Updated 02/17/2025

# ItsAboutQ.net

## FREE ONLINE HVAC TRAINING for CA RESIDENTS

## Complete Catalog of Online Classes and Programs


## AVAILABLE TO CALIFORNIA RESIDENTS ONLY

*ItsAboutQ.net is powered by* HVACRedu.net
Workforce Development Online for the HVACR Industry

*Enroll Now!*

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## NATE Certified HVAC Technician Program

256 or more Instructional Hours

*Refer to the Program Admissions and Enrollment Process after this section.*

The NATE Certified HVAC Technician Program (NCT) is a comprehensive online HVAC education program encompassing a well-rounded set of skills used by installers and technicians who are seeking NATE Certification. It starts with cultivating new technicians into the Ready to Work program with all the essential skills needed to start a career in HVAC. Then, it covers all the NATE Core areas with a rich selection of foundational courses, and then focuses on Air Conditioning Specialty at the Service Level. The content presented in each course targets learning objectives that have been identified by HVAC industry groups (HVAC Excellence, ACCA Quality Standards, AHRI, NATE, HARDI and PAHRA) as critical knowledge areas for an HVAC technician.

### About NATE

North American Technician Excellence (NATE) is the nation's largest and most recognized non-profit certification organization for heating, ventilation, air conditioning and refrigeration technicians. NATE certification tests represent real-world working knowledge of HVACR systems. Developed by a committee of industry experts nationwide, all the NATE tests are rigorous, knowledge-based, multiple-choice tests designed to validate a technician's knowledge. You can read more about NATE at: www.natex.org.

HVACRedu.net's NCT Program is specifically structured to teach foundational skills to individuals who are new-to-the-industry and non-certified installers and technicians who want formal education to upskill their knowledge and prepare for licensing or certification exams.

### What's Included:

- The current edition of the Cengage Refrigeration & Air Conditioning Technology textbook is included in the tuition for this program and is shipped shortly after enrollment.

- Four HVAC Industry Exam fees are included. Students receive an exam voucher to cover the cost of each exam..

- Online Training - The online program is a Career Technical Education (CTE) model. Courses are entirely online with access 24/7/365. Class is always open. Student support is provided by our student services crew and faculty instructors through email, chat, our campus messaging system, and phone.

**For The Employer** *(if the employer purchases the program for the technician)*

- Regular reports on student progress
- Notification of less than satisfactory performance

**For The Student**

- Registration into each course in the program sequence one at a time
- Certificate of Completion upon successfully passing each course
- Online Faculty - mentoring and technical topic assistance
- Business hour communications with faculty and student services via email, chat and phone

## What's Covered in the Program *(Step 1 is optional, Step 2 is required before choosing a Step 3 Specialty Program)*

**Step 1: Ready to Work (RTW) Program (43 hrs)**

**010** Employability Skills (9 hours)
**050** Applied Math (12 hours)
**106** Building Systems (3 hours)
**109** Basic Hand and Power Tools (6 hours)
**BHE** Intro to HVAC Systems (3 hours)
**OSHA** 10 Hour Construction Safety (10 hours)
**NATE** Ready to Work Exam (included)

**Step 2: NATE CORE Program (69+ hrs)**

**015** Customer Service and Sales Skills (15 hours)
**101** Fundamentals (18 hours)
**111** Electrical DC Theory Plus (18 hours)
**112** Electrical AC Theory Plus (18 hours)
Service Core Review (30 days)
TekAssist (Core Exam Practice Session) (30 days)
**NATE** CORE Exam (included)

**Step 3: Choose a Specialty Program:**

**Air Conditioning Specialty Program**

104 Copper Works (12 hours)
113 Electrical Common Components (18 hours)
114 Electrical Motors (21 hours)
121 Air Properties and Measurement (18 hours)
141 Refrigeration I (18 hours)
143 Refrigeration Cycle Service Procedures (9 hours)
242 R-410A Refrigerant Technology (18 hours)
241 Intro to Cooling System Troubleshooting (18 hours)
EPA 608 Certification Prep (12 Hours)
EPA 608 Exam (included)
CTP Exam (Final Prep for NATE Certification Exam)
NATE Air Conditioning Specialty Exam (included)

**Commercial Refrigeration Specialty Program**

104 Copper Works (12 hours)
113 Electrical Common Components (18 hours)
114 Electrical Motors (21 hours)
121 Air Properties and Measurement (18 hours)
141 Refrigeration I (18 hours)
143 Refrigeration Cycle Service Procedures (9 hours)
242 R-410A Refrigerant Technology (18 hours)
241 Intro to Cooling System Troubleshooting (18 hours)
EPA 608 Certification Prep (12 Hours)
EPA 608 Exam (included)
CTP Exam (Final Prep for NATE Certification Exam)
NATE Air Conditioning Specialty Exam (included)

