



5-DAY COURSE SYLLABUS

Sustainable Design and Operation of HVAC Systems in Buildings

HVBE03-ONL26 • ONLINE (ZOOM)

The building industry is approaching general acceptance of sustainable design principles. Sustainable design means that engineers must interact with architects, owners, and facility managers in a team effort to provide high-quality, productive environment for people while considering the impact of their design on the environment. The Leadership in Energy & Environmental Design (LEED) rating system is an excellent way to quantify the sustainability of buildings. This course focuses on sustainable design and operation of HVAC systems used in buildings. It covers the basics of science by which the HVAC systems operate, descriptions of the many system and equipment options that can be selected, guidelines for which might be appropriate in given applications, and exercises and case studies to reinforce the material.

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 workshops	Beginner	HVBE03- ONL26

DESCRIPTION

The building industry is approaching general acceptance of sustainable design principles. Sustainable design means that engineers must interact with architects, owners, and facility managers in a team effort to provide high-quality, productive environment for people while considering the impact of their design on the environment. The Leadership in Energy & Environmental Design (LEED) rating system is an excellent way to quantify the sustainability of buildings.

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Topics are introduced to individuals who have little background on the subject while providing valuable information resources to personnel who have more experience with HVAC systems in buildings.

WHAT YOU WILL LEARN

- Basics of design and operation of HVAC systems in buildings
- Descriptions of various system and equipment options
- Guidelines and Systematic procedures for system and equipment selection
- Insight into sustainable designs of HVAC systems in buildings

COURSE OUTLINE

- 01 Introduction: Sustainability and Economics
- 02 Introduction to HVAC
- 03 HVAC Delivery System
- 04 Cooling Production Equipment and Systems
- 05 Heating Production Equipment and Systems
- 06 Air-Handling Equipment and Systems
- 07 Piping Equipment and Systems

WHO SHOULD ATTEND

- Architects
- Design and Project Engineers
- Technologists
- Facility Managers
- Consultants
- Mechanical Engineers and Technologists
- Maintenance and Operations Personnel
- Other technical personnel who need to develop/upgrade/refresh their current knowledge of HVAC systems in buildings

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

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DAILY SCHEDULE

5-Day Course Schedule

START	END	FORMAT	
10:00 AM EST	5:00 PM EST	Live Online	One-hour lunch break each day, plus refreshment and networking breaks each morning and afternoon session.

DAY	TOPIC	SUBTOPICS
DAY I	Introduction: Sustainability and Economics	- Basics of Energy - Sustainable Design - Indoor Environmental Quality - Commissioning - Evaluating Design Options - Economics of Owning and Operating Buildings
	Introduction to HVAC	- Environmental Comfort - Properties of Air-Water Mixtures - Energy Transport in HVAC Systems - HVAC Load Estimation - Calculating Heating Loads - Calculating Cooling Loads
	Workshop I	Load calculation
DAY II	HVAC Delivery System	- Control of Heating and Cooling - Zoning - Commonly Used Systems for Zone Control
	Cooling Production Equipment and Systems	- Refrigeration Cycle - Direct Expansion Systems - Chilled-Water Systems - Heat Rejection from Cooling Systems to the Environment - Chilled-Water Plant Design
	Workshop II	Sizing and selection of a cooling system
DAY III	Heating Production Equipment and Systems	- Types of Heating Systems - Heating Energy Sources - Furnaces and Air Heaters - Boilers – Types - Selection of Heating Medium and Equipment - Operating and Safety Controls
	Workshop III	Sizing and selection of a heating system
DAY IV	Air-Handling Equipment and Systems	- Air-Handling Equipment - Air Cleaning – Filters - Fans and Duct Systems - Air Devices (diffusers, grills, etc.) - General Guidelines for Duct System Design
	Workshop IV	Duct design – case study
DAY V	Piping Equipment and Systems	- Piping Systems and Components - Pumps – types and performance - Water-Piping Systems
	Group Discussion and Course Wrap-Up	