



United Technologies

turn to the experts



Carrier University 2018 Course Catalog





Carrier Engineering Corporation
Training Class, September 1929



In the early 20th century, Willis Carrier began his legacy of heating, ventilation and air conditioning (HVAC) innovation — and Carrier has trained the industry ever since. Carrier University is the premier learning organization in the HVAC industry. With locations throughout the world, Carrier University offers comprehensive HVAC training in a wide range of areas including technical skills, sales and marketing skills, business management, customer service, controls, design and sustainable building solutions.

Carrier University has training courses for architects, building owners, consulting/specifying engineers, contractors, developers, facility managers and HVAC instructors.

Carrier University delivers these courses through traditional classroom settings, self-study materials and online web-based systems.



Carrier University

has trained the industry since 1929

Bynum Training Center is a 19,500-square-foot facility with five classrooms and a product lab outfitted with residential and commercial products. It includes a production studio with web development tools and video web casting capability. Carrier University utilizes a Learning Management System to provide online training classes and blended learning programs.

Carrier University classes offer a number of continuing education options.



Carrier University is accredited by the International Association for Continuing Education and Training (IACET). Carrier University complies with the ANSI/IACET Standard, which is recognized internationally as a standard of excellence in instructional practices. As a result of this accreditation, Carrier University is authorized to issue the IACET CEU.



Founded in 1997, North American Technician Excellence (NATE) is the nation's largest non-profit certification organization for heating, ventilation, air conditioning and refrigeration technicians. Headquartered in Arlington, Virginia, NATE is the certification organization governed, owned, operated, developed and supported by the entire HVAC/R industry.

Once certified, technicians need to maintain their credentials through Continuing Education Hours (CEHs). Many Carrier University classes qualify for NATE CEHs.



Carrier is a USGBC Education Partner, is the first company to license USGBC's Leadership in Energy and Environmental Design (LEED®) curriculum, and is also the USGBC's largest global partner for LEED education. Many Carrier University courses offered cover topics related to sustainability and may count to maintain GBCI LEED credentials for CMP credit under the education category.

How to Use the Catalog

Classes are divided into three knowledge levels.

Theory – General industry knowledge

Skills – Develop technical skills based on generic manufacturer's equipment

Equipment – Technical how-to knowledge for Carrier equipment

Available Course Categories

Design

Theory – Fundamentals of HVAC design for contractors, consulting engineers and architects

Skills – Understanding eDesign Suite software tools used in HVAC system design by consulting engineers and contractors

Network controls

Classes for control technicians, contractors and facility managers based on Carrier's i-Vu Open network system.

Technician

Theory – Fundamentals for new HVAC technicians. This is an online class format

Skills – These are hands-on fundamental classes designed to teach proper fundamental installation and troubleshooting techniques

Equipment – These courses are designed for experienced technicians to gain understanding of maintaining and troubleshooting Carrier equipment

Certification Legend

NATE – North American Technician Excellence – Continuing Education Hours (CEHs) for residential and commercial technicians

IACET – International Association for Continuing Education and Training – Continuing Education Units (CEUs) or Professional Development Hours (PDHs) for technicians, contractors and engineers

CMP – Credential Maintenance Program – These are continuing education hours which may qualify for GBCI LEED-based credentials under the education category

PE – Continuing education hours for professional engineers' continuing education requirement, some courses specifically approved by FL, NC, NJ and NY

FAD – Factory Authorized Dealer – This credit is eligible for Carrier's factory authorized dealer program

AIA – American Institute of Architects – Courses are approved for credit through AIA

Delivery Methods

Classroom – Traditional classroom format features hands-on lab exercise skills and equipment-based classes

Online – Carrier University utilizes a learning management system to provide online class offerings that are available 24/7

Blended – Mix of traditional online program with remote lab exercises and electronic access to instructor

Custom Classes – If you have an interest in custom classes at your location or at the Carrier training center, contact carrieruniversity@carrier.utc.com

General Information

Schedule of classes is available on www.carrieruniversity.com.

Lodging

Rooms and meals are available at hotels and restaurants convenient to the training center. Class confirmed email will have links to several local hotel options.

Class Hours

Courses begin promptly and run from 8:00 AM to 5:00 PM except as noted on Carrier University website. Do not make travel departure arrangements before the end of class.

What to Wear

Work clothes and work shoes appropriate to the type of work to be performed in the class.

What to Bring

Some classes require computers. Check notes on the Carrier University website page for any special requirements.

Prerequisites

Some classes require prerequisite classes to be taken ahead of time. These will be noted on the Carrier University website. Registration will not be accepted without proper prerequisite class completion.

Directions

Can be found on the www.carrieruniversity.com website.

Tuition

Fee covers cost of course and related material. It does not include meals, lodging and transportation.

More Information

For complete details on each of these courses, including syllabus, course completion requirements, prerequisites, learning outcomes, what you will receive and class details, go to www.carrieruniversity.com.



Registration

Instructors

Courses are taught by experienced HVAC professionals using materials and training aids developed exclusively by Carrier University staff.

Most classes are conducted at the Bynum Training Center

Bynum Training Center location:
6540 Old Collamer Road South
East Syracuse, New York 13057

Some classes are conducted at hosted sites. Training location information is posted on registration page.

Registration Process

You can view the Carrier University course schedule and important event information by going to www.carrieruniversity.com. Click on **SCHEDULE** and the easy-to-use site will guide you to register online.

Preferred method of payment for courses is credit card, and our online registration process allows you to enter your information with assurance of credit card safety.

A Purchase Order is also acceptable. Simply complete your Purchase Order and e-fax to Carrier University registrars at 1-860-775-2654. Your registration will be confirmed once your PO is fully approved.

All registered students will receive a **CLASS CONFIRMED** notice from Carrier University once the decision to hold the class is made.

IMPORTANT: Please do not make travel arrangements until you receive Class Confirmation from Carrier University.

Discounts

Carrier University offers multiple student discount rates of 5% per student on multiple student registrations if they are completed at the same time for the same event.

Special Programs

Carrier University also offers a large number of online training programs. Organizations wishing to purchase packages of 40 or more programs can contact the Carrier University Registrar for more information or a quote.

In addition, Carrier University can offer custom classes either at the Syracuse Training Center for only your students or at your facility with standard class material or material customized to meet your training needs. Generally class sizes need to be 10 or more students.

Contact the Carrier University Registrar or email carrieruniversity@carrier.utc.com for more information or a quote.



Cancellation Policy

Cancellations or rescheduling four weeks prior to the class start date will be refunded in full. Cancellations made three weeks prior to the class start date will be charged 50% of the class fee. For cancellations made 10 days prior to the class start date – no refund will be issued.

Carrier University Contact Information –
Registration Assistance
carrieruniversity@carrier.utc.com
or call 800-644-5544

Multi-Class/Multi-Year Discount Program

This program provides discounts up to 40% for organizations who want to make a commitment to training but are not sure what classes, who will attend or when.

How It Works

1. Purchase one of the three levels of Carrier Training Dollars:

	Price	Carrier Training Dollars
Level 1	\$5,000	\$7,000
Level 2	\$10,000	\$14,000
Level 3	\$25,000	\$35,000

Carrier Training Dollars are good for two years from the date of purchase and may be used for any regularly scheduled catalogued classroom course held in the Syracuse Training Center. Full payment for the package is due at the time of purchase with PO or credit card.

2. To reserve a class with your Carrier Training Dollars, call the Carrier University Registrar, who will assist you in booking the class and will maintain your account balance. The price for the class is at the published price, but your account will pay for the class with Carrier Training Dollars.

3. Carrier Training Dollar rules:

- a. Carrier Training Dollars can be used for any classroom class in the published Course Catalog and held in the Syracuse Training Center.
- b. Seats can be reserved by the organization up to one year before the start of class; however the name of the actual student is not required until one week before class. Seats can be cancelled up to four weeks before the class at no cost. Other standard cancellation rules apply. Carrier University reserves the right to cancel any class which has insufficient enrollment. Classes cancelled by Carrier University will not be charged to your Training Dollars account.
- c. Carrier Training Dollars cannot be combined with any other discount.

