MERCURY

Fundamentals of Mechanical Engineering Technology Course

29 March – 2 April 2027
Amsterdam (Netherlands)



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Ref: 6034_300687 **Date:** 29 March – 2 April 2027 **Location:** Amsterdam (Netherlands) **Fees:** 6200 Euro

Introduction

Mechanical engineering is a discipline that plays a critical role in the chemical, oil, gas, and petrochemical industries. This field requires a solid understanding of core engineering principles, as well as skills in various engineering techniques such as inspection, monitoring, and condition evaluation.

A mechanical engineer is tasked with ensuring the safe containment and controlled movement of solids, liquids, and gasses. Key areas include material properties, design practices, static and rotating equipment design, inspection, repair strategies, and an appreciation for maintenance practices and condition monitoring.

The mechanical engineering technology program integrates principles across various domains, including electrical mechanical engineering technology and mechanical technician certificates. The mechanical engineering technology course lays a foundation for those seeking to advance their knowledge, perhaps enrolling in a master's in mechanical engineering technology.

Critical Concepts in Electrical and Mechanical Technology

Electrical mechanical engineering technology is an integral part of mechanical systems, combining principles from both electrical and mechanical disciplines. Understanding this interconnectedness is crucial, especially when aiming to gain a mechanical engineering certificate or a mechanical technician certificate.

Engineering specialists with advanced knowledge in these areas are equipped to design, innovate, and maintain complex mechanical and electromechanical systems. In essence, these concepts serve as the underpinning for a robust mechanical engineering technology course.

Targeted Groups

- This mechanical engineering technology course is for Technical and non-technical personnel in the chemical, petrochemical, oil, and mechanical industries who need to understand fundamental mechanical engineering issues.
- Maintenance and Project Engineers, Production Engineers, Aspiring Mechanical Engineers, and Plant Operators.
- Non-experienced personnel need a foundational understanding of mechanical engineering concepts, potentially leading to a certified mechanical engineer status or obtaining a fundamentals of engineering certificate.

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Course Objectives

By the end of this mechanical engineering technology course, participants will be able to:

- Conduct a Non-Destructive Examination NDE on both static and rotating equipment.
- Choose appropriate materials for various mechanical applications.
- Grasp the principles of operation and design of complex mechanical systems.
- Implement measures to protect equipment from corrosion.
- Recognize different mode failures in equipment, which is essential for mechanical training certificates.

Targeted Competencies

Upon the end of this mechanical engineering technology course, the target competencies will be able to:

- Understand the mechanical design of pressure equipment and piping systems in adherence to applicable standards and codes.
- Select engineering materials based on properties suitable for specific industrial applications.
- Identification and evaluation of degradation mechanisms that may cause equipment failure.
- Understand the static and rotating equipment utilized in industrial applications.
- Develop and apply effective maintenance strategies and practical approaches to plant management.
- Condition monitoring techniques like inspections and assessments are crucial to mechanical engineering fundamentals.

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Course Content

Unit 1: Introduction and Fundamentals of Mechanical Engineering

- Engineering material properties.
- Understand stress and strain relationships.
- Learn about fracture failure, modes, stress concentration, and fracture toughness.
- Explore fatigue failure, testing methods, and the underlying mechanism.
- Investigate temperature considerations and creep failure.
- Recognize and categorize damage mechanisms.
- Essentials of mechanical design.
- Mechanical technologies field.
- Overview of ASME and API.
- Codes and standards are relevant.
- Mechanical design for static strength.

Unit 2: Materials Selection and Inspection for Mechanical Technology

- Understand strategies for materials selection in the mechanical engineering technology program.
- Examination of materials of construction.
- Carbon steels.
- Alloy steels.
- Stainless steels.
- Nickel-based and titanium alloys.
- Advance inspection techniques.
- Visual.
- Penetrant.
- Magnetic flux
- Eddy's current inspections.
- X-ray and Gamma-ray,
- Ultrasound - TOFD and Pulse-echo.

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Unit 3: Valves, Piping, and Fitness for Service in Mechanical Engineering

- A comprehensive study of valves.
- Valve types.
- Valve characteristics.
- Valve applications.
- Valve selection.
- Valve actuators.
- Delve into piping and pipelines.
- ASME B31.
- Learn about pipe types, construction, and schedules.
- Steel pipes.
- Weld types and sections.
- Overview of flanges and gaskets.
- Learn about plastic pipes and composite pipes.
- Pipe coatings and linings.
- Learn about the significance of pipe supports and insulation blocks.
- Stress relief in piping design.
- Pigging.
- Water hammer in a mechanical engineering technology course.
- Understand the introduction to API 570 for the inspection and repair of pipelines and piping.
- API 579 overview
- Fitness for service.

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Unit 4: Corrosion Management in Mechanical Technologies

- Fundamentals of corrosion.
- Identify types of corrosion.
- Understand techniques for corrosion inspection, monitoring, and prevention methods.
- Corrosion minimization strategies.
- Coatings.
- Inhibitors.
- Cathodic protection.

Unit 5: Compressors in Mechanical Technology Course

- Examine the types of compressors - reciprocating, centrifugal, and screw designs.
- Learn about blading and staging.
- Performance curves.
- Understand the importance of compressed air usage and the relevant instruments.
- Glands and mechanical seals are part of the mechanical engineering technology curriculum.

Unit 6: Mechanical Maintenance and Mechanical Technician Certificate Relevance

- Learn about the discussion on maintenance strategies and philosophies.
- Aid in maintenance system optimization.
- Understand maintenance management systems and their connection with a mechanical engineering technology program.
- Emphasize the role of condition monitoring in equipment maintenance.
- Delve into vibration analysis.
- Shaft alignment plays a role in ensuring the longevity and reliability of mechanical systems.