**Heat Pump Specialty Program**

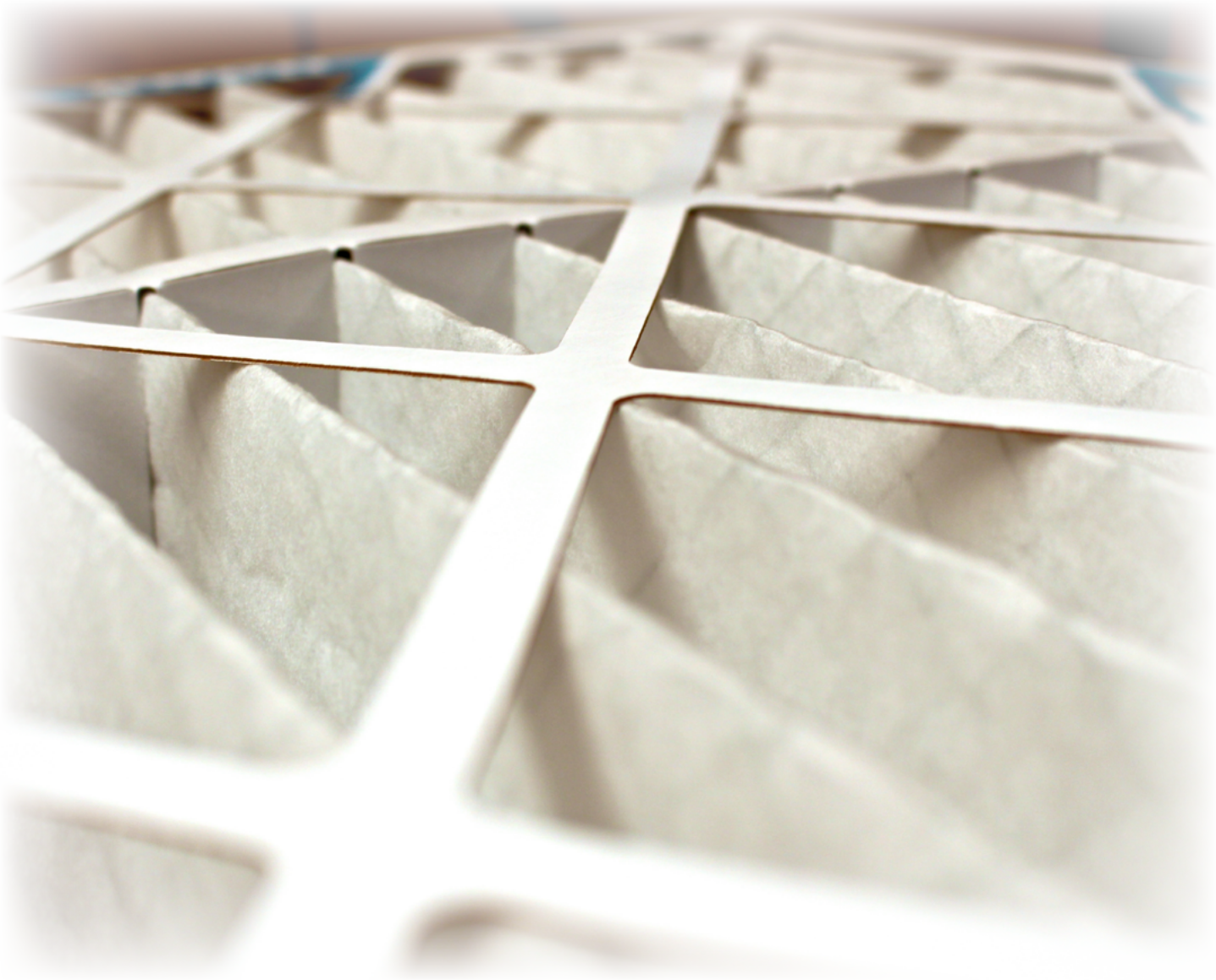
005 Heat Pump Water Heating (3 hours)
104 Copper Works (12 hours)
113 Electrical Common Components (18 hours)
239 Everything About Belts (3 hours)
114 Electrical Motors (21 hours)
121 System Properties & Measurement (18 hours)
141 Refrigeration I (18 hours)
142 Refrigeration II (18 hours)
143 Refrigeration Cycle Service Procedures (9 hours)
242 R-410A Refrigerant Technology (18 hours)
246 Low GWP Refrigerants
241 Intro to Cooling System Troubleshooting (18 hours)
135 Heat Pumps (21 hours)
139 Electric Heat (15 hours)
136 Heat Pump II Troubleshooting (12 hours)
137 Geothermal Heat Pump Systems (18 hours)
005 Heat Pump Water Heating (3 Hours)
EPA 608 Certification Prep (12 hours)
EPA 608 Exam (included in the program price)
NATE Heat Pump Specialty Exam (30 day access))

Once you have passed the NATE Core Certification Exam, you will be ready for the third and final group of courses that guide you through everything you need to know to pass your NATE Air Conditioning Specialty Exam at the Service Level. Once you successfully pass this series with a grade of 70% or more, you can return to TekAssist to practice and brush up again. We've also included your EPA 608 Refrigerant Handling Certification Prep and Exam. Again, Student Services will issue an exam code you can use when signing up. All your exam fees are included in your program, so there is no additional cost to you.

When you reach the end of the program with an overall passing grade of 70% or higher, you will receive a Certificate of Completion for the NATE Certified HVAC Technician Program. This is the program that pays you for upskilling your credentials. You can be proud of your Certificate of Completion and your NATE Certification!

**Note:** The 101 Fundamentals course for Program Students requires that students must pass each module exam with a score of 70% or higher before they can move on to the next module. Once this strong foundation is established in the 101 course, students can then move through the remainder of their program at their own pace, one course at a time.

**Note:** For complete individual course descriptions, go to the corresponding course number in this Catalog.



# HVACR Apprenticeship Related Training Program

607 (or more) instructional hours

This apprenticeship related training program is entirely online–convenient quality education. HVACRedu.net is a US Department of Labor Registered Apprenticeship Training Provider because our online courses align with the US Department of Labor Apprenticeship Guidelines. This online program is the related training/educational component of registered apprenticeship programs; or many employers find it a valuable structured way to provide on-the-job training to new employees. *[Note: Employment and on-the-job-training are not included.]* All courses are written and supported by qualified industry experts. Courses are open entry: open exit, available 24/7/365 so students may begin the program at any time. Students have 8 months from the date of enrollment to access their online program and complete the year's curriculum, but they may complete in less time without restriction. Each learner can access their course when it fits into their own schedule, as long as they are devoting about 6 hours of study time per week. This ensures course completion during the enrollment period. We are happy to offer assistance registering your apprenticeship program with our online training in your state, please contact us. Although a number of e-books are included in the courses, please check out the **REQUIRED TEXTBOOKS** at the end of this catalog.

## Year 1 (155 hours)

Basic Construction Math (12 hrs)
Basic Hand and Power Tools (6 hrs)
Intro to Applied Science (21 hrs)
Energy Sources (18 hrs)
Basic Sheet Metal (21 hrs)
Building Systems (6 hrs)
Employability Skills (9 hrs)
Copper Works (6 hrs)
Refrigeration Cycle I (18 hrs)
EPA 608 Prep (8 hrs)
OSHA 30 Hour Construction Safety (30 hrs)

## Year 2 (149 hours)

Everything About Belts (3 hrs)
Intro to Blueprints (12 hrs)
Construction Technology (20 hrs)
Customer Service (15 hrs)
Indoor Air Quality Basics (18 hrs)
Refrigeration Cycle II (18 hours)
Refrigeration Cycle Service (9 hrs)
Electrical DC I (18 hrs)
Electrical AC II (18 hrs)
Air Properties & Measurement (18 hrs)

## Year 3 (150 hours)

Electrical Common Components (18 hrs)
Electrical Motors (21 hrs)
Heat Loads – Manual J (18 hrs)
R-410A Refrigerant Technology (18 hrs)
Air Distribution – Manual D (18 hrs)
Gas Heat I (18 hrs)
Fuel Gas Pipe Sizing (12 hrs)
Intro to Cooling System Troubleshooting (18 hrs)
High Efficiency Ventilation (9 hrs)

## Year 4 (153 hours)

Fuel Gas Venting Systems (16 hrs)
Code IFGC (20 hrs)
Hydronics I (18 hrs)
Advanced Troubleshooting (21 hrs)
Commercial Boiler Fundamentals (6 hrs)
High Efficiency Commercial Boilers (6 hrs)
Air Handlers & Roof Top Units (6 hrs)
Building Automation Systems I (18 hrs)
High Efficiency HVAC (12 hrs)
Central Chillers (6 hrs)
Cooling Towers (6 hrs)
Operations Management (18 hrs)

**Program Learning Objectives:**

**Year 1**

The apprentice will demonstrate new knowledge in the subjects of Basic Construction Math, Basic Hand & Power Tools, Introduction to Applied Science, Energy Sources, Basic Sheet Metal, Building Systems, Employability Skills, Copper Works, Refrigeration Cycle I, EPA 608, and OSHA Construction Safety, by earning an overall average score of 75% or higher in the combined year's curriculum.

