

## OBJECTIVES

To bring the participants a comprehensive knowledge of petroleum refining (processes, equipment, operation, safety, ...) and to improve their competences in relation with their responsibilities.

On completion of the course, the participants:

- have acquired a solid base related to refining techniques
- know the main refining processes with their fundamental aspects and their operation
- understand the technology and the operation of the equipment
- are aware of safety and environmental issues in refinery operations

## COURSE CONTENT

The sixty classroom days are split into **12 separate modules of 5 days**. Each module is specialized on a particular theme. The course can be implemented in IFP Training centers or abroad in clients facilities, and some additional modules may be proposed on specific topics.

The teaching is backed up by high quality and specific documentation easy to consult after the course.

The different subjects are presented from a very practical point of view with a lot of exercises and case studies.

### Module 1: PHYSICO-CHEMICAL PROPERTIES OF HYDROCARBONS AND PETROLEUM CUTS 5 days

Crude oils and petroleum products. Blending rules.

### Module 2: APPLIED THERMODYNAMICS 5 days

Fluid properties: liquid-vapour equilibria of hydrocarbons mixtures, of non ideal mixtures, of non identified components. K values from modern numerical methods.

### Module 3: DISTILLATION: DESIGN AND OPERATION (two products columns) 5 days

Short cut methods. Optimization. Process control parameters. Internal equipment.

### Module 4: ATMOSPHERIC AND VACUUM DISTILLATION 5 days

Operating parameters. Corrosion and desalting. Operation and control of multidraw-off columns.

### Module 5: HEAT EXCHANGERS - FURNACES AND BOILERS 5 days

Heat transmission, heat exchangers, sizing and performances, furnaces and boilers: operating conditions, combustion heating, operation.

### Module 6: ROTATING MACHINERY 5 days

Fluid flow, technology and operation of pumps, compressors and turbines.

### Module 7: DISTILLATION PROJECT WITH PRO II 5 days

Practice of PRO II/PROVISION, design of an industrial column, simplified design of the equipment, economic evaluation and optimization.

### Module 8: REFINING PROCESSES: LIGHT CUTS AND MIDDLE DISTILLATES 5 days

Catalytic reforming, isomerization, hydrotreatment processes, sweetening of light cuts, sulphur recovery.

### Module 9: REFINING PROCESSES: HEAVY CUTS 5 days

Overview of conversion processes, thermal processes, FCC and RFCC. Distillate hydrocracking, residue hydrocracking, lube base stocks manufacture.

### Module 10: INSTRUMENTATION AND PROCESS CONTROL 5 days

Instruments, controllers, control loop implementation. PID tuning, monovariable control limits, multivariable control.

### Module 11: SAFETY IN REFINERY OPERATION 5 days

Products and equipment related risks, safety in process operation, hazard analysis in design and operation.

### Module 12: REFINING ECONOMICS 5 days

Evolution of the refining industry, refining profitability, refining management. Future of the refining industry.

### ▲ Who should attend?

**Graduate engineers** entering the refining industry and engineers with some years of experience. Also professionals with longer experience in one specific refining area, for example maintenance, who wish to broaden their knowledge of the other refining areas.

### ▲ Duration

**60 days**

### ▲ Dates & Location

**Non-scheduled**

**May only be organized for a single company**

### ▲ Lecturers from

- IFP Training
- ENSPM / IFP
- INDUSTRY

Ref. **GCA / REFTEC**