



Mechanical Engineering

Process Engineering Essentials

Course Introduction

Process engineering is a critical discipline in industries like manufacturing, chemicals, pharmaceuticals, and energy. Understanding the fundamentals of process engineering is essential for optimizing production efficiency, ensuring product quality, and maintaining safety standards. It involves the design, analysis, and control of processes, from raw material inputs to final product output. A strong foundation in process engineering allows professionals to troubleshoot issues, improve processes, and innovate within their industries. This training will provide participants with the core knowledge and tools needed to excel in process engineering roles.

The program will cover the essential concepts in process engineering, including process flow, system design, material and energy balances, and optimization techniques. Participants will learn about process control, safety standards, and how to improve process efficiency.

Target Audience

This course is designed for process engineers, plant operators, and professionals in industries involving manufacturing, chemical processing, and production.

Learning Objectives

- Understand the core principles of process engineering and its applications in various industries.
- Learn how to design, analyze, and optimize process flows and systems.
- Gain knowledge in material and energy balances for both batch and continuous processes.
- Understand process control techniques and how to optimize systems for better performance.

- Explore safety, risk management, and continuous improvement strategies to enhance process efficiency and safety.

Course Outline

• 01 DAY ONE

Introduction to Process Engineering Fundamentals

- What is process engineering and its role in industries
- Key components of a process (input, transformation, output)
- Process design vs. process operation
- Types of processes: batch, continuous, semi-continuous
- Overview of flow diagrams (PFDs and P&IDs)

Importance of process analysis and troubleshooting

• 02 DAY TWO

Process Flow and System Design

- Understanding process flow diagrams (PFDs) and piping and instrumentation diagrams (P&IDs)
- Identifying and managing process units (reactors, separators, heat exchangers)
- Role of equipment design in process optimization
- Material and energy flow analysis in process systems
- Sizing of equipment and pipelines for optimal flow

Design considerations for safety and efficiency

• 03 DAY THREE

Material and Energy Balances

- Introduction to material and energy balances in process systems
- Conservation of mass and energy principles
- How to balance chemical reactions and energy flows
- Performing mass and energy balances in batch and continuous processes
- Using balances to identify process inefficiencies
- Common tools and methods for solving balance problems

• 04 DAY FOUR

Process Control and Optimization

- Basic concepts of process control (feedback, feedforward, PID control)
- Understanding control loops and instrumentation
- Methods for improving process stability and response
- Techniques for process optimization (minimizing costs, maximizing efficiency)
- Key performance indicators (KPIs) for process control
- Troubleshooting control issues in manufacturing processes

• 05 DAY FIVE

Safety, Risk Management, and Process Improvement

- Introduction to safety in process engineering
- Key safety standards and regulations (OSHA, ANSI, ISO)
- Identifying and mitigating process hazards (HAZOP, risk analysis)
- Continuous improvement techniques (Six Sigma, Lean, Kaizen)
- Best practices for process monitoring and performance tracking

Confirmed Sessions

FROM	TO	DURATION	FEES	LOCATION
May 26, 2025	May 30, 2025	5 days	4950.00 \$	Spain - Barcelona
Sept. 22, 2025	Sept. 26, 2025	5 days	4250.00 \$	UAE - Dubai
Nov. 23, 2025	Nov. 27, 2025	5 days	4250.00 \$	KSA - Riyadh