**Year 2**

The apprentice will demonstrate new knowledge in the subjects of: Everything About Belts, Intro to Blueprints, Construction Technology, Customer Service, Indoor Air Quality Basics, Refrigeration Cycle II, Refrigeration Cycle Service, Electrical DC I, Electrical AC II, and Air Properties & Measurement; by earning an overall average score of 75% or higher in the combined year's curriculum.

**Year 3**

The apprentice will demonstrate new knowledge in the subjects of: Electrical Common Components, Electrical Motors, Heat Loads – Manual J, R-410A Refrigerant Technology, Air Distribution – Manual D, Gas Heat I, Fuel Gas Pipe Sizing, Intro to Cooling System Troubleshooting, and High Efficiency Ventilation; by earning an overall average score of 75% or higher in the combined year's curriculum.

**Year 4**

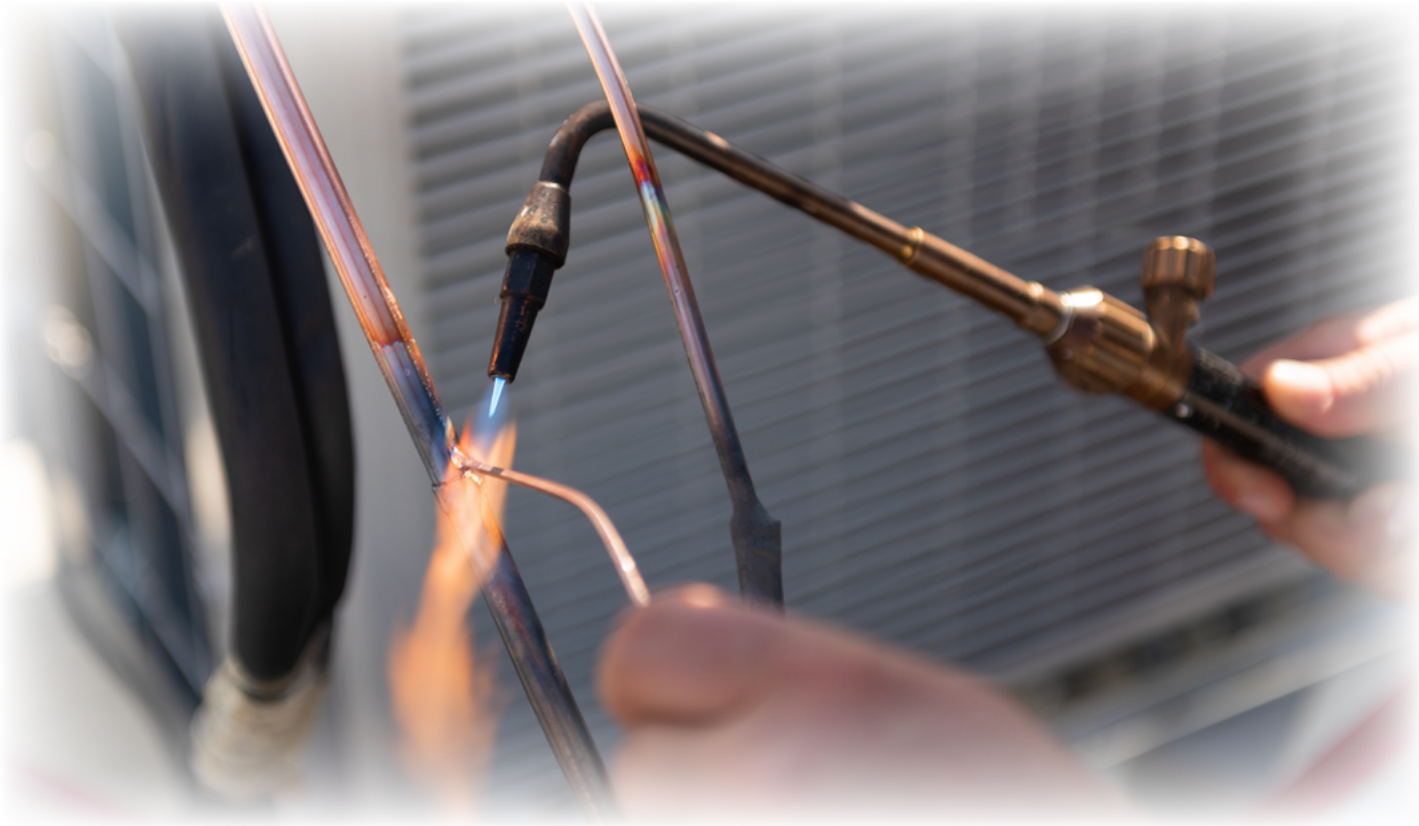
The apprentice will demonstrate new knowledge in the subjects of: Fuel Gas Venting Systems, Code IFGC, Hydronics I, Advanced Troubleshooting, Commercial Boiler Fundamentals, High Efficiency Commercial Boilers, Air Handlers & Roof Top Units, Building Automation Systems I, High Efficiency HVAC, Central Chillers, Cooling Towers, and Operations Management; by earning an overall average score of 75% or higher in the combined year's curriculum.

## *Enroll Now!*

Apprentices are enrolled for an 8 month period of time to complete the year's program. We provide a live program orientation and a campus navigation video to help students succeed. Apprentices can view only the first topic module, and open the following module by earning a minimum score of 70% on each exam. . . one module at a time . . . however, an overall averaged grade of 70% is required to successfully pass the program and receive a certificate of completion. Try to complete 2 modules each week. That will keep you on track to complete by the recommended schedule. You should refer to the Program Student Handbook for specifics.

**The Program Admissions and Enrollment Process can be found HERE.**

**Suggested Hand Tools List For Students HERE.**




## Building Automation Systems Program

129 Instructional Hours - *Written by Ron Auvil*

**The Building Automation Systems Program** is an advanced program totaling 90 instructional hours, videos included. Students will take one course at a time in a systematic progression through courses that lay a good foundation, then move into commercial HVAC systems and through the specific technologies of controls systems. Students are enrolled as online asynchronous independent study. This access allows students to login at their convenience 24/7/365. The courses were written by Ron Auvil who is the Author of HVAC Control Systems, American Technical Publishers. Along with the courses described below, Ron also teaches these topics in a series of recorded video lecture presentations included with each learning module. This program is NATE recognized for 90 hours of continuing education (CEHs) which are applicable to NATE re-certification.

