



COURSE SYLLABUS · HVAC SYSTEMS · 2026

Fundamentals, Sizing, Selection, and Operation of HVAC Systems

HVBE01-ONL26 · BEGINNER · LIVE ONLINE VIA ZOOM

Mastering the fundamentals, sizing, selection, and operation is essential for both designers and operators of HVAC systems. This comprehensive course covers the core principles of HVAC systems, from Psychrometry through to load calculations, system design, equipment selection, controls, energy conservation, and the use of Carrier HAP software.

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	4	Beginner	HVBE01-ONL26

DESCRIPTION

Mastering the fundamentals, sizing, selection, and operation is essential for both designers and operators of HVAC systems. This comprehensive course covers the core principles of HVAC systems, commencing with Psychrometry and proceeding to the representation and calculations of air conditioning processes and cycles.

Participants will learn cooling and heating load calculations, the design of air and water distribution systems, HVAC equipment and system selection, controls, energy conservation, and the economics of HVAC systems. The course also demonstrates the utilization of Carrier's Hourly Analysis Program (HAP) for design and sizing.

Attendees benefit from numerous practical workshops and rules of thumb, aiding beginners in system design and sizing, while offering experienced professionals valuable insights for quick design and operational checks.

WHAT YOU WILL LEARN

- Fundamentals of the design and operation of HVAC systems
- Air conditioning cycle, load, duct, and hydronic piping design calculations
- Selection procedures of efficient operation of various HVAC equipment and systems
- Recognizing energy saving opportunities in HVAC systems and equipment
- Select and design efficient controls of HVAC systems at part-load

COURSE OUTLINE

- 01 Psychrometry
- 02 Air Conditioning Cycles
- 03 Space Conditions – Comfort
- 04 Cooling/Heating Load Calculations
- 05 Rules of Thumb (ROTs)
- 06 Design of Air Distribution System (Duct Design)
- 07 Workshops
- 08 HVAC Equipment and System Selection
- 09 Control Strategies, Energy and Costs
- 10 Design of Water Distribution Systems

WHO SHOULD ATTEND

- Design and Project Engineers and Technologists
- Plant and Facility Engineers
- Mechanical Consultants
- Maintenance and Operation Personnel
- Engineering Students
- Architects and Contractors seeking HVAC knowledge
- Professionals wishing to enter or refresh knowledge in HVAC

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	Psychrometry	- Moist air properties - The psychrometric chart - Moist air processes
	Air Conditioning Cycles	- Recirculated, return, outdoor, and supply air - Relation between supply air and space air conditions - Typical cooling and heating cycles - Capacity of refrigerating plant
DAY II	Space Conditions – Comfort	- Comfort-physiological considerations - Environmental comfort indices - Comfort conditions
	Cooling/Heating Load Calculations	- Design temperature differences - Conduction heat gains/losses - People, lights, and equipment loads - Infiltration, ventilation, radiant, and solar heat gains
	Workshop I	Calculation of design load for an HVAC system under instructor guidance
DAY III	Rules of Thumb (ROTs)	- Cooling and heating load ROTs - Infiltration, ventilation, humidification ROTs - Occupancy, lighting, equipment ROTs
	Design of Air Distribution System	- Total, static and velocity pressures - Loss in static pressure due to friction - Fan laws, performance curves, and selection - Duct design
	Workshop II	Design of a duct system under instructor guidance
DAY IV	HVAC Equipment & System Selection	- Unitary equipment and heat pumps - Chilled water systems - Selection procedures for coils, air conditioners, furnaces
	A/C Control Strategies	- Constant volume and variable air volume systems - Central HVAC system controls
	Energy and Costs	- HVAC system demand calculations - Energy consumption and cost calculations - Maintenance, replacement, and installation costs
DAY V	Hydronic System Design	- Piping loop systems and head loss - Piping layout, sizing, and pump selection
	Workshop III	Design of a water system under instructor guidance
	Carrier HAP Software	- Basic HAP program concepts - Step-by-step instructions for system design using HAP
	Workshop IV	Example problem illustrating the use of HAP to design an HVAC system
Group Discussion & Course Wrap-Up		