



COURSE OVERVIEW ME0150

Advanced Heating, Ventilation & Air-Conditioning Systems (HVAC)

Design, Installation & Maintenance

Course Title

Advanced Heating, Ventilation & Air-Conditioning Systems (HVAC): Design, Installation & Maintenance

Course Reference

ME0150

Course Duration/Credits

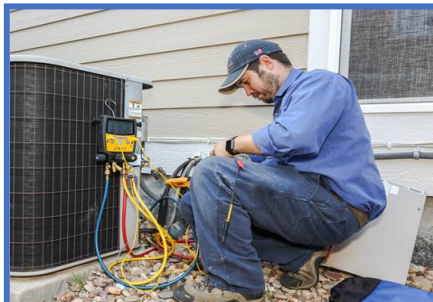
Five days/3.0 CEUs/30 PDHs

Course Date/Venue



Session(s)	Date	Venue
1	April 27-May 01, 2025	Oryx Meeting Room, Double Tree by Hilton Al Saad, Doha, Qatar
2	July 28-August 01, 2025	Ajman Meeting Room, Grand Millennium Al Wahda Hotel, Abu Dhabi, UAE
3	October 26-30, 2025	Boardroom 1, Elite Byblos Hotel Al Barsha, Sheikh Zayed Road, Dubai, UAE
4	November 30-December 04, 2025	Al Khobar Meeting Room, Hilton Garden Inn, Al Khobar, KSA

Course Description



This practical and highly-interactive course includes various practical sessions and exercises. Theory learnt in the class will be applied the following practical methods:

(1) Industrial Facility Visit: Course participants will be taken to an industrial facility where they will practice testing, maintenance and troubleshooting. In case that this course is organized inside client premises (In-House), then client shall provide access to its HVAC and refrigeration workshop for practical sessions.

(2) HVAC Simulator: Participants will use in the class the state-of-the-art HVAC Simulator to practice some of the skills learnt.

This course is designed to assist experienced practitioners review and become more familiar with the particular system parts required for the design, installation, and maintenance of heating, ventilation and air-conditioning systems for all types of institutional, commercial, and industrial building envelopes. As the participant progresses through this five-day course, it will also serve as a refresher providing information about HVAC safety requirements, improved healthy indoor air quality, and emission reduction strategies.





During the course, there will be opportunities to practice using the ASHRAE Pocket Guide for Air Conditioning, Heating, Ventilation & Refrigeration. This easily carried reference provides fast, authoritative HVAC&R information on site. It is packed with practical and useful information that; includes properties performance and pipe sizing for new refrigerants, new data on refrigeration safety, ventilation requirements for residential and non-residential occupancies, occupant thermal comfort, more extensive data on sound and vibration control, thermal storage, radiant panel heating and cooling, air-to-air recovery and more. The participants also will receive a summary review of how to source HVAC related, building envelope, electrical, fire protection, ozone depletion protection, back-flow, and cross-connection controls codes and standards.

Slide shows of installed operational energy management systems computer controls and instrumentation will enable a broader understanding of future real time data logger systems. The participant will learn about HVAC utilization of advanced metering infrastructures, automated water meter readings for leak detection of district chilled water loops, and end user consumption. Demand response electricity systems using smart meters controlling; air conditioning, thermal storage systems, lighting, variable speed motors for fans, and pumps. These applications plus studying the re-use of waste-water produced by HVAC systems supplying grey-water, are tools HVAC professionals may add to their portfolio of utilities cost reduction for building operations. Similar to energy management systems demand responsiveness is easier, less expensive, and simpler when the control protocol is incorporated into the original design. Practice work sheets will be made available to prove these systems are capable of tracking emissions reductions, and providing an additional revenue stream for building owners by lowering energy consumption.

In class exercises for selecting correct equipment, loop checking sequence of operations and locating control points for HVAC systems will provide familiarization of the products available on the market today. A particular emphasis will be on understanding the advantages and disadvantages of commonly available types of electric, pneumatic, self-powered; sensors, actuators, valves, dampers, direct drives, analog and digital controls. We will also review the different types of compressors, coils, exchangers, filters, condensers, dryers, chillers, expansion tanks, cooling towers, split-systems, forced air, boilers, associated piping, duct work, insulation, and common trade practices used in HVAC applications today.