The courses making up the Program are:

- 422 DDC Bootcamp
- 153 HVACR Control Systems Fundamentals
- 154 HVACR Control Systems Types and BAS Basics
- 155 HVACR BAS Installation and Strategies
- 156 HVACR BAS System Management and Advanced Technologies
- 157 HVACR Troubleshooting DDC Systems & Components Course
- 159 HVACR IT for HVAC Technicians

***For course descriptions, see the "Individual Courses" section***

**Required Textbooks:** HVAC Control Systems (4th edition), American Technical Publishers, by Ronnie J. Auvil, ISBN- 978-8269-0779-0 shipped upon program enrollment, included with Program Enrollment.

**Prerequisites**:
This program is designed for HVACR technicians, facilities managers, and commercial maintenance technicians who have already completed an educational program for HVACR and/or have current industry work experience in the field. The program will build on your existing knowledge of HVACR fundamentals and equipment and help you learn HVACR Controls and Building Automation Systems.

**Grades:** Students who complete a course with a grade of 70% or higher will receive a certificate of completion for that course. Further, at the end of the program, if all courses are passed with a score of 70% or higher, students will receive a Certificate of Completion for the Building Automation Systems Program. All courses in the program also carry NATE continuing education credit for technicians maintaining industry certifications.

**Jobs:** A quick check revealed that Indeed.com shows 1,044 job listings for Building Automation Controls Technician; Monster.com shows over 1,000, Career Builder shows 504, and GlassDoor.com shows 4,457. This skill set is much in demand right now and will continue to increase!

## Metasys Tech Program

90 Instructional Hours - *Written by Ron Auvil*

The **Johnson Controls Technician Program** is an advanced program totaling 90 instructional hours. There are 4 courses covering both current and Legacy Johnson Controllers and Operations. Students will take one course at a time in a systematic progression beginning with front end web based operations, then field controller software and hardware. Students are enrolled as online asynchronous independent study. This access allows students to login at their convenience 24/7/365. The courses were written by Ron Auvil who is the Author of HVAC Control Systems, American Technical Publishers. Ron retired as a certified instructor with Johnson Controls and has taught these courses to thousands of personnel across the US. Ron also teaches these topics in a series of recorded video lecture presentations included with each learning module.

***Note: Your instructor, Ron Auvil, has taught thousands of Metasys Operators across the US over the past 20+ years.***

Ron Auvil has 42+ years of HVAC and Controls Experience. This includes 38 years teaching experience. He has worked as a senior controls technician for Johnson Controls. He has also taught HVAC controls classes across the United States for Johnson Controls, Honeywell and others. He has written the definitive textbook on DDC and Pneumatic control systems 'HVAC Control Systems' 4th Edition, from American Technical Publishers.

**The courses making up the program are:**

- 410 Metasys Basic Operator
- 411 JCI HVAC Pro-N2 ASC Controllers
- 412 JCI DX-9100
- 413 JCI CCT/PCT

***For course descriptions, see the "Individual Courses" section***

**Grades:** Students who complete a course with a grade of 70% or higher will receive a certificate of completion for that course. Further, at the end of the program, if all four courses are passed with a score of 70% or higher, students will receive a Certificate of Completion for The Johnson Controls Technician Program. All courses in the program also carry NATE continuing education credit for technicians maintaining industry certifications.

## Commercial Refrigeration Program

83 Instructional Hours - *Written by Dick Wirz and Chris Compton*

The Commercial Refrigeration Program is an advanced program, perfect for HVACR technicians and contractors who want to better understand refrigeration systems used in commercial applications like stores, warehouses, restaurants, and product and food services. Begin with the fundamentals of Refrigeration with Chris Compton and move into the advanced courses with Dick Wirz. The first time the 441 and 442 courses were offered in a webinar, Dick's lectures were recorded. Those recordings are included in the asynchronous delivery so you feel like you're sitting in his classroom. He covers everything you need from refrigeration principles through evaporators, condensers, compressors, metering devices, controls, accessories, motors, and the various refrigerants used so you can service walk-in refrigerators and freezers, and commercial ice makers with confidence. He also describes the most common service issues and troubleshooting procedures. The **REQUIRED TEXTBOOK** that is included in the program: *"Cengage: Commercial Refrigeration for Air Conditioning Technicians, 3rdd Edition". ISBN 978-1305506435* The courses included in this program are described below:

- 141 HVACR Refrigeration I (18 hours/60 days)
- 142 HVACR Refrigeration II (18 hours/60 days)
- 441 HVACR Commercial Refrigeration I (24 hours / 60 days)
- 442 HVACR Commercial Refrigeration II (18 hours / 60 days)
- 245 HVACR Compressor Failure Analysis with Bob Feathers *(Mr. Compressor)* (5 hours / 60 days)

***For course descriptions, see the "Individual Courses" section***

## Rack Tech Plus Program

71 Instructional Hours

*Written by Bob Feathers and Chris Compton*

The Rack Program Plus is an advanced program totaling 71 instructional hours. Students will take one course at a time in a systematic progression that moves through the topics of refrigeration fundamentals, market refrigeration and the specific technologies focusing on Parallel and Unparallel Systems and Applications.

The need for Refrigeration Mechanics is ever evolving:

- Old systems still need to be maintained.
- Retrofit opportunities.
- New technologies and refrigerant requirements.
- System controls / Energy savings.
- Food safety and monitoring are very important.

Students are enrolled as online asynchronous independent study. This access allows students to login at their convenience 24/7/365. This program is NATE recognized for 30 hours of continuing education (CEHs) which are applicable to NATE re-certification.

The content making up the Program consists of:

- 141 Refrigeration
- 142 Refrigeration II
- 444 Rack Tech Program
- 245 Compressor Failure Analysis
  *with Bob Feathers (Mr. Compressor)*

***For course descriptions, see the "Individual Courses" section***

**Prerequisites:** This advanced program is designed for HVACR technicians, facilities managers, and commercial maintenance technicians who have already completed an educational program for HVACR and/or have current industry work experience in the field. The program will build on your existing knowledge of HVACR fundamentals and equipment and help you learn commercial supermarket applications and systems.

## Chiller Mechanic Program

36 Instructional Hours

Many commercial buildings utilize chilled water systems for comfort cooling. These chillers come in many different configurations. Small and mid-size chillers are used in buildings such as schools and medical office buildings. Large facilities such as colleges, hospitals, and military bases have central chiller plants that supply chilled water to multiple buildings. This program is designed for advanced level technicians and building maintenance personnel who are responsible for operation, maintenance, and troubleshooting of chiller systems in commercial buildings. This program is made up of four courses for a total of 12 learning modules that are recognized for 36 hours of continuing education (CEHs), applicable to NATE re-certification.

