



5-DAY COURSE SYLLABUS

Design, Operation and Maintenance of HVAC Systems

HVIN02-ONL26 · ONLINE (ZOOM)

This course provides a comprehensive exploration of HVAC systems, encompassing design, operation, maintenance, and troubleshooting across a diverse range of applications. Understanding Psychrometry is fundamental to grasping HVAC system operations, so the course begins with a concise review of Psychrometry and its application to air conditioning processes on the Psychrometric chart. Subsequently, participants will delve into detailed discussions on the basic subsystems of HVAC systems, covering various single-zone and multiple-zone configurations. Clear guidelines are provided for selecting the most suitable HVAC system for residential, commercial, and industrial applications.

CEUS / PDHS	INSTRUCTOR	DAYS	PRICE	WORKSHOPS	SKILL LEVEL	COURSE CODE
2.8 / 28	Dr. Mohamed Hamed, PhD, P.Eng., FEC	5	\$2,495.00 CAD	1 workshop	Intermediate	HVIN02- ONL26

DESCRIPTION

This course provides a comprehensive exploration of HVAC systems, encompassing design, operation, maintenance, and troubleshooting across a diverse range of applications.

Understanding Psychrometry is fundamental to grasping HVAC system operations, so the course begins with a concise review of Psychrometry and its application to air conditioning processes on the Psychrometric chart. Subsequently, participants will delve into detailed discussions on the basic subsystems of HVAC systems, covering various single-zone and multiple-zone configurations. Clear guidelines are provided for selecting the most suitable HVAC system for residential, commercial, and industrial applications.

Furthermore, the course addresses operation and maintenance procedures for different subsystems and components, alongside an overview of measurements and instrumentation utilized in troubleshooting HVAC systems.

This material caters to individuals with limited background knowledge on the subject, while also offering valuable insights for experienced personnel working with HVAC systems.

WHAT YOU WILL LEARN

- A thorough understanding of the design, operation, and maintenance of various HVAC systems
- Guidelines for the selection of the most appropriate HVAC system for various applications
- Valuable information on maintenance and troubleshooting of various HVAC components and subsystems

COURSE OUTLINE

- 01 Introduction to HVAC
- 02 Psychrometry
- 03 Basic Subsystems of any HVAC System
- 04 Types of HVAC Systems - Single- and Multiple-zone systems
- 05 Selection of HVAC Systems for Various Applications
- 06 HVAC Equipment Selection and Rating Tables
- 07 Operation and Maintenance of Air Subsystem Components
- 08 Operation and Maintenance to Guarantee Indoor Air Quality (IAQ)
- 09 Operation and Maintenance of Refrigeration Subsystem Components
- 10 Troubleshooting of HVAC Systems

WHO SHOULD ATTEND

- Design and project engineers and technologists
- Plant and facility managers/engineers
- Consultants
- Mechanical engineers and technologists
- Maintenance and operation personnel
- Other technical personnel who need to Develop/Upgrade/Refresh their current knowledge of operation and maintenance of various types of HVAC systems
- Professionals with basic knowledge in the construction field including Architects, Technicians, Contractors, Building inspectors, Site Foremen
- Representatives of suppliers or equipment manufacturers
- Engineering Students

REGISTER NOW →

Customize this course — We can offer a customized version of this course, in terms of duration and content, upon request.

REQUEST CUSTOMIZATION

DAILY SCHEDULE

5-Day Course Schedule

START

10:00 AM EST

END

5:00 PM EST

FORMAT

Live Online

One-hour lunch break each day, plus refreshment and networking breaks each morning and afternoon session.

DAY	TOPIC	SUBTOPICS
DAY I	Introduction	- The meaning of Air Conditioning - Comfort conditions - Codes and standards - Rules of Thumb (cooling/heating loads)
	Psychrometry	- Moist-air properties - The Psychrometric chart
DAY II	Psychrometry (Continued)	- Moist air processes - Typical A/C cooling and heating cycles - Steps to Size an HVAC System - Determination of the condition and amount of supply air - Design Case Studies
	Basic Subsystems of any HVAC System	- Air subsystem - Chilled/hot-water subsystem - Refrigeration subsystem - Heat-rejection subsystem - Control subsystem
	Types of HVAC Systems: Single-zone systems	- Packaged terminal air conditioner - Packaged DX rooftop unit - Split DX system - Chilled-water terminal system - Dedicated outdoor-air system - Water-source heat pump - Ground-source heat-pump - Variable-air-volume (VAV) system
DAY III	Types of HVAC Systems: Multiple-zone systems	- Multi-zone air handling unit (AHU) - Changeover-bypass system - DX rooftop VAV system - Packaged self-contained VAV system - Central chilled-water VAV system - Two-fan, dual-duct VAV system - Dual-duct VAV system
	Selection of HVAC Systems for Various Applications	- Factors affecting selection - Selection maps for single-purpose occupancies - Selection maps for multi-purpose occupancies
	HVAC Equipment Selection and Rating Tables	- Packaged DX units - Air Handling Units (AHU) - Air-cooled water chillers - Water-cooled water chillers
	Workshop	Participants will design an HVAC System for a building under the instructor guidance
DAY IV	Fans	- Functions and types of fans - Fan selection - Fan noise – estimated fan sound power level - Eliminating fan-noise problems - Periodic inspection - Fan troubles and the possible causes
	Coils	- Types of coils - Coil accessories - Condensate control - Freeze-up protection - Tightness and cleaning
	Air Cleaning Equipment	- Classification of air filters - Electronic air cleaners

DAY	TOPIC	SUBTOPICS
DAY V		· Activated carbon adsorbers · Selection of air filters
	Air Ducts	· Air leakage · Fire protection · Duct liner and duct cleaning · Sound attenuation in ducts · Silencers
	Operation and Maintenance to Guarantee Indoor Air Quality (IAQ)	· Inspection, service, and access · Monitoring of operating conditions in air systems · Coils and ductwork · Space pressurization control · Minimum Ventilation Control · CO2-based demand-controlled ventilation
	Operation and Maintenance of Refrigeration Subsystem Components	· Compressors · Main problems in direct-expansion systems · Parameters that influence the performance of Shell-and-Tube water-cooled condensers · Air-cooled condensers: clearance, warm air recirculation, dirt clogging, and low-ambient air control · Factors affecting cooling tower performance · Operating considerations for cooling towers · Maintenance of cooling towers
	Troubleshooting of HVAC Systems	· Required Measurements and Instrumentation · Troubleshooting Case Studies
	Group Discussion and Course Wrap-Up	