An introduction to predictive, preventative, troubleshooting, and emergency repair maintenance tips will be taught along with a re-cap of balancing air, and water systems. How to source information to maintain glycol densities, chemical treatment biocides and corrosion inhibitors, air handler unit ultraviolet lights for continuous coil cleaning, and disinfection, should help ensure the buildings investors realize improved life cycle costs, minimal downtime for equipment servicing, and public health protection, Worker safety will be reviewed to ensure clear communications between building operations and the personnel working on the of equipment. A strong emphasis will be for HVAC professionals to learn how to have a written safety plan detailing procedures for lock-out, and tagging, the importance of following original manufacturer's information for installation, starting up, and shutting down, will be reiterated throughout the course.





The course will finish with examples of emerging dual use technologies such as dedicated fire protection lines as a component of the distribution network for deep lake or seawater district cooling systems, grey-water heat pump systems, types of building roofs, road, and building thermal energy systems. A basic introduction to the application of electricity power producing high temperature fuel cells, internal combustion engine, micro-turbine, distributed electric power co-generators use-able waste heat for domestic hot water, heating, and cooling applications will be presented.

The course is condensed and assumes that the participants have prepared themselves by self-study of the ASHRAE e-book for Air Conditioning, Heating, Ventilation, Refrigeration prior to attending. In addition to the e-book, the delegates should bring their scientific calculators.

Course Objectives

Upon the successful completion of this course, each participant will be able to:-

- Apply and gain a comprehensive knowledge on advanced HVAC design, installation, maintenance and failure prevention
- Review the fundamentals of HVAC covering thermodynamics and psychrometrics
- Review the current ASHRAE standards covering ASHRAE 62 ventilation for acceptable air quality and ASHRAE standard 90 energy standard for buildings except low rise buildings
- Recognize energy use and part load efficiency that covers fan systems, part load chiller performance and part load performance of direct expansion units
- Carryout computer based load estimation, energy use calculation and building control
- Illustrate advanced HVAC control systems, build automation and the design of advanced HVAC system
- Identify compressors, coils, exchangers, filters, condensers, dryers, chiller, expansion tanks, cooling towers, split-systems, forced air and boilers
- Employ piping, duct work, insulation and the common trade practices used in HVAC applications today
- Carryout maintenance and troubleshooting, predictive maintenance, preventative maintenance and emergency repair
- Describe balancing air and water systems, glycol densities, chemical treatment biocides, corrosion inhibitors and air handler unit ultraviolet lights for continuous coil cleaning and disinfection
- Employ HVAC systems daily checks, 3-6 months scheduled preventive maintenance procedures and HVAC systems annual scheduled preventive maintenance procedure
- Demonstrate how to pump down, charge and evacuate the HVAC units and discuss ANSI-ASHRAE-ACCA 180-2010 maintenance and inspection standard according to ANSI

Exclusive Smart Training Kit - H-STK®



Participants of this course will receive the exclusive “Haward Smart Training Kit” (H-STK®). The H-STK® consists of a comprehensive set of technical content which includes **electronic version** of the course materials conveniently saved in a **Tablet PC**.

Who Should Attend

This course provides a complete and up-to-date overview of advanced heating, ventilation and air-conditioning systems for HVAC, utilities, maintenance and project engineers and other technical staff. Basic knowledge in HVAC is a pre-requisite for attending this advanced course.

Training Methodology

All our Courses are including **Hands-on Practical Sessions** using equipment, State-of-the-Art Simulators, Drawings, Case Studies, Videos and Exercises. The courses include the following training methodologies as a percentage of the total tuition hours:-

- 30% Lectures
- 20% Practical Workshops & Work Presentations
- 30% Hands-on Practical Exercises & Case Studies
- 20% Simulators (Hardware & Software) & Videos

In an unlikely event, the course instructor may modify the above training methodology before or during the course for technical reasons.

Course Fee

Doha	US\$ 6,000 per Delegate. This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Dubai	US\$ 5,500 per Delegate + VAT . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Al Khobar	US\$ 5,500 per Delegate + VAT . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.
Abu Dhabi	US\$ 5,500 per Delegate + VAT . This rate includes H-STK® (Haward Smart Training Kit), buffet lunch, coffee/tea on arrival, morning & afternoon of each day.

Accommodation


Accommodation is not included in the course fees. However, any accommodation required can be arranged at the time of booking.

Course Certificate(s)

Internationally recognized certificates will be issued to all participants of the course who completed a minimum of 80% of the total tuition hours.

Certificate Accreditations

Certificates are accredited by the following international accreditation organizations:-

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British Accreditation Council (BAC)

Haward Technology is accredited by the **British Accreditation Council** for **Independent Further and Higher Education** as an **International Centre**. BAC is the British accrediting body responsible for setting standards within independent further and higher education sector in the UK and overseas. As a BAC-accredited international centre, Haward Technology meets all of the international higher education criteria and standards set by BAC.