- 202 High Efficiency HVAC System Maintenance – Central Chillers (6 hours/30 days)
- 402 HVACR Packaged Chillers: 25 - 150 Tons (9 hours / 30 days)
- 203 High Efficiency HVAC System Maintenance – Cooling Towers (6 hours/30 days)
- 403 HVACR Water Cooled Mid & Large Tonnage Chillers 150+ Tons (15 hours/60 days)
- 292 Water treatment for HVACR Systems I (24 hours/60 days)
- 293 Water treatment for HVACR Systems II (21 hours/60 days)

***For course descriptions, see the "Individual Courses" section***

# Boiler Tech Program

160 Instructional Hours

***This program could be called "Everything You Wanted to Know About Boilers But Were Afraid to Ask".***

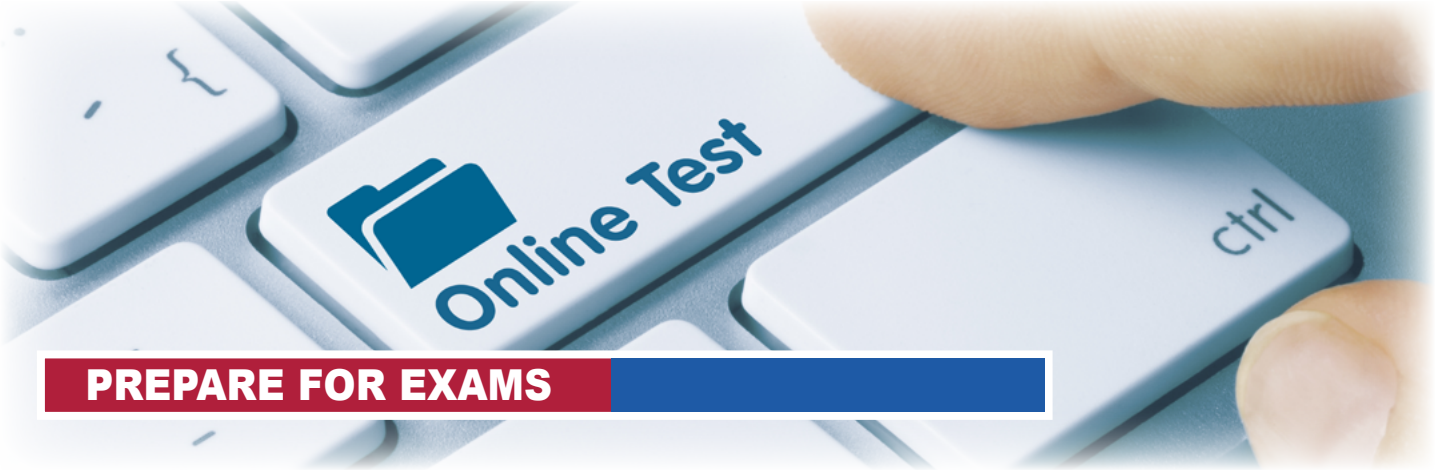
It contains all the courses that HVACRedu.net Subject Matter Experts have created related to Hot Water, Hydronic Systems, Water Treatment, and Boilers. You may want to pick and choose what you study or go through the gauntlet of courses and emerge the Boiler Hero.

Note that one of the courses, 171 Low Pressure Boiler License Prep, is a combination of several of the courses listed in the program but we included it in since it is Boiler related. If you don't want to take the whole program all of these can be taken separately as a stand-alone course.

**Courses included:**

- 191 Hydronics I (18 hours/60 days)
- 291 Commercial Water Heating (12 hours/60 days)
- 161 Boilers I (18 hours/60 days)
- 261 Commercial Boiler Fundamentals (6 hours/30 days)
- 265 Small Commercial Boiler Maintenance (3 hours/30 days)
- 263 High Efficiency Commercial Boilers (6 hours/30 days)
- 266 Large Commercial Boiler maintenance (6 hours/30 days)
- 262 Industrial Steam Boiler Fundamentals (9 hours/30 days)
- 264 Industrial Steam Boiler Maintenance (9 hours/30 days)
- 171 Boilers License Prep (28 hours/9 days)

***For course descriptions, see the "Individual Courses" section***




## How can you be sure you're truly ready to pass your industry exams the first time?
## Save time and money by being sure.

**On the next few pages, you can read the complete descriptions of these online choices:**

**Certification Exam Prep Reviews** are practice exams available on demand, you can continually test yourself and improve weak areas as needed. These will help you become familiar with the language and format of exams and relieve test anxiety.

**Tek Assist**
Practice, practice, practice. To help experienced HVACR Technicians prepare for industry certification exams.

**EPA 608 Review**
Make sure you can pass the essential EPA 608 Certification exam, Type I, II, and III the first time by preparing. This review aligns with new federal standards inacted 2018.

## Certification Exam Prep Reviews

Each review includes random selection exams that provide immediate feedback. With these exams available on demand, you can continually test yourself and improve weak areas as needed. No certificates of completion are issued for these reviews. Instruction aligns with ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180. Online learning tools include:

- Downloadable study handouts
- Video clips on key points
- User friendly navigation
- 30 day access

### Core Service Certification Review
This review prepares technicians for the HVAC Excellence or NATE Core Service Certification exam. The review covers in detail the same main topics as the NATE Core Service:

- HVAC Fundamentals
- HVAC Electrical Knowledge
- HVAC Air Side Knowledge

### Air Conditioning Service Certification Review
This review prepares technicians for the HVAC Excellence or NATE Air Conditioning Certification exam at the Service level. The review is done in four comprehensive sections covering:

- HVAC Electrical Knowledge
- Air Side Knowledge
- Refrigeration Cycle Knowledge
- Cooling Service Knowledge

### Air to Air Heat Pump Service Certification Review

This review prepares technicians for the HVAC Excellence or NATE Air to Air Heat Pump Service Certification exam at either the Installation or Service level. The review is done in four comprehensive sections covering:

- HVAC Electrical Knowledge
- Refrigeration Cycle Knowledge
- Air Side Knowledge
- Heat Pump Specific Knowledge

### Gas Heating (Air) Service Certification Review

This review prepares technicians for the HVAC Excellence or NATE Gas Heating (Air) Service Certification exam at either the Installation or Service level. The review is done in three comprehensive sections covering:

- HVAC Electrical Knowledge
- Air Side Knowledge
- Gas Heat Specific Knowledge

### Hydronics Gas Service Certification Review

This review prepares technicians for the HVAC Excellence or NATE Hydronics Gas Service Certification exam at either the Installation or Service level. The review is done in three comprehensive sections covering:

- HVAC Electrical Knowledge
- Gas Heat Specific Knowledge
- Hydronics Knowledge

### Hydronics Oil Service Certification Review

This review prepares technicians for the HVAC Excellence or NATE Hydronics Oil Service Certification exam at either the Installation or Service level. The review is done in three comprehensive sections covering:

- HVAC Electrical Knowledge
- Oil Heat Specific Knowledge
- Hydronics Knowledge

### Oil Heating (Air) Service Certification Review

This review prepares technicians for the HVAC Excellence or NATE Oil Heating (Air) Service Certification exam at either the Installation or Service level. The review is done in three comprehensive sections covering:

- HVAC Electrical Knowledge
- Air Side Knowledge
- Oil Heat Specific Knowledge


## TekAssist 30 Day Subscription

**Exam Prep Study Guides, Slides, and Sample Exam Questions**

To help experienced HVACR Technicians prepare for industry certification exams (especially NATE Core and Specialties), we have partnered with Jeff Taylor of TekAssist to bring you 30 days access to his library of extensive online downloadable study guides, instructional slide presentations, and online sample exam questions (with correct answer indicator) for almost any HVACR topic including:

- Core
- Air Conditioning
- Gas Heat
- Heat Pumps
- Air Distribution
- Commercial

Your enrollment in TekAssist includes access to everything in its entire library. It is a great way to prepare for any industry certification exam on a budget.

