HAVTECH

DAIKIN

HVAC SYSTEMS PROGRAM

NEW! Modular Course System

SAVE TIME WITH FLEXIBLE COURSES!

HVAC SYSTEMS PROGRAM OVERVIEW

The Daikin HVAC Systems Program combines the knowledge and experience of Daikin's Principles of HVAC, Principles of Air Systems Design, Principles of Refrigeration, Principles of Chiller Plant Design, and Building Systems classes into one comprehensive program that uses a blended learning approach.

This program utilizes both VIRTUAL INSTRUCTOR LEAD (VILT) and SELF-DIRECTED learning methods.

Target audience:

- Engineers
- Building Operators
- Contractors

This higher education level course includes:

- Access to online course content for up to one (1) year
- Six (6) month live instructor access
- Daikin HVAC Fundamentals textbooks

HVAC Systems Program	Estimated Hours to Complete	CEU Credit Eligibility
	49	4.9

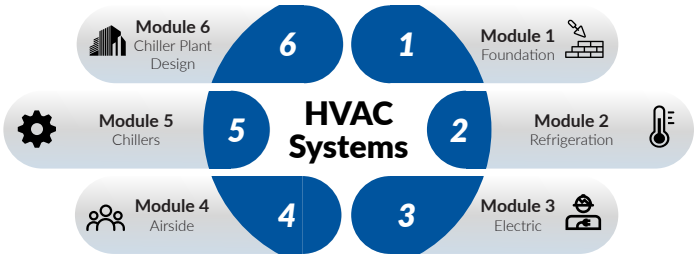
Full Program Cost

Best Value!

Per Person:	$1000

Per Module Cost

Individual Module Per Person	$200



MODULES OFFERED

6 MODULE PROGRAM or "A LA CARTE"

Individuals may choose to complete the entire 6 module program or **NEW!** Register for modules that most interest YOU!

1. FOUNDATIONS OF HVAC
2. REFRIGERATION
3. ELECTRIC
4. AIRSIDE
5. CHILLERS
6. CHILLER PLANT DESIGN

For more info, click or scan below

LEARNING INSTITUTE

For questions, please contact Training@Havtech.com

SEMESTER A SCHEDULE

JANUARY – JUNE 2023

Completion Requirements:

- A certificate of completion for the modules will only be provided if the participant completes ALL of the tests for that module.
- ONE Date/Time per VILT Pathway is required; each VILT session is 90 minutes and are stated in EST
- There is an opportunity for attendees to earn CEU credits. This designation must be known prior to the start of each module. See last page for CEU eligibility.
- Two weeks prior to each module's start date, an e-mail will be sent to choose a VILT session on a first come, first served basis.

