

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

Oil & Gas Process Engineering Certification

60 days

OGPROC-EN-A

Overview

LEVEL

Knowledge

PURPOSE

This course provides in-depth technical knowledge of Oil & Gas production facilities design and optimization in order to provide Process Engineer with industry international best practices.

LEARNING OBJECTIVES

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

- describe fundamental concepts underlying Oil & Gas processing,
- analyze operating conditions and basic design of oil, water and gas treatment,
- design oil, gas and water processing facilities and anticipate process performances by simulation and troubleshoot process operations,
- describe technology of static equipment and rotating machinery used in production facilities and analyze performances and key operating parameters,
- size main process equipment of surface facilities,
- identify main risks related to Oil & Gas production and to contribute to safety engineering studies,
- contribute to the dynamics of process development projects.

WAYS AND MEANS

Highly interactive training course delivered by industry experts and adapted to participants' experience.
Multiple teamwork sessions and industrial case studies.
Hands-on activities on professional software: HYSYS™ or PRO/II™ for process simulation, PIPESIM™ and OLGA™ for gathering networks and flow assurance.
Teamwork project on a real case study of surface facilities design.

LEARNING ASSESSMENT

Continuous assessments all-along the program.
Final assessment including a presentation in front of a jury.

PREREQUISITES

Engineering degree or equivalent professional experience within the Oil & Gas industry.

WHY AN IFP TRAINING CERTIFICATION?

- An international recognition of your competencies.
- A Graduate Certificate delivered.
- An expertise confirmed in Oil & Gas Process Engineering Certification.
- Ready-to-use skills.

Agenda

THERMODYNAMICS APPLIED TO WELL EFFLUENT PROCESSING

5 d

Well effluent. Ideal gas and real fluid behavior. Gas compression and expansion: HYSYS™ or PRO/II™ simulation (propane cryogenic loop). Liquid-vapor equilibrium of pure components and mixtures - Mixture separation: HYSYS™ or PRO/II™ simulation: phase envelope of well effluents, sales gas, stabilized crudes. Fundamentals of distillation.

OIL & WATER TREATMENT

5 d

Crude oil treatment: stabilization, dehydration, sweetening. HYSYS™ or PRO/II™ simulation: oil stabilization process and associated gas compression. Produced and injection water treatment.

GAS PROCESSING & CONDITIONING

5 d

Commercial specifications for natural gas. Need for gas field processing. Gas hydrates & moisture content of natural gas. Dehydration process: TEG units and molecular sieves. Application: sizing of a TEG column. Sweetening: amines, membranes. NGL recovery and fractionation. HYSYS™ or PRO/II™ simulation: associated gas and gas condensate sweetening, dehydration, NGL recovery and compression. Fundamentals of Liquefied Natural Gas (LNG) chain.

DYNAMIC SIMULATION OF OIL & GAS PROCESSING FACILITIES

5 d

During this week, case study and exercises are performed using a dynamic simulator replicating a DCS environment in order to allow the participants to understand process dynamics: analysis of wellhead pressure/temperature variations choke valve tuning, hydrates detection and inhibition; crude oil processing (study of operating parameters on oil stabilization, dehydration and desalting); gas dehydration (impact of TEG operating conditions); multistage gas compression and export: effect of operating parameters.

PIPING SYSTEMS & PROCESS EQUIPMENT: SIZING & OPERATION

5 d

Piping and valves. Metallurgy. Corrosion. Cathodic protection. Pressure relief systems. PSV's and flare network. Storage equipment. Thermal equipment. Pressure vessels: technology and selection criteria, internals, elements of calculation.

GATHERING & DISTRIBUTION SYSTEMS DESIGN - FLOW ASSURANCE

5 d

Fundamentals of fluid mechanics. Multiphase flow. Flow assurance issues. Gathering and distribution systems design. Oil & Gas export pipelines design. Tie-in assessment: case study using PIPESIM™. Multi-phase dynamic simulation: network simulation using OLGA™.

INSTRUMENTATION, PROCESS CONTROL, AUTOMATION & ELECTRICAL SYSTEMS

5 d

Electrical power generation. Electrical power distribution network and equipment. Field instrumentation, controllers, control loop structures. Distributed Control System (DCS). Safety Instrumented Systems (SIS): ESD, HIPS, fire and gas system.

ROTATING EQUIPMENT - TECHNOLOGY, SELECTION & OPERATION

5 d

Fundamentals of pumping circuits and gas compression. Operating principles, technology, selection criteria, performances and operating conditions of centrifugal and volumetric pumps; centrifugal and reciprocating compressors; gas turbines; turbo-expanders.

OIL & GAS PROCESSING FACILITIES TROUBLESHOOTING

5 d

Troubleshooting flowchart. Recognize a trouble when occurring. Problem definition using ISHIGAWA fishbone chart. Methodological approach to identify causes and remedial options. Action plan. PARETO chart. Implement operational/design modification. Management of change and feedback. Exercises using dynamic simulator replicating a DCS environment: use of DCS tools to identify/characterize process deviations.

SAFETY ENGINEERING CASE STUDIES

5 d

Main safety engineering studies: HAZID and HAZOP workflow and application; plant layout case study; QRA ; consequence analysis methodology.

PROCESS DEVELOPMENT PROJECT - JURY

10 d

During this final project, participants will be required to design a process, simulate it, evaluate its performances with reference to various production scenarios, select and size associated key equipment. This 10-day teamwork project is real case study based on actual data. Participants are coached throughout the project to produce the required deliverables, which are to be presented on the last day (jury): process design and simulation; main equipment sizing; heat and mass balance; fuel gas requirements; HAZID and plant layout.