*Note: This 30 day online access is provided for industry certification exam preparation and knowledge refresh only. There are no instructors or student support services included, no grades, and no continuing education credits. All content is copyrighted to TekAssist.*

# EPA 608 Refrigerant Usage Certification

(30 days)

This course was created to help prepare the student for the EPA Section 608 Certification exam, in alignment with the very latest federal standards and requirements. The top level is packed with downloadable study guides, a video, and an EPA 608 Exam Prep Manual. The first module starts the student with the Core terms. The next three modules cover everything you need to know for Type I, II, and III certifications with a Terms Definitions Exercise and they end with a practice exam. Once the student has successfully completed this course, he/she will be well prepared for a successful exam to become an EPA 608 Licensed Technician. The online proctored EPA Exam is included with this course. The course is divided into the following sections:

- Resources
- Core
- Type I
- Type II
- Type III
- EPA Exam

# CONTINUING EDUCATION OFFERINGS

## Courses for Continuing Education Hours or Units (CEUs)

Each learner can access their course when it fits into their own schedule, as long as they are devoting about 6 hours of study time per week. This ensures course completion during the enrollment period. Learners have the freedom to move through their course more quickly when they have available study time. All courses include instructor support. If you have questions for the instructor, just send an e-mail and you will have an answer within 24 hours.

Our courses present specific HVACR concepts by incorporating some or all of the following: text reading assignments, web site tours, applied exercises, online quizzes, industry terminology definitions, video clips, animations, images and printable handouts. Each module concludes with a 20 question module-specific exam and the course may conclude with a 25 question comprehensive final exam. Students are required to earn a minimum score of 70% overall for successful course completion, and to complete the Online Learning Survey before a Certificate of Completion will be issued.

All courses are aligned with the National Standards for HVACR education and the Home Performance industry as formulated by numerous industry groups such as ACCA Quality Standards, AHRI, HVAC Excellence, PAHRA, PHCC, RSES, and others. Each course is recognized for NATE Continuing Education Hours applicable to re-certification (see each course description). Courses may also qualify for state and local re-licensure CEH's, and for state teaching certification renewal CEU's (check with your local agency for details and contact us if you need assistance).

Some course descriptions also describe the Recommended Prerequisites. Please refer to each course description in the Catalog for the specific details. Prerequisites are not required; however, you will find the Advanced course content challenging if you have not mastered the recommended prerequisites.

You may use your certificate(s) of completion to verify successful completion of a course by providing it to any of the following: your state's HVACR licensing board, state's board of education as credit toward renewal of a teaching certificate, national industry certification organizations (such as NATE) to be applied to re-certification, your employer to be used for advancement, or if you're enrolled in a state apprenticeship program-to the state office of apprenticeship as verification of successful completion of the re-quired course of study. You may also use certificates in your professional portfolio as part of maintaining, upskilling, or advancing job qualifications; or when job hunting.

# TECHNICIAN PROFESSIONAL DEVELOPMENT

(No admission process)

## Technical Core Assessment (TCA) - (*Create your own custom program)*

You get a Competency Based Professional Education Plan

If you are a technician, but you're not sure where to start, or what to study first, start with this online assessment of your current knowledge. Don't waste time taking classes you don't need. The TCA will reveal your strengths and weaknesses in nine CORE areas of HVACR, and indicate your readiness for industry certification exams such as HVAC Excellence, or NATE.

If you're a manager or supervisor, the TCA is a great way to establish a competency based training plan for new hires and existing technicians. It is a series of nine separate assessments focusing on HVACR Core knowledge areas. The questions for each assessment are randomly selected from a pool of qualified questions for that knowledge area. The TCA has a 30 day enrollment.

You must complete the nine Core Assessments to receive a Professional Education Plan (PEP). Remember, you have 30 days to take all nine. You'll receive an email with your results and PEP shortly after you complete the TCA. Your performance on the assessments will determine the structure of your PEP. It is not necessary to complete all nine assessments in one sitting or in any order, but you will want to complete each individual assessment in one sitting. Allow 30 minutes for each assessment. We recommend that you have a calculator, a watch or clock with a second hand, a pencil, and note paper to assist in completing the assessments.

Your Professional Education Plan is competency based training, customized for your needs. If you follow your plan and complete the courses or reviews listed on your PEP, it will bring your knowledge up to the industry standards for CORE knowledge excellence and prepare you for certification exams.

The knowledge areas covered are:

- Safety Assessment (Core) - 1 Question
- HVAC Efficiency Technician 2 (Core) - 12 Questions
- Electrical 1 Assessment (Core) - 20 Questions
- Electrical 2 Assessment (Core) - 20 Questions
- Electrical 3 Assessment (Core)- 20 Questions
- Electrical 4 Assessment (Core) - 20 Questions
- HVAC Physics Assessment (Core) - 20 Questions
- HVAC Air Properties Assessment (Core) - 20 Questions
- Refrigeration Cycle Assessment (Core) – 20 Questions

# Individual Courses

*Levels: Foundation, Intermediate, Advanced, Energy Efficient*

## 005 Heat Pump Water Heating (3 hours / 60 days)

*Provided by AO Smith and HVACRedu.net*

Heat pump water heaters are the most efficient type of electric water heater and are required under NAECA III for some applications. Heat pump water heaters are easy to install, but do require management of the condensation produced. Heat pump water heaters have built-in diagnostics to make troubleshooting easier. Most problems can be diagnosed with the built-in diagnostics and a multi-meter.
This comprehensive workshop is provided free of charge. It includes video modules that we recommend watching in order. At the end of this course, there is a certification test. Upon passing with a 70% on the test, you will be able to download your certificate in PDF form.

## 010 010 Employability Skills (9 hours / 60 days)

*Written by Patricia Leiser and Phil Rains*

Learn how to provide customers with first class customer service by becoming a valued employee, handling your paperwork and recordkeeping correctly, and communicating with your customers and co-workers in professional ways that develop return customers.