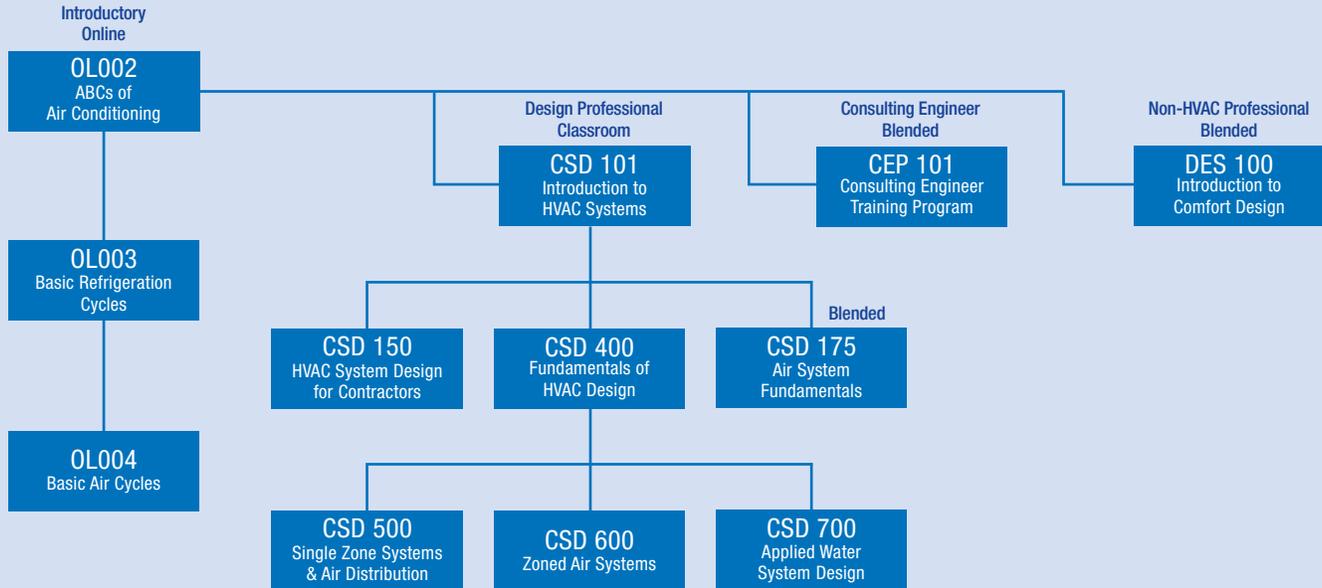
For more information or to purchase a package:
Call: Carrier University Registrar at 800-644-5544
Email: carrieruniversity@carrier.utc.com



Design Skills

Design Curriculum Track

Carrier University design courses provide the tools to design sustainable high-performance HVAC systems.



★ NEW 2018 The ABCs of Air Conditioning OL002 (ONLINE)

The ABCs of Air Conditioning is one of several introductory training courses on the basics of HVAC systems. This training course has two major parts. Part 1 has four sections which describe the basic principles of air conditioning systems. In the first section of Part 1, it describes how the ambient environment influences human body comfort. The next section covers the air cycle and how air is used to deliver and maintain comfort. The last two sections of Part 1 cover the refrigeration cycles used to control temperature and humidity. Part 2 covers the types of equipment used in residential and commercial buildings to control comfort conditions. The course is intended for new technicians, sales representatives and other people desiring a better understanding of HVAC topics. To receive FAD or NATE credit you must pass the final exam.

TIME	COST	NATE	IACET	FAD	FORMAT
3 hrs	\$25	Yes	Yes	Yes	Online

★ NEW 2018 Basic Refrigeration Cycles OL003 (ONLINE)

Basic Refrigeration Cycles is one of several introductory training courses on the basics of HVAC systems. This training course describes the three basic types of vapor compression refrigeration cycles: positive displacement, non-positive displacement and absorption. The operation of the compression used in each cycle is explained and where each type is typically applied. The compressor types covered include scroll, reciprocating, rotary, screw and centrifugal. The training also addresses single and double effect absorption systems. The course is intended for new technicians, sales representatives and other people desiring a better understanding of HVAC topics. To receive FAD or NATE credit you must pass the final exam. This training program complements the ABCs of Air Conditioning program with a more detailed study of the mechanical refrigeration system.

TIME	COST	NATE	IACET	FAD	FORMAT
2 hrs	\$25	Yes	Yes	Yes	Online

★ NEW Quarter 4 2018 Basic Air Cycles

OL004 (ONLINE)

Basic Air Cycles is one of several introductory training courses on the basics of HVAC systems. This training course describes how HVAC systems treat air to maintain comfort conditions in residential and commercial applications. The course starts with an introduction to properties of air and the impact on comfort and then describes how air conditioning systems function to maintain comfort conditions. Topics covered include: properties of air, basic psychrometrics, air conditioning processes, fans, air distribution, duct systems, air heating and cooling systems, filtration, ventilation, IAQ components and airside control of systems servicing multiple spaces. The course is intended for new technicians, sales representatives and other people desiring a better understanding of HVAC topics. To receive FAD or NATE credit you must pass the final exam. This training program complements the ABCs of Air Conditioning program with a more detailed study of the airside performance and components of HVAC systems.

TIME	COST	NATE	IACET	FAD	FORMAT
2 hrs	\$25	Yes	Yes	Yes	Online

★ NEW Fall 2018 Introduction to Comfort Design

DES100

In commercial buildings proper comfort conditions can be as important as energy efficiency. Architects, owners and facility managers are often unaware of how envelope and other non-HVAC system design decisions impact the system ability to maintain comfort conditions. This one-day symposium discusses what comfort is and how envelope, massing and space layout can impact HVAC systems. Different air conditioning systems will often respond differently to these influences. For design professionals, understanding these HVAC systems with their application and limitations will help the design team develop solutions that better meet the client's comfort, energy and cost requirements. Topics covered include: thermal comfort, building envelope influences on systems, HVAC system types and applications, air distribution, and energy and energy code implications. This seminar uses a number of workshops including lab activities with actual HVAC units to demonstrate the concepts covered. At the end of this seminar participants will better understand the impact of architectural decisions and have a more complete understanding of the various HVAC systems and their application. Course is intended for architects and other design professionals desiring a better understanding of the interaction of building design and HVAC systems.

DAYS	COST	AIA	FAD	CMP	IACET	PE
1	\$200	Yes	Yes	Yes	Yes	Yes

▲ UPDATED 2018

HVAC System Design for Contractors

CSD 150

Most HVAC systems for smaller commercial buildings use packaged rooftops or split system units designed by a design-build contractor. Often little time is allocated for designing these systems, yet compromises in the design process can be costly and result in comfort complaints. For the design-build contractor this means being able to quickly perform all the design steps without compromising cost or comfort. This three-day program uses several building examples to demonstrate the design steps and offers methods to quickly create cost-effective designs. HVAC concepts are presented in just enough detail for the student to understand how to apply each of the design steps. The course walks step by step through the complete system design on a light commercial building. Instructor-led workshops and lab exercises using actual operating rooftop units in the training lab make the learning both practical and immediately usable on the job. At the end of the course, a participant will be able to do an electronic cooling/heating load, select packaged or split system equipment, design an air distribution system, select and lay out the controls, and design a refrigerant piping system as applied on a light commercial project. Participant should be able to apply the design steps to quickly and accurately design HVAC systems for the majority of projects in commercial buildings less than 50,000 square feet.

DAYS	COST	NATE	IACET	FAD
3	\$850	Yes	Yes	Yes

★ NEW Fall 2018 Air System Fundamentals

CSD175

The comfort and energy performance of HVAC systems is very dependent on the design, installation and adjustment of the air distribution system. System designs using rules of thumb and older design guidelines may not fully address current code requirements or the impacts of reduced building cooling loads on the air distribution system. In addition, good air system designs can be compromised by installation and commissioning mistakes. This two-day program is intended for system designers and looks at how ventilation codes, space loads and air distribution, design impact comfort and energy. Classroom sessions are enhanced using lab exercises on operation CV and VAV air distribution systems. Participants can see how air system design impacts performance and using the diagnostic tools used in the field, how to properly adjust and evaluate system performance. Topics covered include: fans, ventilation, economizers, duct design, room air distribution, air measurement tools, adjustment of minimum airflows and ventilation for constant volume, variable volume and single zone VAV systems. At the end of this course participants will be better able to design and evaluate CV and VAV air systems. Approximately 25% to 30% of this class is hands-on labs allowing designers to not only design better systems but also get the background needed to direct technicians in proper adjustment and evaluation of air distribution systems.

DAYS	COST	IACET	PE
2	\$600	Yes	Yes

Design Skills

▲ **UPDATED 2018** Introduction to HVAC Systems CSD 101

For anyone involved in the selection, design, operation or maintenance of commercial buildings, a working knowledge of the various HVAC systems is essential. This class establishes a baseline comparison of the most common commercial systems and how they control comfort conditions. The class starts with an explanation of the environmental conditions which influence comfort temperature, humidity, air distribution and air quality. Participants learn about the design process and criteria for system selection. The various classifications of HVAC systems and associated distribution systems are explained along with the function and operation of all the major system components. The class evaluates over 15 types of HVAC systems, describing how the systems work, applications, and basic advantages and shortcomings. Each system type is evaluated based on performance for energy, first cost, life cycle cost and comfort performance. System options and modifications which contribute to energy efficiency, sustainability and high performance are also explored. The class consists of a mix of presentation and workshops which give the student opportunity to apply the concepts presented. Several lab exercises are conducted in the training center lab with operating HVAC equipment to demonstrate material covered. After this class participants will be better able to make informed decisions about the best choices of HVAC systems for various applications and how systems can best meet the project goals of performance, comfort, cost and sustainability.