MODULE	PATHWAY	Est. Hrs	CEU Credits	DATES		
JANUARY	**Intro to HVAC (VILT)**	7.75	0.8	Weds, 1/11 11am-12:30pm	Thursday, 1/19 11am-12:30pm	Thursday, 1/26 11am-12:30pm
Module 01 **Foundations**	Intro to Plans			**Self-directed content to do online between January 9th to January 31st**		
	Thermodynamics					
	Psychrometrics					
	Hydronics and Pumps					
FEBRUARY	**Refrigeration Components (VILT)**	5.5	0.6	Weds, 2/8 11am-12:30pm	Weds, 2/15 11am-12:30pm	Weds, 2/22 11am-12:30pm
Module 02 **Refrigeration**	Refrigeration Cycle			**Self-directed content to do online between February 6th to February 28th**		
	Energy Recovery for Refrigeration					
MARCH	**Motors and VFDs (VILT)**	10	1	Weds, 3/8 11am-12:30pm	Weds, 3/15 11am-12:30pm	Weds, 3/22 11am-12:30pm
Module 03 **Electric**	Electrical Basics			**Self-directed content to do online between March 6th to March 28th**		
	Electrical Schematics					
	Controls Concepts for HVAC					
	Controls Components					
APRIL	**Air Distribution (VILT)**	7.41	0.7	Weds, 4/5 11am-12:30pm	Weds, 4/12 11am-12:30pm	Weds, 4/19 11am-12:30pm
Module 04 **Airside**	Coils			**Self-directed content to do online between April 5th to April 28th**		
	Fans					
	Air Handler Units					
	Rooftop Units					
	Controls for Air Handler Units					
MAY	**Chiller Types (VILT)**	9.5	1	Weds, 5/3 11am-12:30pm	Weds, 5/10 11am-12:30pm	Weds, 5/17 11am-12:30pm
Module 05 **Chillers**	Chiller Basics			**Self-directed content to do online between May 3rd to May 26th**		
	Constant Flow Systems					
	Variable Flow Systems					
	Low Delta T					
	Condenser Water Systems & Cooling Towers					
	Controls					
JUNE	**Chiller Plant Variations (VILT)**	8.25	0.8	Weds, 6/7 11am-12:30pm	Thursday, 6/8 11am-12:30pm	Weds, 6/14 11am-12:30pm
Module 06 **Chiller Plant Design**	Chiller Plan Optimization			**Self-directed content to do online between June 5th to June 28th**		
	Energy Recovery for Refrigeration					
	Water-Side-Free-Cooling					
	Thermal Storage in CHW Systems					
	Process Cooling					
	District Cooling					

MODULE 1: FOUNDATIONS

Total CEU Credit Hours for Module	Est. Hrs. to Complete: 7.75	CEU Credits Eligibility: 0.8

INTRO TO HVAC VILT

- Identify each type of HVAC equipment (water-cooled chiller, air-cooled chiller, water-source heat pump, rooftop unit, air handler unit, air terminal system, and variable refrigerant volume)
- Explain how each type of equipment works in a system

INTRO TO PLANS SELF-DIRECTED ONLINE CONTENT

- Read the sequence order of a plan to use in the field
- Identify the most common HVAC-associated symbols on a plan
- Identify the scale of a given plan
- Use the support column grid to successfully navigate a plan
- Identify the correct sequence of key components
- Explain how the key components fit into piping, duct work, and plumbing

THERMODYNAMICS SELF-DIRECTED ONLINE CONTENT

- Describe the differences between latent and sensible heat
- Describe each type of heat transfer (radiation, conduction, and convection)
- Provide examples of each type of heat transfer
- Calculate heat transfer to size a coil (sales) or to check coil efficiency (service)
- Explain the relationship between pressure and temperature

PSYCHROMETRICS SELF-DIRECTED ONLINE CONTENT

- Read a psychrometric chart and locate a state point on the chart
- Use a psychrometric chart to calculate the state point between outside air and return air in order to determine the correct damper positioning
- Explain the relationship between air flow and humidity, and the impact equipment could have on each
- Plot key types of HVAC equipment on a psychrometric chart
- Explain how to remove latent or sensible energy by confirming or sizing a refrigerant coil

HYDRONICS AND PUMPS SELF-DIRECTED ONLINE CONTENT

- Identify key components of a hydronic system
- Accurately read a pump curve
- Identify causes for cavitation in a pump
- Convert measurements from Pounds per Square Inch Gauge (PSIG) to Foot of Head (FtHd)
- Calculate an equivalent piping length

MODULE 2: REFRIGERATION

Total CEU Credit Hours for Module	Est. Hrs. to Complete: 5.5	CEU Credits Eligibility: 0.6

REFRIGERATION CYCLE COMPONENTS VILT

- Identify the primary components of the refrigeration cycle
- Explain the purpose of each primary component of the refrigeration cycle
- Identify the secondary components of the refrigeration cycle
- Explain the correct sequence of the refrigeration cycle components
- Explain the refrigerant state in each stage of the refrigeration cycle

REFRIGERATION CYCLE SELF-DIRECTED ONLINE CONTENT

- Explain the purpose of the refrigeration cycle within HVAC system
- Explain latent, sensible, and specific heat within the refrigeration cycle
- Identify the areas of the refrigeration cycle where specific types of heat are transferred
- Identify different applications where the refrigeration cycle is used