**Modules cover:**

- Personal Work Habits
- Industry Paperwork and Recordkeeping
- Communications & Work Relationships

## 015 015 Customer Service & Sales Skills (15 hours / 60 days)

*Written by Steve Coscia, CSP- President of Coscia Communications*

This course is a compilation of essential lessons on customer service/sales soft skills created by the preeminent leader in soft skills education, Steve Coscia. It provides the soft skills basics for technicians who want to make a positive first impression and differentiate their service delivery. You will improve your communication skills and know how to deliver more proactive and helpful service. This video series includes real situations along with explanations for how to satisfy customers throughout. Non-credit exam questions are built into the lesson to engage the student and ensure content retention. Each module is also followed by a credited and required exam. This course is presented in flash video format with modules covering the following topics:

**015-1 Contractor Soft Skills**
This informative lesson provides the soft skills basics for technicians who want to make a positive first impression and differentiate their service delivery. All content is based on actual customer encounters. Students will learn the importance of a positive attitude when serving customers.

- Courteous and Polite Behaviors
- The First Impression
- Balancing Empathy & Expertise
- Listening & Handling Stress

**015-2 Customer Service Superiority**
In this lesson, service professionals will improve their communication skills and convey a more proactive and helpful attitude by serving customers with urgency and empathy. First impressions matter. A service professional's role is more than solving problems and answering questions – it's also about adding value. This lesson features actual customer interactions that students will relate to and learn from.

- How to Add Value When Serving Customers
- The Four Parts of a Service Greeting
- How to Let Customers Hear Your Urgency When Helping Them
- How to Remain Calm When Serving Difficult Clients

**015-3 Customer Service Persuasion**
This lesson covers the persuasive behaviors that enable service professionals to convert customer inquiries into more business. The communication skills techniques in this lesson focus on relationships and delivering value, especially when customers ask about price. Actual customer inquiries are conveyed and analyzed in real time for the student's benefit.

- Gaining Self-Confidence and Being More Persuasive
- Improve from Transactional to Relational Service Events
- Dominate the Listening – Let Customers Talk
- Give Customers Options – Many Ways to Say "YES"

**015-4 Customer Service Teamwork**
This informative lesson provides the soft skills basics for technicians who want to improve their effectiveness and value as team members and leaders. All content is based on actual encounters within teamwork situations.

- Improve personal and team effectiveness and efficiency
- Learn conflict resolution skills
- Recognize importance of word usage in communication and understanding
- Recognize the value of empathy in teamwork situations.

**015-5 Customer Service Leadership**
This informative lesson provides the soft skills basics for technicians who want to make a positive first impression and enhance their customer service professionalism. All content is based on actual customer encounters.

- Effective introduction strategies.
- Expanded conflict resolution skills.
- Recognize the importance of awareness, perception and perspective.
- Recognize the value of objectivity in customer service situations.

**015-6 Customer Service Attitude**
This lesson focuses on how to establish a positive first impression by having a positive attitude and showing respect to your customer.

- Attitude
- Parking the Vehicle

OSHA

## OSHA 10-Hour Construction Safety

*Presented in partnership with ClickSafety.*

This OSHA 10-Hour Construction online course is a part of an OSHA outreach program that results in a valid DOL/OSHA 10-Hour Card. This online training course teaches recognition, avoidance, abatement, and prevention of safety and health hazards in workplaces. This course also provides information regarding workers' rights, employer responsibilities and how to file a complaint. It was designed to help workers stay up-to-date with their OSHA safety requirements. If you should fail the exam, OSHA requires that you re- purchase the course and re-take the exam from the beginning.

OSHA

## OSHA 30-Hour Construction Safety

*Presented in partnership with ClickSafety.*

This OSHA 30-Hour Construction Safety online course is OSHA-Authorized featuring the required steps for completing OSHA Outreach training. This online training covers everything from Electrical Hazard Safety to Fall Protection. Our OSHA 30-Hour Construction online course is a proven way to receive a valid OSHA 30-Hour Card and achieve the safety level required by your company for work in the construction industry. If you should fail the exam, OSHA requires that you re-purchase the course and re-take the exam from the beginning.

## 050 Applied Math (12 hours / 60 days)

*Written by Chris Compton*

A course designed to refresh and exercise common math concepts as applied to the HVACR workplace. This course provides demonstrations and exercises in the four basic math functions; addition, subtraction, multiplication and division. Each of the four functions is practiced using HVACR workplace applications. The course is offered without an instructor, but everything you need is included in the learning modules to refresh your working knowledge of basic math. Each of the four math functions are applied to:

- Whole numbers
- Fractions
- Decimals

Each module provides a tutorial that demonstrates how the specific process is performed and then followed with a selection of exercises to sharpen your skills. The correct answer is given after each of the exercise problems. The module is completed with a 10 randomly selected question exam. You will have 5 attempts at each exam to master math process assessed. Your highest score will be entered in your grade book.

**Modules cover:**

- Addition of Whole Numbers
- Subtraction of Whole Numbers
- Multiplication of Whole Nimbers
- Division of Whole Numbers
- Addition of Common Fractions
- Subtraction of Common Fractions
- Multiplication of Common Fractions
- Division of Common Fractions
- Addition of Decimal Fractions
- Subtraction of Decimal Fractions
- Multiplication of Decimal Fractions
- Division of Decimal Fractions

## BHE BHE Understanding HVAC Systems (3 hours / 30 days)

*Presented in partnership with Blue House Energy.*

Understanding HVAC Systems covers the fundamentals of how fuel is converted into energy, the types of space heating and cooling systems typically found in North American homes, and current ventilation system requirements for new construction. This mini-course has three modules.

Each module has a quiz at the end. You need a 70% grade or higher in the quiz at the end of each module to proceed to the next module (there is no limit on quiz attempts). There is no final exam on this course. This course is recognized for 3 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Fundamentals of Energy
- Mechanical Systems Overview
- Ventilation Requirements

## 101 101 Fundamentals (18 hours / 60 days)

*Written by Chris Compton*

An introduction to the HVACR basic fundamentals and terminology, and the applied physics concepts that are utilized in HVACR systems. Subjects include measurements, heat, pressure, gas properties, and air properties. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Measurements
- Heat Energy
- Pressure
- Gas Works
- Air Works
- Introduction to the Industry

## 103 103 Basic Sheet Metal (21 hours / 60 days)

*Written by Mark Clemons*

This course will assist HVAC Technicians and others involved in the HVAC industry with a basic understanding of sheet metal. Sheet metal work is essential to HVAC work. An HVAC tech doing a furnace change out, for instance, will need to fit the new furnace to the plenum which may involve designing or building an adapter. The idea of taking a flat piece of metal and forming it into something useful, functional or decorative can be one of the most fascinating aspects of HVAC work. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re- certification.

