribution networks for air, fire and cooling water; flare.

Environmental control:

Air pollution sources, detection and technologies for reduction.

Sources of aqueous pollution; wastewater treatment, regulation and controls.

PETROLEUM ECONOMICS

5 d

Evolution of the demand for derived products, international oil markets.
Short-term refinery management.