



Consulting and Training | Reach New Heights

Course Name

Fundamental of Process Engineering

Sector Name

Oil, Gas and Chemical

Document Type

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Fundamental of Process Engineering

Course Introduction

Process engineering plays a pivotal role in industries such as chemicals, oil, gas, and petrochemicals. This training course is designed to provide participants with the essential concepts of process engineering and their application to the mechanical industry. This course focuses on the secure handling, transportation, and transformation of solids, liquids, and gases. Key areas of emphasis include separation processes like distillation, heat transfer, hydraulics, fluid dynamics, reaction engineering, process control, and economics.

This training course also spotlights the application of solid mechanical engineering principles, alongside other engineering techniques such as inspection, monitoring, and condition assessment. These skills empower mechanical engineers to design and maintain the equipment crucial for process engineers.

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Fundamental of Process Engineering

Target Audience

- ✓ Process Engineers – Designing and improving industrial processes.
- ✓ Mechanical & Chemical Engineers – Understanding process flow, equipment, and efficiency.
- ✓ Maintenance & Reliability Engineers – Ensuring smooth operation and minimal downtime.
- ✓ Plant Operators & Technicians – Managing process systems and troubleshooting.
- ✓ Production & Operations Managers – Overseeing process performance and optimization.

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Learning Objectives

- ✓ Utilize practical knowledge to address core challenges within process and mechanical engineering, and related industrial facilities.
- ✓ Grasp the foundational principles governing processes and facilities, and effectively apply this understanding to critical process units and categories, such as separation, heat exchange, and chemical reactions.
- ✓ Apply practical expertise to assess both stationary and rotating mechanical machinery, while also employing techniques for monitoring their condition.
- ✓ Gain insight into mechanical testing methodologies, failure mechanisms, fitness-for-service assessments, non-destructive testing (NDT), and the fundamentals of corrosion and corrosion prevention.
- ✓ Execute pertinent calculations and analyses to support operational activities, equipment sizing, and troubleshooting within chemical processes and mechanical systems.

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Fundamental of Process Engineering

Course Outline

✓ 01 DAY ONE

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

Introduction and Fundamentals of Process Engineering

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

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

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

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]

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Course Outline

✓ 02 DAY TWO

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

Static Equipment, Pressure Vessels

- ✓ Pressure vessel parts and Service Classification
- ✓ Overview of ASME VIII-1
- ✓ Material Selection, Designation, and Essential Properties
- ✓ Corrosion, Types, Allowance, and Protection
- ✓ Overview of API pressure vessel inspection
- ✓ Non-Destructive Examination

Static Equipment, Heat Exchangers

- ✓ Classification of Heat Exchangers
- ✓ Overview of TEMA
- ✓ Design of Shell and Tube Heat Exchangers
- ✓ Design of Air-Cooled and Plate Heat Exchangers
- ✓ Overview of API 660 and API 661
- ✓ Heat Exchangers Failure Mechanisms

Static Equipment, Valves & Piping

- ✓ Valve Types and Characteristics
- ✓ Valve Components, Selection, and Materials
- ✓ Valve and Actuators Sizing
- ✓ Piping Systems and Pipe Materials & Coatings
- ✓ Overview of API 570 - Inspection & Repair of Pipelines
- ✓ Fitness for Service, API 579 overview

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Fundamental of Process Engineering

Course Outline

✓ **03 DAY THREE**

Rotating Equipment, Pumps & Compressors

- ✓ Pump Types and Performance Curves
- ✓ NPSH and Cavitation
- ✓ Pump Selection and Sizing
- ✓ Types of Compressors and Performance Curves
- ✓ Surge, Stall, and Choking

Rotating Equipment, turbines

- ✓ Classification of turbines
- ✓ Gas Turbines Main Components and Control
- ✓ Steam Turbines Main Components and Control
- ✓ Turbine Materials and Coatings
- ✓ Failure analysis of Gas Turbine Components
- ✓ Failure analysis of Steam Turbine Components

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Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
March 15, 2027	March 17, 2027	3 days	4950.00 \$	switzerland , Geneva
June 14, 2027	June 16, 2027	3 days	3250.00 \$	UAE , Abu Dhabi
Sept. 14, 2026	Sept. 16, 2026	3 days	3250.00 \$	UAE , Abu Dhabi
Oct. 26, 2026	Oct. 28, 2026	3 days	3250.00 \$	UAE , Dubai

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