MERCURY

Structural and Piping Design of the Ship

2 – 6 May 2027
Online



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Ref: 15597_316541 **Date:** 2 – 6 May 2027 **Location:** Online **Fees:** 2900 Euro

Introduction:

The structural and piping design of ships is a critical aspect of maritime engineering. It encompasses the comprehensive planning, analysis, and construction of a vessel's framework and its intricate network of pipes. This discipline ensures a ship's safety, efficiency, and durability, which must withstand the rigorous demands of marine environments and operational conditions.

The structural design focuses on the ship's hull, decks, bulkheads, and superstructure, ensuring these components provide strength, stability, and buoyancy. The piping design involves meticulously arranging and installing pipes that transport fluids and gases essential for the ship's propulsion, cooling, heating, and various other systems.

Effective structural and piping design requires a deep understanding of material properties, hydrodynamics, thermodynamics, and adherence to international maritime standards and regulations. Engineers must consider load distribution, corrosion resistance, and maintenance accessibility while optimizing for weight and cost. Integrating advanced computer-aided design CAD tools and simulation software has revolutionized this field.

This ship structural and piping design course will explore the fundamental principles and methodologies of ship structural and piping design. Topics will include the selection of materials, design criteria, stress analysis, and the implementation of piping systems for various ship functions. Participants will have a robust understanding of how to design ship structures and piping systems that meet stringent industry standards and ensure the vessel's operational integrity and longevity.

Targeted Groups:

- Marine Engineers.
- Naval Architects.
- Shipbuilders.
- Maritime Project Managers.
- Mechanical Engineers.
- Piping Designers.
- Structural Engineers.
- Marine Surveyors.
- Shipyard Technicians
- Marine Consultants.
- Offshore Engineers.
- Maritime Regulatory Bodies.
- Engineering Students specializing in Marine or Mechanical Engineering.

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Course Objectives:

At the end of this ship structural and piping design course, the participants will be able to:

- Understand the fundamentals of ship structural design.
- Learn the principles of material selection for marine applications.
- Master the techniques for designing and laying out piping systems.
- Gain proficiency in using CAD and simulation tools for ship design.
- Analyze and apply maritime standards and regulations in design processes.
- Develop skills in corrosion prevention and control in marine environments.
- Perform load distribution and stress analysis for ship structures.
- Integrate thermal and mechanical systems effectively in ship design.
- Enhance problem-solving and critical thinking in engineering challenges.
- Implement safety and risk assessment strategies in ship design.
- Coordinate and manage structural and piping design projects efficiently.
- Conduct maintenance and inspection of ship structures and piping systems.

Targeted Competencies:

Upon the end of this ship structural and piping design training, the target competencies will:

- Structural Analysis and Design.
- Material Selection and Testing.
- Piping System Design and Layout.
- Hydrodynamics and Fluid Mechanics.
- CAD and Simulation Software Proficiency.
- Compliance with Maritime Standards and Regulations.
- Corrosion Prevention and Control.
- Load Distribution and Stress Analysis.
- Thermal and Mechanical Systems Integration.
- Problem-solving and Critical Thinking.
- Project Management and Coordination.
- Safety and Risk Assessment.
- Maintenance and Inspection Techniques.

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Integration of Specialized Ship Design Concepts:

This ship structural and piping design course covers specialized topics such as cruise ship structural design, container ship structural design, and the design principles of ships and marine structures. Participants will gain insights into ship structural design concepts and analyze ship structural analysis and design challenges. They will also cover the various types of piping systems in ships, creating comprehensive ship piping diagrams and studying detailed ship piping system drawings to translate theoretical knowledge into practical design skills.

Course Content:

Unit 1: Fundamentals of Ship Structural Design:

- Intro to ship structural components: hull, decks, bulkheads, and superstructure.
- Understand the principles of buoyancy and stability.
- Material properties and selection for shipbuilding.
- Load distribution and stress analysis techniques.
- Structural design criteria and methodologies.
- Intro to computer-aided design CAD tools.
- Regulatory standards and classification societies.
- Case studies of structural failures and lessons learned.

Unit 2: Piping Systems in Ships:

- Overview of shipboard piping systems and their functions.
- Types of pipes and fittings used in marine applications.
- Design principles for efficient piping layout.
- Flow dynamics and pressure drop calculations.
- Selection of materials for different piping applications.
- Installation techniques and best practices.
- Corrosion control methods for piping systems.
- Maintenance and inspection procedures for piping.

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Unit 3: Advanced CAD and Simulation Tools:

- Intro to advanced CAD software for ship design.
- Model ship structures using CAD tools.
- Simulate structural loads and stress distribution.
- Create piping system layouts in CAD.
- Perform fluid flow simulations for piping systems.
- Integrate thermal and mechanical systems in simulations.
- Analyze simulation results for design optimization.
- Practical workshops on using CAD and simulation software.

Unit 4: Compliance with Maritime Standards and Regulations:

- Overview of international maritime regulations and standards.
- Understand the role of classification societies.
- Design ships to meet safety and environmental regulations.
- Documentation and certification requirements.
- Procedures for regulatory approval and compliance checks.
- Case studies of regulatory compliance in ship design.
- Impact of evolving regulations on ship design practices.
- Strategies for staying updated with regulatory changes.

Unit 5: Project Management and Practical Applications:

- Principles of project management in ship design.
- Plan and schedule ship design projects.
- Resource allocation and cost management.
- Coordination among multidisciplinary teams.
- Risk assessment and mitigation strategies.
- Quality control and assurance in design projects.
- Real-world applications and case studies.
- Capstone project: Designing a ship structure and piping system.