DAYS	COST	FAD	CMP	IACET	PE
2	\$600	Yes	Yes	Yes	Yes

Fundamentals of HVAC Design CSD 400

This course covers the subjects that are fundamental in the design of all types of HVAC systems. Students learn the fundamental principles of HVAC design, including psychrometrics, heat transfer, mechanical refrigeration, and load estimating. Participants will become proficient with HVAC's two most important design tools, the psychrometric chart, and the pressure enthalpy diagram. At the completion of the course, participants will be able to do an accurate commercial load estimate that is the basis to the other system design decisions. In addition, the participant will be able to use psychrometric principles and the P-h diagram to describe and analyze HVAC processes. The concepts of this course are a recommended prerequisite for taking the other three courses and the building blocks of the student's HVAC design career. Computer-assisted work sessions and a design project are used to practice the principles taught. Several lab exercises are done in the training center lab using actual HVAC equipment.

DAYS	COST	NATE	IACET	FAD	PE
5	\$1,200	Yes	Yes	Yes	Yes

Single Zone Systems and Air Distribution CSD 500

Comfort conditions for spaces in a commercial building may be achieved in one of two basic ways: by applying single zone units to each space or by using systems that provide control to multiple spaces. This course centers on the skills and knowledge necessary to design one of the most common HVAC systems, a constant volume air distribution system using single zone packaged and split system equipment. The principles taught in this class will help anyone involved in the design or renovation of projects using single zone packaged equipment to quickly develop more cost-effective designs. Participants learn to determine building zones and acceptable compromises in comfort control. How to design the air distribution system for good air motion and sizing of the duct system are covered in detail. Achieving the most effective selection of packaged (rooftop) and split system equipment is covered, as is how to develop a sequence of control to maintain comfort design conditions. Participants use workshops to apply the material covered in the class to a typical project. Work sessions are used to practice the skills. Several lab exercises are conducted in the training center lab using actual rooftop equipment.

DAYS	COST	IACET	FAD	PE
5	\$1,200	Yes	Yes	Yes

Zoned Air Systems CSD 600

Comfort conditions for spaces in a commercial building may be achieved in one of two basic ways: by applying single zone units to each space or by using systems that provide control to multiple spaces. This course covers the skills and knowledge needed to design systems that control multiple zones using all-air systems. Two of the basic all-air zoning systems – Variable Volume/Variable Temperature (VVT) and Variable Air Volume (VAV) are covered in depth. Other all-air systems (Double Duct, Multizone, etc.) are also discussed. In this course participants learn how to zone a building when more than one building zone is served from one air handler. Variable Volume/Variable Temperature systems allow constant volume packaged equipment to meet the varying load requirements of a zoned building. Variable Air Volume systems use applied and special packaged equipment to vary air volume to achieve space conditions in each building zone. Participants learn to design for the influence these multiple zone systems have on design decisions, load estimates, equipment selections, room air distribution, duct design and control sequence. Participants use workshops to apply the material covered in the class to a typical project. Work sessions are used to practice the skills. Several lab exercises are conducted in the training center lab using various types of VAV, VVT and other systems for zone air applications.

DAYS	COST	IACET	PE
5	\$1,200	Yes	Yes

Applied Water System Design CSD 700

Larger commercial buildings often use chilled water distribution systems rather than packaged or split system DX (Direct Expansion). This course centers around the skills and knowledge needed to design an applied chilled water system for a multiple-zoned commercial building. In this course participants learn how to zone a building when more than one building zone and air handler are served from one central chilled water plant. Participants will learn how initial decisions, load estimates, and equipment selection are impacted when applied water systems will be used. The course covers various piping and pumping systems, the selection of chillers, pumps, cooling towers, and control valves. Participants learn to design dedicated ventilation systems that achieve required zone ventilation, design the piping distribution system and develop the system's control sequence for a chilled water system. The course addresses the application of fan coil and chilled beam systems as well as air handlers applied on constant and variable volume systems. Participants use workshops to apply the material covered in the class to a typical project. Work sessions are used to practice the skills. Several lab exercises are conducted in the training center lab using air- and water-cooled chillers.

DAYS	COST	IACET	PE
5	\$1,200	Yes	Yes

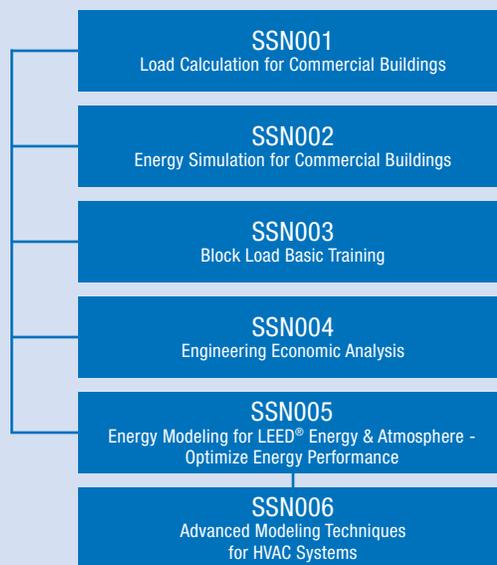
★NEW Consulting Engineer Training Program CEP 101

This class is designed for recently graduated engineers entering the HVAC field as consulting engineers. This five-day program will provide an overview of HVAC terms, concepts and system fundamentals to enhance the ability to properly run loads and energy models while understanding the validity of output from these modeling tools. Workshops will be utilized for specific topics in order to build confidence in each of the key skills identified in the class syllabus. In addition, a fully functioning lab will be utilized daily to further enhance the learning process. Six online prerequisite topics are made available prior to the class to baseline class knowledge. One multiuse building will be utilized throughout the entire class. Additional online training modules will be made available for 6 months after class completion. Class size is very limited to provide maximum interaction with instructors. At the end of this course participants will be able to recognize and use common HVAC terms and concepts, use load and energy software and recognize appropriate results, select and lay out diffusers and size duct, and develop a sequence of operation and a points list for single zone and VAV systems.

DAYS	COST	IACET
5	NONE	Yes

eDesign Suite Software Curriculum Track

Carrier University eDesign training helps designers use the eDesign software more productively



Load Calculation for Commercial Buildings SSN001

This hands-on course covers cooling and heating loads for commercial buildings using load calculation software. Students learn the fundamentals of design weather data, scheduling of loads, defining building parameters, and modeling various air system and plant types. Completion of the load calculation workshops is required to get a certificate. The class manual furnished to each student includes detailed workshops for defining Single Zone Constant Volume, Variable Air Volume and Terminal air systems as part of the course. Students who complete this course are able to calculate heating and cooling loads for commercial buildings in order to properly size the HVAC system.

DAYS	COST	IACET	PE
1	\$300	Yes	Yes

Design Skills

Energy Simulation for Commercial Buildings SSN002

This course focuses on the process required to perform whole building energy simulations and operating cost calculations using energy calculation software. To receive a certificate, students must complete workshops involving in-depth understanding and hands-on modeling of simulation weather data, energy profiles, air systems, plant performance and utility rates. The class manual distributed to each student includes the detailed workshops which also include boiler, chiller, cooling tower, and air system configuration examples. Students who complete this course are able to perform energy simulations and operating cost analysis for commercial building systems.

DAYS	COST	IACET	PE
1	\$300	Yes	Yes

Block Load Basic Training SSN003

Hands-on session covering the basic operation of the Block Load Program. Each student will learn how to use the program by completing several simple project exercises, including definition and input of design weather data, construction materials and HVAC system parameters, interpretation of load calculation reports, and how to determine HVAC equipment size.

DAYS	COST	IACET	PE
1/2	\$150	Yes	Yes

Engineering Economic Analysis SSN004

Hands-on session covering the basic operation of the Engineering Economic Analysis program. This session is devoted to comparing the lifecycle economics of alternative designs for commercial HVAC systems. Attendees will learn how to apply the program for four types of economic analysis - (1) simple payback, (2) simple cash flow, (3) private sector lifecycle, (4) public sector lifecycle.

DAYS	COST	IACET	PE
1/2	\$150	Yes	Yes

▲ UPDATED 2018

Energy Modeling for LEED® Energy and Atmosphere - Optimize Energy Performance SSN005

This intense one-day class focuses on the LEED® Energy and Atmosphere Credit to Optimize Energy Performance. Advanced simulation techniques are applied to the Performance Rating Method for whole building energy simulation per ASHRAE/IESNA Standard 90.1 requirements. Training covers in-depth, hands-on application of baseline and proposed building energy analysis and includes development of creative HVAC system alternatives for more LEED-Energy points including the new LEED V4 tables and requirements. Students who complete this course have the ability to run simulation software for analyzing baseline versus proposed building models for LEED Energy and Atmosphere Credit, Optimize Energy Performance.