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The International Accreditors for Continuing Education and Training (IACET - USA)

Haward Technology is an Authorized Training Provider by the International Accreditors for Continuing Education and Training (IACET), 2201 Cooperative Way, Suite 600, Herndon, VA 20171, USA. In obtaining this authority, Haward Technology has demonstrated that it complies with the **ANSI/IACET 2018-1 Standard** which is widely recognized as the standard of good practice internationally. As a result of our Authorized Provider membership status, Haward Technology is authorized to offer IACET CEUs for its programs that qualify under the **ANSI/IACET 2018-1 Standard**.

Haward Technology's courses meet the professional certification and continuing education requirements for participants seeking **Continuing Education Units (CEUs)** in accordance with the rules & regulations of the International Accreditors for Continuing Education & Training (IACET). IACET is an international authority that evaluates programs according to strict, research-based criteria and guidelines. The CEU is an internationally accepted uniform unit of measurement in qualified courses of continuing education.

Haward Technology Middle East will award **3.0 CEUs** (Continuing Education Units) or **30 PDHs** (Professional Development Hours) for participants who completed the total tuition hours of this program. One CEU is equivalent to ten Professional Development Hours (PDHs) or ten contact hours of the participation in and completion of Haward Technology programs. A permanent record of a participant's involvement and awarding of CEU will be maintained by Haward Technology. Haward Technology will provide a copy of the participant's CEU and PDH Transcript of Records upon request.



Course Instructor(s)

This course will be conducted by the following instructor(s). However, we have the right to change the course instructor(s) prior to the course date and inform participants accordingly:



Mr. Karl Thanasis, PEng, MSc, MBA, BSc, is **Senior Mechanical & Maintenance Engineer** with over **45 years** of extensive industrial experience. His wide expertise includes **Boiler Maintenance, Boiler Control, Pressure Vessel Operation, Advanced Pressure Vessel Design, Piping & Pipeline, Maintenance, Repair, Shutdown, Turnaround & Outages, Maintenance & Reliability Management, Mechanical Maintenance Planning, Scheduling & Work Control, Advanced Techniques in Maintenance Management, Predictive & Preventive Maintenance, Maintenance & Operation Cost Reduction Techniques, Reliability Centered Maintenance (RCM), Machinery Failure Analysis, Rotating Equipment Reliability Optimization & Continuous Improvement, Material Cataloguing, Mechanical & Rotating Equipment Troubleshooting & Maintenance, Root Cause Analysis & Reliability Improvement, Condition Monitoring, Root Cause Failure Analysis (RCFA), Steam Generation, Steam Turbines, Power Generator Plants, Gas Turbines, Combined Cycle Plants, Boilers, Process Fired Heaters, Air Preheaters, Induced Draft Fans, All Heaters Piping Work, Refractory Casting, Heater Fabrication, Thermal & Fired Heater Design, Heat Exchangers, Heat Transfer, Coolers, Power Plant Performance, Efficiency & Optimization, Storage Tank Design & Fabrication, Thermal Power Plant Management, Boiler & Steam System Management, Pump Operation & Maintenance, Chiller & Chiller Plant Design & Installation, Pressure Vessel, Safety Relief Valve Sizing & Selection, Valve Disassembling & Repair, Pressure Relief Devices (PSV), Hydraulic & Pneumatic Maintenance, Advanced Valve Technology, Pressure Vessel Design & Fabrication, Pumps, Turbo-Generator, Turbine Shaft Alignment, Lubrication, Mechanical Seals, Packing, Blowers, Bearing Installation, Couplings, Clutches and Gears. Further, he is also versed in Wastewater Treatment Technology, Networking System, Water Network Design, Industrial Water Treatment in Refineries & Petrochemical Plants, Piping System, Water Movement, Water Filtering, Mud Pumping, Sludge Treatment and Drying, Aerobic Process of Water Treatment that includes Aeration, Sedimentation and Chlorination Tanks. His strong background also includes Design and Sizing of all Waste Water Treatment Plant Associated Equipment such as Sludge Pumps, Filters, Metering Pumps, Aerators and Sludge Decanters.**

Mr. Thanasis has acquired his thorough and practical experience as the **Project Manager, Plant Manager, Area Manager - Equipment Construction, Construction Superintendent, Project Engineer and Design Engineer**. His duties covered **Plant Preliminary Design, Plant Operation, Write-up of Capital Proposal, Investment Approval, Bid Evaluation, Technical Contract Write-up, Construction and Sub-contractor Follow up, Lab Analysis, Sludge Drying and Management of Sludge Odor and Removal**. He has worked in various companies worldwide in the **USA, Germany, England and Greece**.

