MERCURY

Advanced HVAC Design - Principles and Practices for Efficient Systems

6 – 10 December 2026
Cairo (Egypt)



Dubai - UAE: +971 4 450 5697
Istanbul - Türkiye: +90 539 599 1206
Amman - Jordan: +962 79 712 3347

Advanced HVAC Design - Principles and Practices for Efficient Systems

Ref: 15441_308029 **Date:** 6 – 10 December 2026 **Location:** Cairo (Egypt) **Fees:** 4000 Euro

Introduction:

In this advanced HVAC design course, participants will delve into the core concepts of HVAC design, exploring topics ranging from heat transfer and load calculations to equipment selection, air distribution, and control strategies. They will have the expertise to create HVAC systems prioritizing comfort, energy efficiency, indoor air quality, and sustainability.

A specific focus will be directed towards HVAC designs for oil and gas facilities within the spectrum of advanced HVAC design. Participants will thoroughly understand the unique requirements and challenges associated with HVAC operations in this industry and examine how advanced HVAC solutions can cater to these demanding environments.

This advanced HVAC design course will entail a deep dive into the specificities of HVAC engineering applied to oil and gas operations. It will ensure that HVAC design engineers have the knowledge and advanced HVAC tools essential for thriving in this sector. It incorporates many techniques and systems, such as advanced HVAC solutions and technologies.

This advanced HVAC design training empowers participants to design sophisticated HVAC systems. Catering to the complexities of different environments, such as those in the oil and gas sector, participants will learn to address challenges through modern design philosophies and utilizing advanced HVAC tools.

Targeted Groups:

- HVAC Engineers and Designers.
- Mechanical Engineers.
- Building Services Consultants.
- Architects.
- Construction Professionals.
- Facility Managers.
- Energy Efficiency Specialists.
- Sustainability Professionals.
- HVAC System Installers and Technicians.

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Course Objectives:

At the end of this advanced HVAC design course, the participants will:

- Grasp essential concepts of heat transfer, fluid dynamics, thermodynamics, and psychrometrics for HVAC design.
- Master methodologies for precise heating and cooling load calculations in residential and commercial spaces.
- Create well-sized and balanced ductwork layouts for efficient air distribution.
- Evaluate and choose HVAC equipment based on load calculations, energy efficiency, and sustainability.
- Design efficient heating and cooling systems with a focus on hydronic components.
- Design HVAC systems that maintain comfort and indoor air quality.
- Develop control sequences and strategies to enhance system efficiency and comfort.
- Integrate energy-efficient and sustainable practices into HVAC design.
- Planned and executed commissioning processes to verify HVAC system performance.
- Apply learned concepts through practical exercises and case studies.
- Enhance teamwork and communication skills through group engagement.
- Stay informed about the latest HVAC technology and regulations.

Targeted Competencies:

By the end of this advanced HVAC design training, the participant's competencies will:

- Introduction to HVAC Systems and Design Fundamentals.
- Air Distribution Design and Duct Sizing.
- HVAC Equipment Selection and System Components.
- Hydronic System Design and Thermal Comfort.
- HVAC Controls and System Commissioning.

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Course Content:

Unit 1: Introduction to HVAC Systems and Design Fundamentals:

- Overview of HVAC systems and their importance in building design.
- Basic principles of heat transfer, fluid dynamics, and thermodynamics.
- Understanding psychrometrics and its role in HVAC design.
- Introduction to different types of HVAC systems central, decentralized, hybrid.
- Load calculation methodologies Manual J, CLTD/CLF, Radiant Time Series.

Unit 2: Air Distribution Design and Duct Sizing:

- Importance of proper air distribution in HVAC systems.
- Ductwork design considerations: friction, velocity, pressure drop.
- Types of duct systems: radial, extended plenum, perimeter loop.
- Duct material selection and insulation requirements.
- Introduction to ASHRAE duct sizing methods.

Unit 3: HVAC Equipment Selection and System Components:

- Overview of HVAC equipment: air handlers, chillers, boilers, heat, and pumps.
- Factors influencing equipment selection: load, efficiency, environmental considerations.
- Types of refrigerants and their impact on design.
- Components of HVAC systems: coils, fans, filters, dampers, and controls.
- Energy efficiency and sustainable design principles in equipment selection.

Unit 4: Hydronic System Design and Thermal Comfort:

- Introduction to hydronic systems: boilers, pumps, cooling towers.
- Types of hydronic distribution systems: two-pipe, four-pipe, radiant heating/cooling.
- Balancing hydronic systems for optimal performance.
- Thermal comfort parameters: PMV/PPD, operative temperature, ASHRAE Standard 55.
- Designing for indoor air quality IAQ and ventilation rates.

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Unit 5: HVAC Controls and System Commissioning:

- Importance of HVAC controls in system operation and energy efficiency.
- Types of control systems: direct digital control DDC and building automation systems BAS.
- The sequence of operations and control strategies for HVAC systems.
- Role of sensors, actuators, and feedback loops in control systems.
- Commissioning process, verification, testing, and optimization of HVAC systems.