DAYS	COST	CMP	IACET	PE
1	\$200	Yes	Yes	Yes

▲ UPDATED 2018

Advanced Modeling Techniques for HVAC Systems SSN006

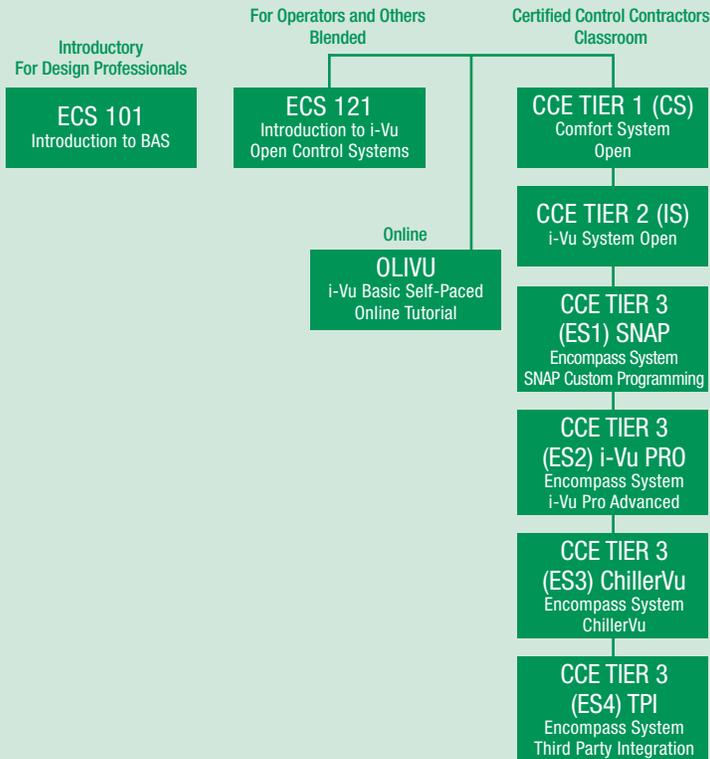
In this full day workshop-based class, students configure a series of advanced modeling scenarios. Included are workshops covering the process of eliminating unmet hours, optimizing the ASHRAE ventilation (OA) design for a multiple-zone application using the ASHRAE Standard 62.1 *Ventilation Rate Procedure*, configuring three different 100% OA systems (100% OA variable flow air system for laboratory make up, 100% OA VAV air system, and a standard 100% OA constant volume (DOAS) air system). Next we will configure VRF systems for both loads and energy modeling including heat pump and heat recovery applications. Also included are workshops on modeling of an air system that preheats with waste heat, warehouse heating systems with passive cooling, and a common boiler serving both domestic hot water and perimeter heating. Also included are workshops that cover new chiller-based heat recovery, setting up multiple energy conservation (ECM) alternatives, creating a template project, selecting pre-engineered packaged equipment to match load output results, use of multipliers at the space and air system level, diversity modeling, analyzing maximum % RH using ASHRAE DP weather data, understanding the CFM calculation based on user SAT inputs. We will cover use of the Wizards for space and air system creation and rapid operating costs. Students who complete this course have the ability to configure and model all the advanced HVAC scenarios mentioned here utilizing computer simulation software.

DAYS	COST	CMP	IACET	PE
1	\$300	Yes	Yes	Yes

Network Controls Training

Controls Curriculum Track

Optimize the performance of your Carrier CCN or i-Vu control systems with Carrier University training classes.



Introduction to BAS (Building Automation Systems) ECS 101

This course is designed to provide a fundamental knowledge of the controls and control strategies used in comfort HVAC systems. The course is intended for engineers, entry-level technicians, and owners wishing to gain a better understanding of control theory and BAS control systems. The course starts by introducing the basic concepts of control and the vocabulary necessary to understand HVAC controls used in the designing of HVAC systems. This will take the student through the basic elements and building blocks of HVAC controls and show how comfort control systems create the desired equipment responses for maintaining room environmental condition set points. Students learn about what DDC Controllers are, what a Sequence of Operation is, and the importance of a Sequence of Operations. Class discussions will include the various temperature control strategies and HVAC systems that can be employed to maximize comfort provided to the building occupants. You will be exposed to the different types of controls and BAS control networks being installed and the basic concepts of control interoperability. The four key management methods available through BAS control networks will be addressed and students will be shown how to specify network configuration and functionality. At the conclusion of this class, students will be better able to discuss and specify BAS control systems. This class is a combination of classroom training and includes several workshops allowing students to demonstrate the concepts covered in class.

DAYS	COST	IACET	PE	FAD	NATE
2	\$600	Yes	Yes	Yes	Yes

Courses on the Carrier Comfort Network System (CCN) are no longer offered as regularly scheduled course offerings. However customized versions based on the previously offered courses can be provided on request. Course may also be customized to meet specific requirements. For information and pricing contact:

Carrier University
 Bynum Training Center
 PO Box 4808
 Syracuse, NY 13221-4808
 1-800-644-5544
 1-860-775-2654 fax
 carrieruniversity@carrier.utc.com



Network Controls Training (continued)

Introduction to i-Vu Open Control Systems ECS 121

This is a comprehensive introductory course that provides entry-level as well as the experienced controls technicians with the skills necessary to install, interface and operate Carrier's i-Vu Open (6.0) BACnet DDC control system. The course begins with a review of basic digital control theory followed by a discussion of the standard algorithms used to control typical HVAC systems. MS/TP Network configuration options and requirements, Open systems architecture and standard communications protocols will also be covered. Students are introduced to Carrier's family of native BACnet, stand-alone and networkable controllers, and learn their function, application, installation, and wiring within the i-Vu Open Control system. The i-Vu Open Tech Tools software will be discussed and application will be introduced to the student. The i-Vu User interface will be used to interface with selected training simulators to alter set point tables and occupancy schedules and monitor algorithm performance and operation. The class is a combination of 50% classroom and 50% simulator exercises. The information learned in this class provides students the tools and knowledge to install and maintain Carrier i-Vu Open Control systems quicker and operate them more efficiently.

This program does not qualify as a part of Controls Expert Certification.

DAYS	COST	NATE	IACET
2	\$600	Yes	Yes

i-Vu Basic Self-Paced Online Tutorial OLIVU

This course is a great place to start your i-Vu journey! If you have little or no experience with the Carrier i-Vu system or you've never attended a BASU (Building Automation System University) course, then this class is for you. From this course, you will be able to work with the i-Vu user interface, create operators and privileges, develop schedules, troubleshoot with alarms and trends, and document with i-Vu's report features. Higher-end topics are also included.

TIME	COST	FORMAT	AUDIENCE
2 hrs	\$200	Online	New to Industry

Carrier Controls Expert—Comfort System (CS) Open CCE TIER 1 (CS)

This CCS course is the first in the Control Expert Training Series. This course will provide a technician the necessary skills to design, install, commission and troubleshoot Carrier's i-Vu Open Comfort System tier products, the i-Vu Open network, and the i-Vu Open tools. This course is exclusive to registered Carrier Controls Expert Offices. For more information on the Carrier Controls Expert Program, please contact your local Carrier Controls sales representative or visit www.carrier.com/controls-experts.

DAYS	COST	IACET
4	\$700	Yes

Carrier Controls Expert—i-Vu System (IS) Open CCE TIER 2 (IS)

This CCE course is the second in the Controls Expert Training Series. This course will provide a technician the necessary skills to design, install, commission and troubleshoot Carrier's i-Vu Open i-Vu System tier products as well as the i-Vu Web front end. This course is exclusive to registered Carrier Controls Expert Offices. For more information on the Carrier Controls Expert Program, please contact your local Carrier Controls sales representative or visit www.carrier.com/controls-experts.

DAYS	COST	IACET
4	\$700	Yes



Carrier Controls Expert—Encompass System (ES) SNAP Custom Programming

CCE TIER 3 (ES1) SNAP

The ES1 Custom Programming course is the third in the Controls Expert Training Series. This course will provide a technician the necessary skills to develop custom application programs using Carrier's SNAP custom programming tool for use with Carrier's i-Vu Open general purpose controllers. This course is exclusive to registered Carrier Controls Expert Offices. For more information on the Carrier Controls Expert Program, please contact your local Carrier Controls sales representative or visit www.carrier.com/controls-experts.

DAYS	COST	IACET
2	\$350	Yes

Carrier Controls Expert—Encompass System (ES) i-Vu Pro Advanced

CCE TIER 3 (ES2) i-Vu PRO

The ES2 i-Vu Pro Advanced course is the fourth in the Controls Expert Training Series. This course will provide a technician the necessary skills to install, commission and support Carrier's i-Vu Open Pro user interface solution. This course is exclusive to registered Carrier Controls Expert Offices. For more information on the Carrier Controls Expert Program, please contact your local Carrier Controls sales representative or visit www.carrier.com/controls-experts.