ENERGY RECOVERY FOR REFRIGERATION SELF-DIRECTED ONLINE CONTENT

- Explain energy recovery applications that affect refrigeration
- Explain environmental conditions where energy recovery is the best application
- Identify energy recovery applications by their piping layout

MODULE 3: ELECTRIC

Total CEU Credit Hours for Module	Est. Hrs. to Complete: 10	CEU Credits Eligibility: 1

MOTORS AND VFDS VILT

- Explain how a motor operates
- Identify the HVAC types of motor designs and configurations
- Explain how the types of motor starters function
- Explain power factor as it applies to motors

ELECTRICAL BASICS SELF-DIRECTED ONLINE CONTENT

- Explain how power distribution works
- Explain how electricity flows
- Use Ohm's Law to calculate current, voltage, and resistance
- Explain the relationship between electricity and magnetism
- Explain how the basic components in electrical equipment work (switches, fuses, contactors, relays, capacitors, resistors/resistance/electrical loads, diodes, transformers, and thermostats)

ELECTRICAL SCHEMATICS SELF-DIRECTED ONLINE CONTENT

- Identify electrical terms, acronyms, and symbols
- Explain how to read an electrical schematic
- Identify practical approaches to problem solving when working with an electrical system

CONTROLS CONCEPTS FOR HVAC SELF-DIRECTED ONLINE CONTENT

- Describe the three levels of controls for HVAC (unit, system, BMS/BAS)
- Explain how key terminology is used in the control process
- Explain the basic control strategies
- Explain the four different types of control point
- Describe the four types of modulating controls

CONTROLS COMPONENTS SELF-DIRECTED ONLINE CONTENT

- Describe the types of control sensors
- Describe the types of control dampers
- Describe the types of valves

MODULE 4: AIRSIDE

Total CEU Credit Hours for Module	Est. Hrs. to Complete: 7.41	CEU Credits Eligibility: 0.7

AIR DISTRIBUTION VILT

- Identify different methods of air distribution
- Explain how each method of air distribution works

COILS SELF-DIRECTED ONLINE CONTENT

- Describe different coil types
- Explain the different uses and benefits of each coil type

FANS SELF-DIRECTED ONLINE CONTENT

- Use fan curves and fan laws to determine the most useful fan type for a specific application
- Identify fan type by blade configuration
- Determine the safe operation range of a fan type
- Explain fan laws and why they are used

AIR HANDLER UNITS SELF-DIRECTED ONLINE CONTENT

- Identify the major components in an air handler unit
- Explain the function of the major components in an air handler unit under varying conditions
- Explain the importance of casing design in air handler unit performance

ROOFTOP UNITS SELF-DIRECTED ONLINE CONTENT

- Identify the major components in a rooftop unit
- Explain the function of the major components in a rooftop unit
- Describe the differences between a DOAS and a standard rooftop unit

CONTROLS FOR AIR HANDLER UNITS SELF-DIRECTED ONLINE CONTENT

- Describe control strategies for air handler units
- Explain the interaction of AHU and RTU controls to include air flow, enthalpy, temperature, and pressure

MODULE 5: CHILLERS

Total CEU Credit Hours for Module	Est. Hrs. to Complete: 9.5	CEU Credits Eligibility: 1

CHILLER TYPES VILT

- Demonstrate the ability to knowledgeably discuss chiller basics
- Explain how an air-cooled chiller works
- Explain how a water-cooled chiller works
- Explain the basics of an absorption chiller
- Knowledgeably discuss relevant AHRI standards

CHILLER BASICS SELF-DIRECTED ONLINE CONTENT

- Explain lift, or pressure ratio
- Explain the Carnot Cycle and Coefficient of Performance (COP)
- Describe condenser water relief using AHRI standards