Mr. Thanasis is a **Registered Professional Engineer** in the **USA and Greece** and has a **Master's and Bachelor's degree in Mechanical Engineering with Honours** from the **Purdue University and SIU in USA** respectively as well as an **MBA** from the **University of Phoenix in USA**. Further, he is a **Certified Internal Verifier/Trainer/Assessor** by the **Institute of Leadership & Management (ILM)** a **Certified Instructor/Trainer** and has delivered numerous trainings, courses, seminars, workshops and conferences worldwide.





Course Program

The following program is planned for this course. However, the course instructor(s) may modify this program before or during the course for technical reasons with no prior notice to participants. Nevertheless, the course objectives will always be met:

Day 1

0730 - 0800	Registration & Coffee
0800 - 0815	Welcome & Introductions
0815 - 0830	PRE-TEST
0830 - 0930	Review of Fundamentals Thermodynamics • Psychrometrics
0930 - 0945	Break
0945 - 1100	Psychrometrics & HVAC Process Simulation Software • Practical Exercises With Software
1100 - 1230	Current ASHRAE Standards ASHRAE 62 Ventilation for Acceptable Air Quality • ASHRAE Standard 90 Energy Standard For Buildings Except Low Rise Buildings • What Makes a "Good" Design
1230 - 1245	Break
1245 - 1420	Energy Use & Part Load Efficiency Fan Systems • Part Load Chiller Performance • Part Load Performance of Direct Expansion Units
1420 - 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day One

Day 2

0730 - 0930	Computer Based Load Estimation & Energy Use Calculation
0930 - 0945	Break
0945 - 1100	Building Control Fundamentals • Types of Control for Reheat, VAV, Single Zone, Humidity Control
1100 - 1230	Advanced HVAC Control Systems Selecting Correct Equipment • Loop Checking • Sequence of Operations
1230 - 1245	Break
1245 - 1420	Advanced HVAC Control Systems (cont'd) Locating Control Points • Advantages and Disadvantages of Commonly Available Types of Electric, Pneumatic, Self-Powered; Sensors, Actuators, Valves, Dampers, Direct Drives, Analog and Digital Controls
1420 - 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Two

Day 3

0730 - 0930	Building Automation Technology • Smart Meters Controlling
0930 - 0945	Break





0945 – 1100	Building Automation (cont'd) Energy Savings • Lighting
1100 – 1230	Design of Advanced HVAC System Compressors • Coils • Exchangers • Filters
1230 – 1245	Break
1245 – 1420	Design of Advanced HVAC System (cont'd) Condensers • Dryers • Chillers • Expansion Tanks
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Three

Day 4

0730 – 0930	Design of Advanced HVAC System (cont'd) Cooling Towers • Split-Systems • Forced Air • Boilers
0930 – 0945	Break
0945 – 1100	Design of Advanced HVAC System (cont'd) Piping • Duct Work • Insulation • Common Trade Practices Used in HVAC Applications Today
1100 – 1215	Maintenance & Troubleshooting Predictive Maintenance • Preventative Maintenance • Troubleshooting • Emergency Repair • Maintenance Tips
1215 – 1230	Break
1230 – 1420	Maintenance & Troubleshooting (cont'd) Balancing Air and Water Systems • Glycol Densities • Chemical Treatment Biocides • Corrosion Inhibitors • Air Handler Unit Ultraviolet Lights for Continuous Coil Cleaning and Disinfection
1420 – 1430	Recap Using this Course Overview, the Instructor(s) will Brief Participants about the Topics that were Discussed Today and Advise Them of the Topics to be Discussed Tomorrow
1430	Lunch & End of Day Four

Day 5

0730 – 0830	HVAC Systems Daily Checks
0830 – 0930	HVAC Systems 3 Months Scheduled Preventive Maintenance Procedures
0930 – 0945	Break
0945 – 1100	HVAC Systems 6 Months Scheduled Preventive Maintenance Procedures
1100 – 1230	HVAC Systems Annual Scheduled Preventive Maintenance Procedure
1230 – 1245	Break
1245 – 1315	How to Pump Down, Charge & Evacuate the HVAC Units
1315 – 1345	ANSI-ASHRAE-ACCA 180-2010 Maintenance & Inspection Standard According to American National Standard Institute (ANSI), American Society of Heating, Refrigerating & Air Conditioning Engineers (ASHRAE) & Air Conditioning Contractors of America (ACCA)
1345 – 1400	Course Conclusion
1400 – 1415	POST-TEST
1415 – 1430	Presentation of Course Certificates
1430	Lunch & End of Course