DAYS	COST	IACET
2	\$350	Yes



Carrier Controls Expert—Encompass System (ES) ChillerVu

CCE TIER 3 (ES3) ChillerVu

The ES3 ChillerVu course is an elective in the Controls Expert Training Series. This course will provide a technician the necessary skills to install, commission and support Carrier's ChillerVu plant control solution. This course is exclusive to registered Carrier Controls Expert Offices. For more information on the Carrier Controls Expert Program, please contact your local Carrier Controls sales representative or visit www.carrier.com/controls-experts.

DAYS	COST	IACET
2	\$350	Yes

Carrier Controls Expert—Encompass System (ES) Third Party Integration into the i-Vu Web

CCE TIER 3 (ES4) TPI

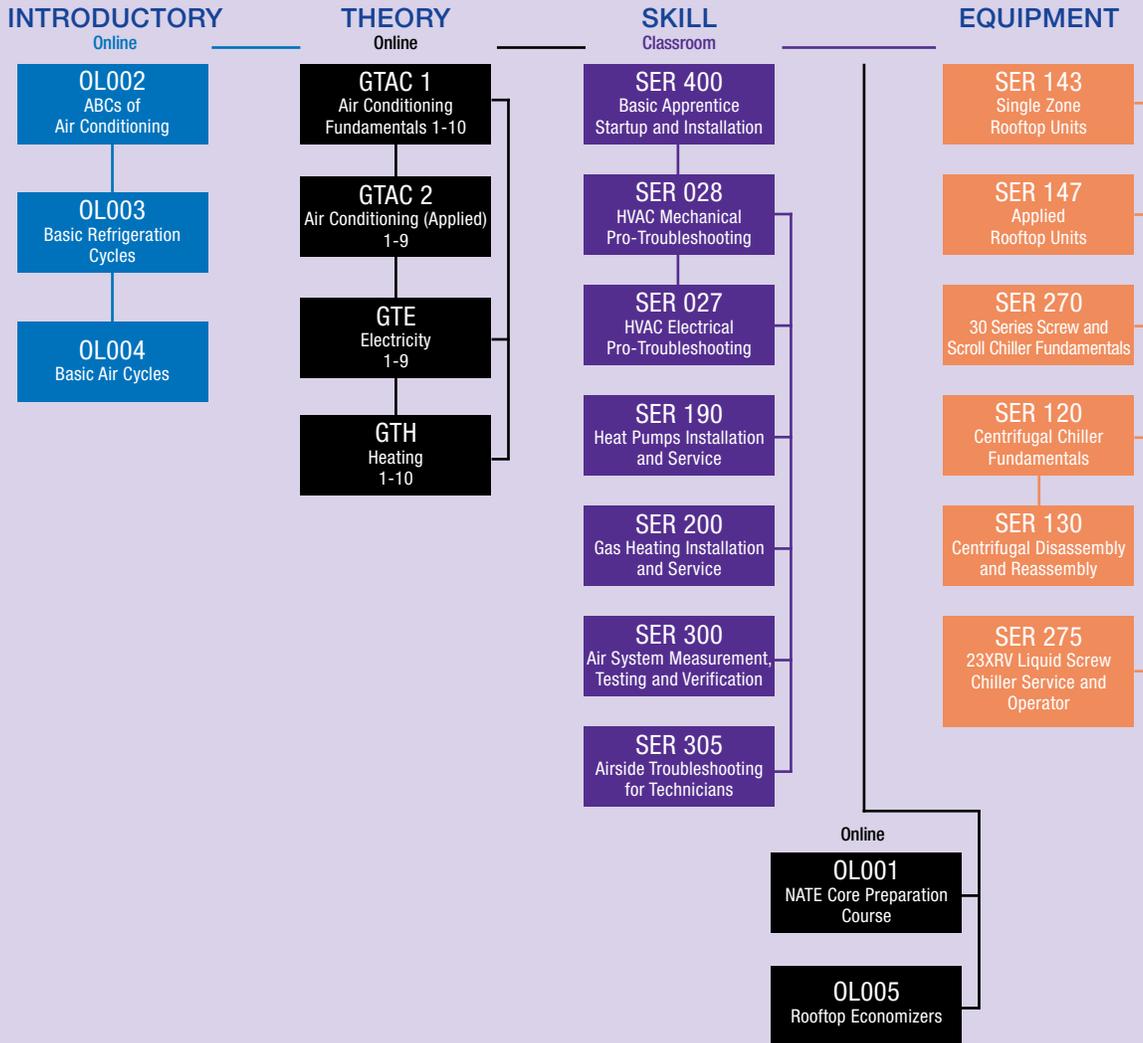
The ES4 Third Party Integration course is the fifth in the Controls Expert Training Series. This course will provide a technician the necessary skills to develop custom third party integration programs using Carrier's SNAP custom programming tool in order to integrate third party BACnet, Modbus or LON products into Carrier's i-Vu Web and i-Vu Open System. This course is exclusive to registered Carrier Controls Expert Offices. For more information on the Carrier Controls Expert Program, please contact your local Carrier Controls sales representative or visit www.carrier.com/controls-experts.

DAYS	COST	IACET
3	\$525	Yes

Service Training

Service Curriculum Track

Install and troubleshoot HVAC systems quicker and more reliably with Carrier University service training



General Training Air Conditioning

Servicing heating and air-conditioning systems requires a solid knowledge in the fundamental principles of air-conditioning system operation. This online training series provides the background to understand both the theory and function of components used in heating and air conditioning systems. The General Training Air Conditioning series is in two sections; GTAC1 covers the theory and fundamental concepts, and GTAC2 covers more advanced topics and basic troubleshooting skills.

These modules are presented in simple language and concentrate on presenting the concepts in ways that can be easily understood by people new to the industry. After completing these modules, a student should possess the understanding of the concepts behind the air conditioning process, the types of systems and components, and basic troubleshooting techniques. Each module is self-paced and contains a quiz for the section and final exam, each with reference to the appropriate section of the module, allowing students to evaluate their understanding of the concepts presented.

Online Basic Air Conditioning Theory

GTAC1 Air Conditioning Fundamentals

▲ UPDATED Summer 2018
Introduction to Air Conditioning
OLGTAC11

This module is a basic introduction to concepts behind the air conditioning process and assumes no previous knowledge of the subject matter. The module explains HVAC terminology and basic concepts of heat flow as applied in HVAC.

▲ UPDATED Summer 2018
Temperature and Pressure
OLGTAC12

The second module covers heat transfer and temperature/pressure relationships. It also introduces the Ph (pressure enthalpy) chart which provides a good way to visualize the air conditioning process.

The Refrigeration Cycle
OLGTAC13

Module 3 introduces the function of major components and shows how these components work together to constitute the mechanical refrigeration system.

Systems
OLGTAC14

This fourth module describes various types of HVAC systems. In addition it discusses the compressor, condenser and evaporator performance curves.

Compressors
OLGTAC15

Module 5 covers the types of compressors, their operation, different types, their construction, function and capacity.

Condensers
OLGTAC16

In Module 6 operation of condensers within the refrigeration system is introduced. Also covered in this module is a discussion about condenser capacity and how condenser problems relate to system troubleshooting.

Evaporators
OLGTAC17

Module 7 studies the basic evaporation process. Particular attention is paid in this module to the process's relationship to the Ph chart and identifying evaporator problems.

Metering Devices
OLGTAC18

Module 8 covers the specifics of modulating and fixed orifice refrigerant metering control. The module discusses the expansion process and superheat control within the refrigeration cycle.

Electrical and Refrigerant Controls
OLGTAC19

In Module 9 the operation and function of basic switches and loads in control and power circuits of mechanical refrigeration systems are described. Also covered are the various refrigerant flow controls devices.

Refrigeration Cycle Accessories
OLGTAC110

Module 10 explains many of the refrigerant system options and accessories. Benefits of these options in terms of enhanced system operation, ease of installation and servicing, and user convenience are stressed.

TIME	COST	IACET	FAD	NATE
2 hrs PER MODULE	\$25 PER MODULE	Yes	Yes	Yes

CLASS TIME APPROX. 2 HRS. ACCESS IS AVAILABLE FOR 4 WEEKS AFTER FIRST LOG-IN.

General Training Air Conditioning
OLGTAC10

This class is the complete 10 modules and includes a mid-term test and a comprehensive final exam.

TIME	COST	IACET	FAD	NATE
20 hrs	\$200	Yes	Yes	Yes

CLASS TIME APPROX. 20 HRS. ACCESS IS AVAILABLE FOR 6 WEEKS AFTER FIRST LOG-IN.

Online Basic Air Conditioning Theory (continued)

GTAC 2 Air Conditioning (Applied)

Refrigerant Characteristics

OLGTAC21

This module discusses refrigerant types, characteristics, and oil compatibility of pure azeotropes, and zeotrope blends. It focuses on proper application and safe handling for new, replacement refrigerants used in air conditioning and refrigeration systems.

Refrigerant Oils

OLGTAC22

The second module covers oils used in air conditioning systems and how they are properly applied. The module also includes a discussion on the compatibility of oils with new, replacement refrigerants and changeout procedures.