CONSTANT FLOW SYSTEMS SELF-DIRECTED ONLINE CONTENT

- Explain how constant flow systems function in single chiller plants, parallel chiller plants, and series chillers
- Explain series counter flow

VARIABLE FLOW SYSTEMS SELF-DIRECTED ONLINE CONTENT

- Describe how a primary-secondary water system works
- Explain a variable primary flow system
- Explain pump control related to variable flow systems
- Explain chiller staging

LOW DELTA T SELF-DIRECTED ONLINE CONTENT

- Explain Low Delta T and Low Delta T Syndrome
- Determine possible causes of Low Delta T

CONDENSER WATER SYSTEMS AND COOLING TOWERS SELF-DIRECTED ONLINE CONTENT

- Demonstrate an understanding of Cooling Technology Institute (CTI) standards for cooling towers
- Describe approach and range of a cooling tower
- Explain Total Dissolved Solids (TDS) and the importance of make-up water
- Distinguish different configurations of cooling towers

CONTROLS SELF-DIRECTED ONLINE CONTENT

- Describe the general control sequence of operation for a chiller
- Explain how leaving chilled water reset works
- Identify external equipment that can be controlled with Daikin chillers
- Explain how system design and control sequence can help with Low Delta T Syndrome and compressor short cycling
- Describe the basic sequence of operation for primary-secondary flow and variable primary flow

MODULE 6: CHILLER PLANT DESIGN

Total CEU Credit Hours for Module	Est. Hrs. to Complete: 8.25	CEU Credits Eligibility: 0.8

CHILLER PLANT VARIATIONS VILT

- Discuss key considerations for alternative fuels in chiller plant design
- Explain the requirements for a hybrid plant design
- Describe methods of preferential chiller loading
- Explain the advantage of tertiary piping in specific applications
- Describe the impact of tall buildings on system design

CHILLER PLANT OPTIMIZATION SELF-DIRECTED ONLINE CONTENT

- Explain load profile and why it is important
- Describe key design considerations
- Recommend design conditions for optimizing a chiller plant
- Describe various optimization tactics
- Explain chiller staging in chiller plant optimization

ENERGY RECOVERY SELF-DIRECTED ONLINE CONTENT

- Explain energy recovery using a split condenser unit
- Explain why templifiers are used and the advantages and disadvantages of using templifiers in every recovery
- Explain how system design and control affect energy recovery

WATER-SIDE-FREE COOLING SELF-DIRECTED ONLINE CONTENT

- Explain the advantages and disadvantages of different applications of water-side-free cooling
- Explain cooling tower sizing
- Describe the sequence of operation for water-side-free cooling

THERMAL STORAGE IN CHW SYSTEMS SELF-DIRECTED ONLINE CONTEN

- Explain load profile (run time) related to thermal storage
- Explain the difference between full and partial load storage
- Describe the differences between thermal storage technologies

PROCESS COOLING SELF-DIRECTED ONLINE CONTENT

- Explain the difference between process cooling and comfort cooling
- Explain the impact of chiller selection for process cooling
- Describe different types of process cooling
- Describe operating conditions for process cooling

DISTRICT COOLING SELF-DIRECTED ONLINE CONTENT

- Describe chiller plant design considerations related to district cooling
- Explain chiller staging as it relates to district cooling
- Describe the advantages of series counter flow chillers
- Explain the advantages of changing a primary secondary piping layout to a distributed piping system
- Explain the benefits of district cooling

CEU Calculation Formula

CEU Calculation

- To qualify for CEUs, a learner must:
  - Inform Havtech that they want CEU credits prior to the start of the program
  - Complete all activities
  - Attend One (1) VILT per module
  - Pass all tests with a minimum of 80%

Module	Estimated Hours to Complete	CEU Credits Eligibility
01 - **Foundations**	8	0.8
02 - **Refrigeration**	6	0.6
03 - **Electric**	10	1
04 - **Airside**	7	0.7
05 - **Chillers**	10	1
06 - **Chiller Plant Design**	8	0.8
TOTAL	**49**	**4.9**