



**Chemical, Mechanical Engineering**



**SCANDINAVIAN ACADEMY**  
Training and Development

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# Course: Process & Mechanical Engineering Essentials

| Code | City             | hotel              | Start      | End        | price  | Hours |
|------|------------------|--------------------|------------|------------|--------|-------|
| 511  | Florence (Italy) | Hotel Meeting Room | 2024-02-26 | 2024-03-08 | 7950 € | 50    |

## Why Choose this Course?

This combined course focuses on the central areas of Process and Mechanical Engineering and guides the delegates in developing both fundamental and practical understandings of key issues. Process engineering is at the heart of much of the chemical, oil, gas, and petrochemical industries.

Process and Mechanical engineers are interested in the safe containment, transportation and transformation of solids, liquids and gases. Of specific importance are separation processes including distillation, heat transfer, hydraulics and fluid flow, reaction engineering, process control and economics. It also focuses on sound mechanical engineering principles, together with other engineering techniques including inspection, monitoring and condition evaluation, that enable mechanical engineers to design and maintain the equipment required by process engineers.

### This course will feature:

- Practical introduction to the fundamentals of process engineering
- Practical introduction to the fundamentals of Mechanical Engineering, Equipment and Materials
- Key areas applicable to major process industries especially oil, gas & petrochemical
- Process and Mechanical Engineering influence on Safety and Risk, Failure Modes and Maintenance
- The links between the two engineering disciplines

## The Structure

This comprehensive programme consists of two modules which can be booked as a 10 Day Training event, or as individual, 5 Day courses.

**Module 1** - [Process Engineering Essentials: Upstream & Downstream Process Control & Optimisation](#)

**Module 2** - [Mechanical Engineering Essentials: Rotating & Static Equipment & Structural Integrity](#)

## What are the Goals?



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

- Apply practical understanding of central issues in process & mechanical engineering in oil, gas, petrochemical, chemical, and allied facilities
- Understand fundamental principles used in processes & facilities & apply practical understanding of essential process units & classes of units involved in separations, heat exchange & reactions.
- Apply practical understanding to static & rotating mechanical equipment & related condition mentoring & inspection techniques.
- Understand mechanical testing methods, Failure Mechanisms & Fitness for Service, NDT & principles of corrosion & corrosion protection.
- Perform relevant calculations & analyses to assist in operation, sizing, & troubleshooting of chemical processes & mechanical equipment.

### **Who is this Course for?**

This course is suitable to a wide range of professionals but will greatly benefit technical and non-technical personnel in the chemical, petrochemical, oil and process and mechanical industries with a need to understand and discuss fundamental process and mechanical engineering:

- Petroleum Engineers
- Maintenance & Production Engineers
- Process Engineers
- R&D Chemists, Plant Chemists
- Economists & Business Managers

### **How will this be Presented?**

This course will utilise a variety of proven adult learning techniques to ensure maximum understanding, comprehension and retention of the information presented. This includes formal lectures and discussions, active participation through the use of problem-solving exercises, videos, group discussions, analysis of real-life case studies, and industry best practices. Case studies and examples will cover a range of levels, making the course also suitable non-technical Staff.

### **The Course Content**

#### **Module 1: Process Engineering Essentials: Upstream & Downstream Process Control & Optimisation**

##### **Day One**

##### **Introduction and Fundamentals of Process Engineering**

- Mass and energy balances



- Reactor types
- Process & Engineering Diagrams
- Flammability
- Electrical area classification
- Risk Management and Hazard Studies

## **Day Two**

### **Hydraulics and Fluid flow**

- Pressure and head & Bernoulli's theorem
- Flow of liquids, Reynolds number and pressure drop in pipes
- Two-phase and multi-phase flow
- Enthalpy and thermodynamics
- Principle of process relief devices and process design of relief systems
- Mechanical Equipment - Pumps, Compressors & Mixers

## **Day Three**

### **Heat Transfer and Reaction Engineering**

- Heat Transfer Mechanisms
- Heat transfer coefficients and calculation
- Heat exchangers, type and sizing
- Catalysis and Reaction Engineering
- Chemical reactions & kinetics
- Green Chemistry & Engineering and Sustainability

## **Day Four**

### **Distillation Processes and Equipment**

- Phase behavior and vapour/liquid equilibria
- Gas/Liquid separation
- Distillation equipment - Columns and vessels
- Troubleshooting of process equipment
- Overview of Other Separation Processes
- Effluent treatment [in refinery and petrochemical] industries



## **Day Five**

### **Process Control and Economics**

- Classification of control systems
- Measured variables
- Simple feedback control
- Preliminary economic analysis
- Fixed and variable costs, break even analysis
- Estimating the cost of process equipment and plants

## **Module 2: Mechanical Engineering Essentials: Rotating & Static Equipment & Structural Integrity**

## **Day Six**

### **Introduction & Fundamentals of Materials Selection, Types & Failures**

- Engineering Material Properties and Selection
- Materials Testing
- Types of Metals
- Static Strength and Fitness For Service
- Materials Failure Mechanisms
- Mechanical Design, Standards and Codes

## **Day Seven**

### **Static Equipment, Valves, Piping & Fitness for Service**

- Valves Types and Characteristics
- Valve Selection
- Valve Actuators
- Piping Systems and Pipe Supports
- Overview of API 570 - Inspection & repair of Pipelines & Piping
- Fitness for Service, API 579 overview



## **Day Eight**

### **Rotating Equipment, Pumps & Compressors**

- Pump Types, Positive Displacement and Dynamic
- Pump curves
- Pump Selection
- Types of Compressors
- Compressor Performance Curves

## **Day Nine**

### **Corrosion & Corrosion Protection**

- Corrosion Fundamentals
- Types of Corrosion
- Corrosion Inspection and Monitoring
- Corrosion Minimization
- Corrosion Protection

## **Day Ten**

### **Mechanical Maintenance**

- Strategies & Philosophies
- Code and Standards
- Condition Monitoring

Non Destructive Inspection techniques



**The Scandinavian Academy employs modern methods in training and skills development, enhancing the efficiency of human resource development. We follow these practices:**

- **Theoretical Lectures:**
  - We deliver knowledge through advanced presentations such as PowerPoint and visual materials, including videos and short films.
- **Scientific Assessment:**
  - We evaluate trainees skills before and after the course to ensure their progress.
- **Brainstorming and Interaction:**
  - We encourage active participation through brainstorming sessions and applying concepts through role play.
- **Practical Cases:**
  - We provide practical cases that align with the scientific content and the participants specific needs.
- **Examinations:**
  - Tests are conducted at the end of the program to assess knowledge retention.
- **Educational Materials:**
  - We provide both printed and digital scientific and practical materials to participants.
- **Attendance and Final Result Reports:**
  - We prepare detailed attendance reports for participants and offer a comprehensive program evaluation.
- **Professionals and Experts:**
  - The programs scientific content is prepared by the best professors and trainers in various fields.
- **Professional Completion Certificate:**
  - Participants receive a professional completion certificate issued by the Scandinavian Academy for Training and Development in the Kingdom of Sweden, with the option for international authentication.
- **Program Timings:**
  - Training programs are held from 10:00 AM to 2:00 PM and include buffet sessions for light meals during lectures.