Refrigerant Piping

OLGTAC23

This module familiarizes you with enough detail to spot and modify obvious field piping errors. Topics covered are piping requirements, sizing, insulation, and support and piping loops.

System Dehydration

OLGTAC24

This fourth module discusses moisture problems and their effect on air conditioning systems, and the importance of moisture elimination during evacuation.

Charging, Recovery, Recycling and Reclamation

OLGTAC25

Explained in this module is how to charge, recover and recycle traditional and replacement halocarbon refrigerants. The module also focuses on tools and equipment used in performing these procedures.

Installation Procedures

OLGTAC26

In Module 6 all facets of mechanical refrigeration system installation for comfort cooling are covered including planning, piping, brazing, wiring, pump down, prestart checks, and startup and safety essentials.

Heat Pumps

OLGTAC27

Module 7 covers the overall concept of the heat pump, its operation, benefits and disadvantages, operating economics, servicing concerns and how water-source heat pumps are used for heat reclaim in commercial buildings.

Part Load

OLGTAC28

Operating problems often show up at part load rather than at full capacity. This module explains how these operating problems impact the refrigeration cycle.

Troubleshooting

OLGTAC29

This ninth module introduces basic refrigeration system troubleshooting procedures. Study includes diagnostic tools along with troubleshooting, logic, information, and charts.

TIME	COST	IACET	FAD	NATE
2 hrs PER MODULE	\$25 PER MODULE	Yes	Yes	Yes

CLASS TIME APPROX. 2 HRS, ACCESS IS AVAILABLE FOR 4 WEEKS AFTER FIRST LOG-IN.

General Training Air Conditioning

OLGTAC20

This class is the complete nine modules and includes a mid-term test and a comprehensive final exam.

TIME	COST	IACET	FAD	NATE
18 hrs	\$200	Yes	Yes	Yes

CLASS TIME APPROX. 18 HRS, ACCESS IS AVAILABLE FOR 6 WEEKS AFTER FIRST LOG-IN.

Online Basic Electricity Theory

Servicing heating and air conditioning systems requires more than knowledge of mechanical system operation but also a very good understanding of electrical circuits and operation. This online training series provides the background to understand electrical circuits, the components used in them and how they function in heating and air conditioning systems. These modules are presented in simple language and concentrate on presenting the concepts in ways that can be easily understood by people new to the industry. After completing these modules, a student should possess the understanding of electrical circuits used in air conditioning systems and have attained basic electrical troubleshooting techniques. Each module is self-paced and contains a quiz for the section and final exam, each with reference to the appropriate section of the module, allowing students to evaluate their understanding of the concepts presented.

GTE Electricity

▲ UPDATED Spring 2018

[Introduction to Electricity](#)

OLGTE21

Module 1 introduces the student to electrical terminology and basic concepts of electricity. This module is appropriate to students with limited knowledge of electricity and covers Ohm's Law, power, series, and parallel circuits.

▲ UPDATED Summer 2018

[Electrical Components and Their Symbols](#)

OLGTE22

Module 2 introduces basic AC, magnetism, and common electrical components. It begins the coverage of wiring diagrams and their symbols by constructing a very basic circuit diagram.

▲ UPDATED Fall 2018

[Wiring Diagrams](#)

OLGTE23

Module 3 discusses safety practices and introduces additional electrical components. A step-by-step construction of a simplified wiring diagram, covering power, control, and load circuits for a typical packaged air conditioner with electric heat, is developed.

[Wiring Diagram Exercises](#)

OLGTE24

The fourth module covers step-by-step construction of a wiring diagram for a heat pump to demonstrate more advanced diagram-reading skills and control circuit concepts.

Electric Meters and Their Uses

OLGTE25

Module 5 discusses the construction of various types of meters and explains their applications. Sample problems illustrate the use of meters in electrical troubleshooting and testing.

Alternating Current Fundamentals

OLGTE26

The sixth module expands on basic AC concepts covered in Modules 1 and 2 as the basis for understanding AC motors and AC power. Also covered are the basic concepts of motors and generators, capacitors, phase shift, and power distribution systems.

Motor Fundamentals and Motor Protection

OLGTE27

Module 7 covers basic theory and operation of common single-phase and three-phase AC induction motors, including motor starting circuits. The module also describes the various types of protective devices used with motors.

Electronic Devices and Circuits

OLGTE28

Module 8 discusses basic concepts, packaging, and troubleshooting of electronic circuits used in comfort air conditioning. The module covers semiconductors, timing and sensing devices, and the use of microprocessor controls in comfort applications.

Electrical Troubleshooting

OLGTE29

Module 9 describes and illustrates techniques for troubleshooting electrical and electronic circuits with a focus on control circuits and motors.

TIME	COST	IACET	FAD	NATE
2 hrs PER MODULE	\$25 PER MODULE	Yes	Yes	Yes

CLASS TIME APPROX. 2 HRS. ACCESS IS AVAILABLE FOR 4 WEEKS AFTER FIRST LOG-IN.

General Training Electricity (Fundamentals)

OLGTE20

This class is the complete nine modules and includes a mid-term test and a comprehensive final exam.

TIME	COST	IACET	FAD	NATE
18 hrs	\$200	Yes	Yes	Yes

CLASS TIME APPROX. 18 HRS. ACCESS IS AVAILABLE FOR 6 WEEKS AFTER FIRST LOG-IN.

Online Basic Gas Heating Theory

The most popular form of heating in North America is gas. Servicing gas heating systems requires understanding the theory of operation and how the system components function to provide safe, economical comfort heating. This online training series provides the background to understand both the theory and function of components used in gas heating systems. These modules are presented in simple language and concentrate on presenting the concepts in ways that can be easily understood by people new to the industry. After completing these modules, a student should possess the basic understanding of the concepts behind systems which use gas heating, the types of systems and components used, and basic troubleshooting techniques. Each module is self-paced and contains a quiz for the section and final exam, each with reference to the appropriate section of the module, allowing students to evaluate their understanding of the concepts presented.

GTH Heating

Introduction to Gas Heating

OLGTH21

This first module introduces students to four of eight foundation blocks of heating: 1) Heat, 2) Molecules, Heat and Temperature, 3) Heat Transfer, 4) Pressure.

Principles of Gas Combustion

OLGTH22

This second module introduces the remaining four foundation blocks of heating: 5) Gas Properties, 6) Combustion Theory, 7) Practical Combustion, and 8) Efficiency.

Gas Furnaces

OLGTH23

In this module students learn basic furnace design, gas system components, furnace controls, and system controls and components.

Gas Burners

OLGTH24

Module 4 expands on basic concepts from the first three modules and includes: theoretical flame characteristics, burner design, actual flame characteristics, combustion systems, and pilot burners.

Gas Controls

OLGTH25

This module focuses on the controlled combustion process: gas controls, manual and automatic valves, and gas regulators.

Gas Ignition Systems

OLGTH26

Module 6 explains the three types of ignition systems commonly used: standing pilot, re-ignition pilot, and direct burner ignition.

Gas Safety and Operating Controls

OLGTH27

This module covers basic theory and operation of common safety controls, operating controls, and system controls used in gas furnaces.

Furnace Installation Practices

OLGTH28

In Module 8 students learn application principles: planning, designing, and selecting equipment, as well as proper gas-piping techniques and installation practices.

Ventilation and Combustion Air

OLGTH29

This module introduces terminology of Category I vent design, basic vent design and combustion air requirements, as well as Category IV venting and combustion air requirements and design.

Gas Troubleshooting

OLGTH210

Module 10 covers basic troubleshooting practices: basic adjustments, gas input, primary air, efficiency checks, furnace problems, how to identify and correct the operation and function of basic switches and loads.

TIME	COST	IACET	FAD	NATE
2 hrs PER MODULE	\$25 PER MODULE	Yes	Yes	Yes

CLASS TIME APPROX. 2 HRS, ACCESS IS AVAILABLE FOR 4 WEEKS AFTER FIRST LOG-IN.

General Training Heating

OLGTH20

This class is the complete 10 modules and includes a mid-term test and a comprehensive final exam.

TIME	COST	IACET	FAD	NATE
20 hrs	\$200	Yes	Yes	Yes

CLASS TIME APPROX. 20 HRS, ACCESS IS AVAILABLE FOR 6 WEEKS AFTER FIRST LOG-IN.

Online Skills Training

NATE Core Preparation Course

OL001 (ENGLISH ONLINE)

Boost your score by as much as 10 POINTS! This online training is targeted at residential and light commercial service technicians who want to review topics that will be covered in the Core exam. This refresher course represents over six hours of training and practice questions that can be reviewed repeatedly over a four-week period. A final exam measures your readiness for the NATE Core exam. Topics include: HVAC, electricity, motors and customer relations. Study guides in PDF format are included with course registration.