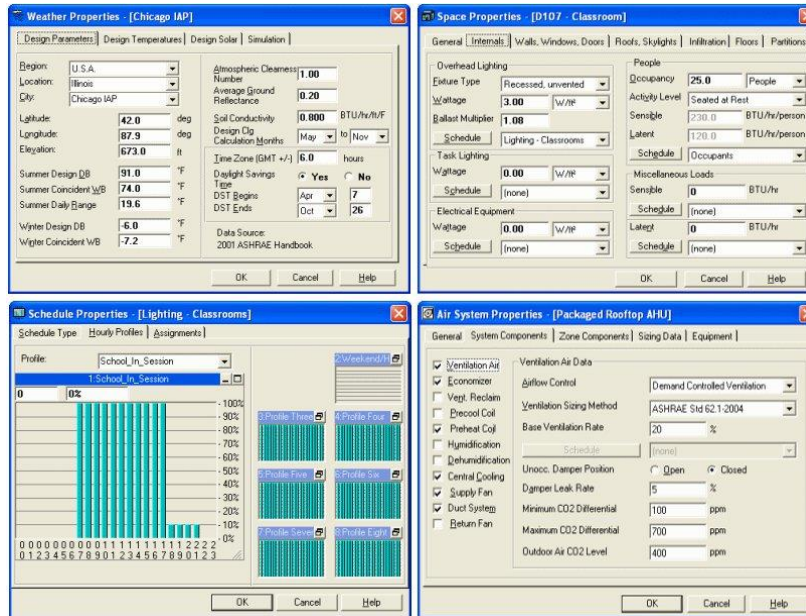
Practical Sessions/Site Visit



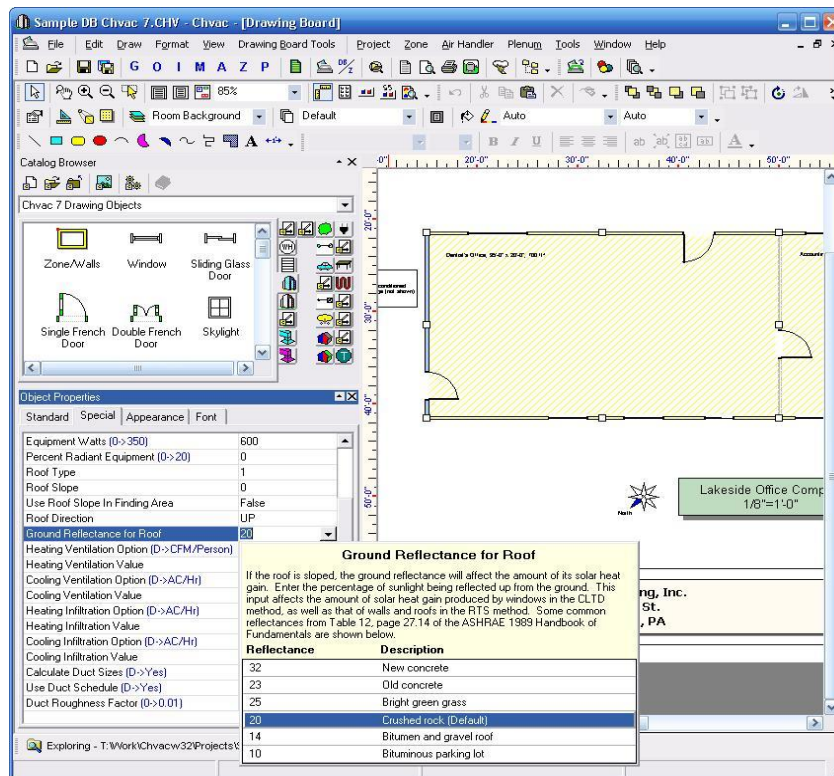


Simulator (Hands-on Practical Sessions)

Practical sessions will be organized during the course for delegates to practice the theory learnt. Delegates will be provided with an opportunity to carryout various exercises using one of our state-of-the-art simulators “Hourly Analysis Program (HAP) Software”, “Elite CHVAC Simulator”, “Danfoss Refrigerant Slider App”, “Danfoss Trouble Shooter App”, “Air Light Psychrometric Calcs” Simulators”.



Hourly Analysis Program (HAP) Software



Elite CHVAC Simulator



Danfoss Refrigerant Slider App

Danfoss Trouble Shooter App

Air Lite Psychrometric Calcs

Book(s)

As part of the course kit, the following e-book will be given to all participants:

Title	ASHRAE Pocket Guide for Air Conditioning, Heating, Ventilation, Refrigeration
Edition	IP Edition
ISBN	9781931862783
Author	ASHRAE
Publisher	ASHRAE

Course Coordinator

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