TIME	COST	IACET	FAD
6 hrs	\$35	Yes	Yes

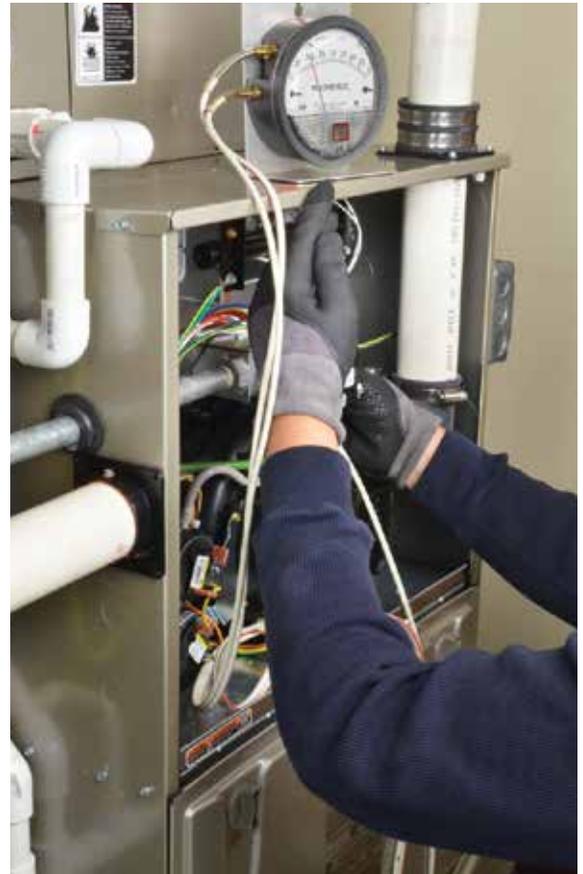
CLASS TIME APPROX. 6 HRS, ACCESS IS AVAILABLE FOR 4 WEEKS AFTER FIRST LOG-IN.

★ NEW MAY 2018 Rooftop Economizers

OL005 (ONLINE)

Economizers have been applied on rooftop units in cooler climates for many years, but current energy codes now require their use in nearly every U.S. climate zone. Many technicians may not have a clear understanding of how economizers operate, are installed, commissioned or how to troubleshoot them. Energy codes now require accurately setting minimum ventilation air and use of advanced control systems. This online program uses a series of training videos that take the technician step by step from the basic operation of the economizer to how to troubleshoot typical problems and control operation. Knowledge checks provided with each section help the participant ensure they understand the critical points in each section. At the completion of this course a technician will be better able to adjust and troubleshoot economizer systems used in most packaged rooftop systems. To receive NATE or FAD credit you must pass each of the online knowledge checks.

TIME	COST	NATE	IACET	FAD	FORMAT
1 hr	\$25	Yes	Yes	Yes	Online



Technician Skill Training

Basic Apprentice Startup and Installation SER 400

Designed for the new hire into the HVAC residential light commercial installation and startup business, this course was specifically developed for the person with minimum training or field experience. It is intended to quickly help a new hire become a useful and profitable member of the installation team. The course not only provides practical hands-on training, but will show the students the right way to install and start residential and light commercial equipment. This will help insure proper system operation with top efficiency, promote customer satisfaction, and eliminate costly callbacks. This course can also provide the first stepping stone in training for an installer, who is being groomed to advance towards a service technician position. This 4-day course splits time in the classroom with hands-on training. Skills covered include brazing, refrigerant recovery and charging and proper use of common HVAC troubleshooting tools. The class is 30% to 40% lab time. Upon request the EPA 508 certification can be held evenings after class at a slight additional cost. This certification is required to handle refrigerants.

DAYS	COST	NATE	IACET	FAD
4	\$1,200	Yes	Yes	Yes

HVAC Electrical Pro-Troubleshooting SER027

A primary skill for HVAC technicians is the ability to troubleshoot electrical circuit problems. This course teaches the fundamental and advanced skills of troubleshooting residential and commercial HVAC electrical system problems. In this course, technicians learn and practice proven diagnostic techniques that they can apply immediately, back on the job. The goal is to provide technicians with both the skills and confidence to tackle any control or power electrical system malfunction. Emphasis is on using a process to rapidly discover failed components and prevent repeat failures through root cause determination. Following this logical, systematic procedure for troubleshooting electrical systems makes the job much less intimidating. This course can be taken as a stand-alone class, or can be taken in conjunction with HVAC Mechanical Pro-Troubleshooting. This is not a course for a technician just entering the HVAC field, and an understanding of basic electrical theory is assumed. This class is a combination of classroom and in-lab hands-on training, with 30% to 40% lab time.

DAYS	COST	NATE	IACET	FAD
5	\$1,200	Yes	Yes	Yes

HVAC Mechanical Pro-Troubleshooting SER 028

Quality installation and servicing of HVAC systems requires the technician to fully understand the principles of refrigeration and operation of refrigerant systems components. In addition they must know how to properly handle refrigerants and use the tools required to service refrigeration systems. This course teaches essential skills needed to troubleshoot residential and commercial HVAC refrigeration system problems encountered on Direct Expansion (DX) systems. Students will learn to use time-proven diagnostic techniques that can be applied immediately back on the job. The goal is to provide technicians with not only the skills and confidence to tackle any mechanical system malfunction (with emphasis on rapid and accurate discovery of the failed component), but also the ability to determine the root cause of the problem to eliminate repeat failures. This course may be taken in conjunction with the HVAC Electrical Pro-Troubleshooting Course for complete troubleshooting proficiency, but can be taken as a stand-alone class if electrical troubleshooting techniques are already understood or are not needed. For technicians just entering the HVAC field or persons with no field experience, this course is most effective when preceded by the BASIC Program (SER400), which introduces participants to fundamental concepts of both air conditioning and heating systems, including lab time with service test equipment and tools. This class is a combination of classroom activity and in-lab exercises using testing and servicing tools, with 30% to 40% lab time. Upon request the EPA 508 certification can be held evenings after class at a slight additional cost. This certification is required to handle refrigerants.

DAYS	COST	NATE	IACET	FAD
5	\$1,200	Yes	Yes	Yes

Heat Pumps Installation and Service SER190

Rising energy prices have increased interest in air-to-air heat pumps even in climate zones not normally considered for heat pump applications. Technicians in many climate zones now need to have a good working knowledge of the operation and troubleshooting of heat pump units. This training course covers residential and commercial split system and packaged air-to-air heat pumps including dual fuel units. Students will learn how to troubleshoot, service and maintain heat pumps fast and accurately. Classroom sessions discuss the refrigeration, air, and electrical systems. Newly acquired skills are tested on operating equipment in the lab. Topics covered include heat pump operation, defrost operation and troubleshooting, supplemental heating, dual fuel setup and operation, operation and troubleshooting of variable speed compressor and indoor fan motors, and metering devices including electronic expansion valves. This class is a mix of classroom training and lab exercises on actual residential split system and commercial rooftop units, with 30% to 40% lab time.

DAYS	COST	NATE	IACET	FAD
3	\$900	Yes	Yes	Yes

Gas Heating Installation and Service SER 200

In North America gas heating furnaces are the most common type of residential and light commercial heating system. In this course, you'll learn how to install, troubleshoot, service, and maintain gas furnaces—professionally, accurately, and quickly. The equipment covered in this class ranges from standard efficiency furnaces to the latest multi-poise condensing furnaces with modulating gas valves, variable speed motors, microprocessor controls, electronic thermostats, and direct ignition burners with flame rectification proving circuits. Classroom sessions cover: gas heating fundamentals, types of gas heating systems, furnace construction, operating components and safety controls, furnace combustion and venting air requirements, installation rules and gas pipe sizing, determining proper size for vent pipe and venting concerns, conversion of natural gas to LP, adjustments for altitude, accessories (such as humidifiers and electronic air cleaners), reading electrical schematics and interpretation of various heating electrical circuits. Classroom instruction is reinforced with a number of lab troubleshooting exercises on operating rooftops and residential furnaces, with 30% to 40% lab time.

DAYS	COST	NATE	IACET	FAD
3	\$900	Yes	Yes	Yes

▲ UPDATED Air System Measurement, Testing and Verification SER 300

Comfort and performance issues are often the result of improper airflow. Airflow testing is the primary performance indicator of any HVAC system and must be completed before all others service procedures can begin. Without verification of airflow throughout the entire system, it's impossible to effectively test the heating and refrigeration performance or assure zone-by-zone airflow. Proper assessment of required outside ventilation air supplied to the zone(s) through air economizers in systems such as VAV (variable air volume), CV (constant volume) and SZVAV (single zone VAV systems) is essential to code compliance and zone comfort. Just because the airflow of the supply air blower may be adequate, you cannot accept this airflow is being effectively dispersed throughout the building and the various comfort zones. The primary purpose of air delivery systems is to “deliver comfort and proper ventilation air” and neither of these air properties can be assured unless zone-by-zone airflow is tested, measured, and verified to match the zone design calculations. If the proper airflow doesn't match or meet the needs of the occupied comfort zone, there's no way the ventilation and load requirements can maintain the occupants' comfort. “Air System Measurement, Testing and Verification” is as important as any step a technician performs in commissioning or troubleshooting a system.



This course is an in-depth analysis of the principles that impact airflow including air properties; fan, air terminal, and diffuser performance; airflow measurement and testing instrumentation. Also covered is how to determine proper ventilation in compliance with code requirements and determine if it is being delivered to the zone. Use of control systems to properly set up various VAV terminals including single duct and fan-powered pressure dependent and pressure independent systems is covered. At the end of this course a technician will be capable of using typical field measurement tools to commission and troubleshoot air systems. Over 50% of this class involves exercises using working units and typical field instrumentation.

DAYS	COST	IACET	NATE
5	\$1,200	Yes	Yes

★ NEW FALL 2018 Airside Troubleshooting for Technicians SER 305

After electrical problems the second most common troubleshooting issues HVAC technicians encounter are related to the airside. This two-day course provides the technician with the background understanding and hands-on skill to better diagnose and correct airside problems on packaged and applied HVAC systems. Topics covered include: using airside diagnostic tools; determining airflow in ducts, units and diffusers; setting, adjusting and analyzing economizer and minimum ventilation air flow; determining airside unit capacity and balancing against refrigeration capacity, determining and adjusting primary air to single duct, series fan powered, and parallel fan powered VAV boxes; and adjusting airflows for single zone VAV. Classroom instruction is supported by lab exercises on operating constant volume (CV) and variable air volume (VAV) systems with over 60% of the time in the lab. At the conclusion of this course a technician will be better prepared to diagnose the most common airside problems in most HVAC systems. This course is not intended for test and balance or commissioning technicians but rather for general service technicians who encounter airside issues in their daily work.

DAYS	COST	NATE	IACET	FAD
2	\$600	Yes	Yes	Yes



Technician Equipment Training

Single Zone Rooftop Units SER143

The Single Zone Rooftop service course is for technicians servicing Carrier Single Zone rooftop units. This training course covers commercial rooftop units 25 tons and less, and deals with the industry's most common packaged products. The class provides detailed training intended to improve the troubleshooting skills and product knowledge of HVAC technicians. A variety of rooftop units and simulators are used to provide training exercises for wiring diagram interpretation, compressor troubleshooting, and control/sensor troubleshooting. The course specifically covers Carrier rooftop units produced over the last 20 years, however, many procedures covered can be universally applied to all makes of rooftop units. Specific models covered include 48/50 T, H, P, L and K series units under 25 tons. These models cover electric/electric, gas/electric and heat pump units primarily as applied in constant volume applications. At the end of this course a student will be better able to quickly diagnose and repair refrigeration, gas heating, heat pump, economizer, air side and system operation problems on these units. The class addresses electromechanical, ComfortLink, PremierLink™, and the RTU-OPEN™ Control systems and their operation. The class also addresses staged air volume, ECM and VFD applications, Humidi-MiZer Adaptive dehumidification system, EnergyX heat recovery, and various economizer options used with these units. The course also covers the 48/50LC*B multi-zone variable air volume unit. This class is a mix of classroom training and in-lab exercises on actual rooftop units. Over 30% of the class involves lab exercises on actual operating rooftop units.

DAYS	COST	NATE	IACET	FAD
5	\$1,200	Yes	Yes	Yes

Applied Rooftop Units SER147

The Packaged Variable Volume Commercial Rooftop service course is for technicians servicing Carrier Variable Volume-Zoned rooftop units. This training course on commercial rooftop units deals with the industry's most common packaged product in the over 20 ton market. The class provides detailed training intended to improve the troubleshooting skills and product knowledge of HVAC technicians. This course covers the Carrier A, Z, P and N Series Rooftops over 25 tons with ComfortLink Controls. This 3-day training session is conducted utilizing classroom presentations and supplemented with simulator exercises on actual unit control panels. Students will learn how to use the system controls and the latest Controls & Troubleshooting documents to quickly determine and repair system faults. The simulator exercises cover the three modes of operation: Cooling, Heating and Ventilation. There are over 16 electrical faults built in each simulator, allowing the technician to experience the most common problems encountered in the field. Technicians work their way through the panel's bug list to ensure a hands-on comfort level with each unit type. Classroom activities include a detailed coverage of installation, startup, maintenance, and troubleshooting of the refrigeration, heating, economizer, and system option. Over 30% of the class involves lab exercises on actual unit control panels.

DAYS	COST	NATE	IACET
3	\$900	Yes	Yes

Technician Equipment Training (continued)

30 Series Screw and Scroll Chiller Fundamentals SER270

Efficient operation of air- and water-cooled chiller systems requires a thorough understanding of their operation and service procedures. Many of these chillers use scroll or screw compression technology. In this class the service technician will learn how to best operate, maintain, troubleshoot, and service Carrier's complete line of scroll and screw 30 Series air-cooled and water-cooled chillers produced over the last 20 years. Models covered include the 30GX/HX, RA/RB/RAP, and XA/XW/XV/XAV. Studies include chiller refrigeration cycle, compressor theory, cooler heat transfer, and water- and air-cooled condensers. You'll learn how to analyze performance by recording and analyzing refrigerant and water pressures and temperatures and calculating GPM flows. We also cover refrigerant controls, adjustments, charging, capacity control and capacity testing, and operation and troubleshooting of the electrical system, including timers, temperature controllers, and operating and safety controls. This class is mostly done in the classroom; however, several lab exercises are done using the control simulators, allowing students to have hands-on knowledge of chiller control operation. The skills learned in this class will allow operators to run machines more efficiently and service technicians to reduce service time and callbacks.

DAYS	COST	NATE	IACET
3½	\$1,200	Yes	Yes

Centrifugal Chiller Fundamentals SER120

Centrifugal chillers represent a significant HVAC investment for the building owner, and each type of machine requires specific operating, servicing and maintenance practices to protect the investment. This course is intended for service technicians and operators of Carrier 19 series centrifugal chillers. The course covers fundamental principles of centrifugal chillers with in-depth coverage of the operation and service techniques associated with most Carrier centrifugal chillers produced over the last 30 years. Carrier chiller models covered include 19D, DV low-pressure chillers and 19E, F, 19XL, XR and 19XRV high-pressure chillers. Participants learn how to operate, maintain, troubleshoot, and service both the low- and high-pressure machines (including PIC controls). Studies include: centrifugal refrigeration cycles, compressor theory, lubrication cycles, purge operation, refrigerants, heat exchangers, and heat transfer. The course also covers troubleshooting techniques and equipment needed to record and analyze machine temperatures and pressures; performance using heat exchanger approaches; waterside flow rate analysis; maintenance requirements; and logging machine data. This course is mostly classroom instruction and includes numerous exercises using the classroom information to analyze performance. Successful completion of this course is required in order to attend the SER 130 Centrifugal Disassembly and Reassembly course.

DAYS	COST	NATE	IACET
4	\$1,600	Yes	Yes

Centrifugal Disassembly and Reassembly SER130

This class is intended to be the follow-up class to SER 120, Centrifugal Chiller Fundamentals, and is designed to teach experienced service mechanics how to properly disassemble both low- and high-pressure centrifugal compressors, including Models 19D, DV, 19E / F and 19XL, XR and XRV. Techniques and procedures for using precision instruments are taught for determining clearances, fits, and tolerances of various bearings, seals and components. Students also review compressor lubrication and motor cooling. This class is almost completely a lab course, and students work in teams to disassemble, adjust, and reassemble the various chiller models. Because this course is lab-oriented with enhanced student/instructor contact, attendance is limited and early registration is recommended.

DAYS	COST	NATE	IACET
4	\$2,925	Yes	Yes

23XRV Liquid Screw Chiller Service and Operator SER275

This course is targeted at service technicians and facility managers who operate or service Carrier model 23XR/XRV water-cooled screw chillers. This class will cover the chiller refrigeration cycle, compressor theory, drive theory, cooler heat transfer, and water-cooled condensers. Operation and function of the compressors, muffler, condenser, coolers, economizers, metering devices, oil concentrator and accessories are covered. You will learn how to analyze performance by recording and analyzing refrigerant and water pressures and temperatures. Service technicians will be able to distinguish between chiller and system problems and to quickly diagnose problems using service logs. The class also covers the unit controls and how to set up and adjust the controls for optimum system performance. In addition, recommended pre-start and startup procedures, and operational and field issues will be covered. These compressors have very few tear-down procedures; these procedures will be covered but are not demonstrated. The class consists of classroom instruction with a number of exercises to develop the skills taught in the class and some lab exercises using control simulators developing a working knowledge of the control system operation.

DAYS	COST	NATE	IACET
2	\$600	Yes	Yes





Carrier University

Bynum Training Center

PO Box 4808

Syracuse, NY 13221-4808

1-800-644-5544

1-860-775-2654 fax

carrieruniversity@carrier.utc.com

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