**Modules cover:**

- Types of Sheet Metal and Their Uses
- Assembling, Connecting, and Fastening Sheet Metal Components
- Sheet Metal Tools and Their Uses
- Sealing, Insulating and Lining Sheet Metal Ductwork
- Specifications, Symbols, and Codes
- Introduction to Sheet Metal Duct Layout and Fabrication
- Methods of Layout & Development

## 104 Copper Works (6 hours / 60 days)

*Written by Chris Compton*

Copper Works is different from all our other online courses because it was designed to provide specific guidance for students in a Copper Lab. It is rich with images and streaming videos that deliver the course content. There are two exams; one at the end of module 1, and the second at the end of module 3. If you are a technician who wants to improve your copper working skills without going to a classroom, this course is right for you. This course is recognized by NATE for 6 hours of continuing education (CEHs) applicable to re-certification.

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**Modules cover:**

- Copper Tubing/Pipe and Fittings
- Cutting, Flaring, Swaging & Bending Tubing
- Torch Safety and Operation
- Soft Solder
- Silphos Braze
- Silver Braze

## 106 Building Systems Review (3 hours / 30 days)

*Written by Scott Oakley*

This is an entry-level course in a single module designed for those who need a basic understanding of residential building construction assemblies, terms and materials, as they pertain to HVACR installation and service work on a jobsite. The content of this course follows the recommended topics for basic study of HVACR. With this introductory course a student will have a better understanding of many of the basic building construction methods and materials. The content covered is keyed to the specified HVACR industry competency and curriculum guidelines published by several organizations concerned about education provided to HVACR technicians: NATE (North American Technician Excellence), ARI (Air-conditioning and Refrigeration Institute), ACCA (Air Conditioning Contractors of America) . This course is NATE recognized for 3 hours of continuing education (CEHs) applicable to re-certification and RSES (Refrigeration Service Engineers Society).

## BHE Construction Technology (20 hours / 60 days)

*Presented in partnership with Blue House Energy.*

Construction Technology covers all the bases of today's industry; building science, indoor air quality and healthy indoor environments, air sealing and insulation, and mechanical systems. Each of the fourteen online learning modules includes a downloadable study guide. There is a review and quiz at the end of each module to help you gauge your understanding of the topics covered. You can review any section or topic in any module as many times as you require. However, once you have completed all fourteen modules within the 60 day access allowance, you take the final test, which you may only take once. A grade of at least 75% earns you a Certificate of Achievement. An additional benefit is that you will continue to have access for review of the online modules for a full 12 months after you complete the course. This course is NATE recognized for 20 hours of continuing education (CEHs) applicable to re-certification.

**Modules cover:**

- Introduction to Construction
- Technology
- Building Components
- Moisture Management
- House as a System
- Indoor Air Quality
- Healthy Housing
- Fundamentals of Air Sealing
- Strategies for Air Sealing
- Fundamentals of Insulation
- Strategies for Insulation
- Fundamentals of Windows & Doors
- Fundamentals of Energy
- Mechanical Systems Overview
- Ventilation Requirements

## 109 Basic Hand and Power Tools (6 hours / 60 days)

*Written by James Eller*

An introduction to the basic hand, power and specialty tools used daily by the working HVACR technician. The topics discussed include Installation, Service and Troubleshooting Tools. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Installation Hand Tools - Sheet Metal & Piping
- Electronic & Power Tools

## 110 Blueprints (12 hours / 60 days)

This online course provides an introduction to Blueprints used in construction specific to the heating, ventilation, and air conditioning systems that are likely to be found on the jobsite. HVACR Technicians need to understand how to read blueprints in order to perform their jobs and avoid errors. Subjects covered throughout this course include blueprint terms, symbols, interpretation and application of drawings; how to locate and identify the different components of a blueprint, scales of drawings, different measuring instruments; the meaning of different lines, markings, abbreviations, symbols, and keynotes; using gridlines to locate an area, caring for blueprints, and finally, how to measure for accuracy. This course is NATE recognized for 12 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Intro to Blueprints
- Components of the Blueprint & Scale
- Lines of Construction, Abbreviations, Symbols & Keynotes
- Using Gridlines to Identify Plan Locations & Dimensions

## 111 Electrical DC Theory Plus (18 hours / 60 days)

*Written by Chris Compton*

An introduction to basic electrical theory such as the electron, Ohms Law, circuit schematic symbols, circuit characteristics and measurements as applied to DC & AC circuits in the HVACR industry. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This online course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.The ESCO Electrical Theory and Application e-book is viewable in the course.

**Modules cover:**

- Electrical Safety Fundamentals
- What Is Energy
- Atomic Theory
- Basic Circuits
- Parallel Circuits
- Power

## 112 Electrical AC Theory Plus (18 hours / 60 days)

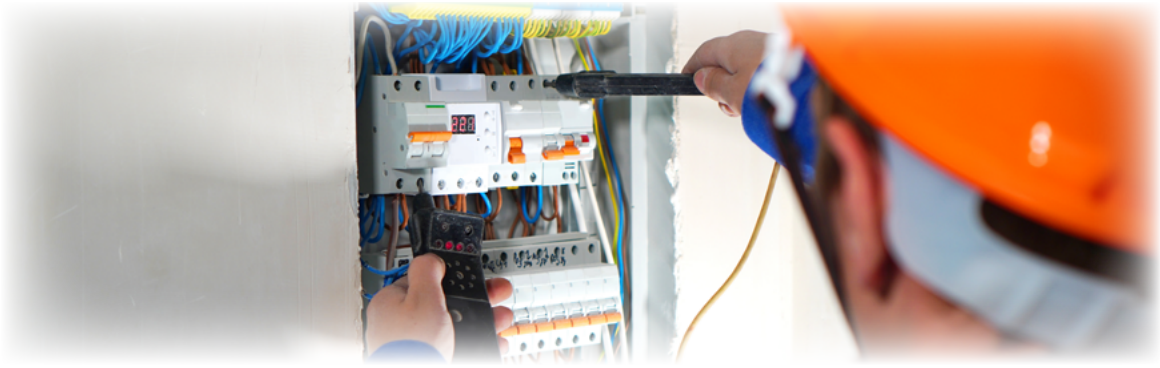
*Written by Chris Compton*

A continuation of the Electrical 111 course, concepts presented focus on alternating current production and application to devices utilized in HVACR systems. Topics include magnetism, alternating current, two types of loads, capacitors, and values of load devices and their calculations, and transformers. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. The ESCO Electrical Theory and Application e-book is viewable in the course.

**Modules cover:**

- Magnetism
- Alternating Current
- Loads, Resistive and Inductive
- Capacitors
- Resistance
- Transformers

**Recommended Prerequisites:** It is recommended that you have a good understanding of HVACR Fundamentals and Completion of 111 HVACR Electrical DC Theory Plus, or equivalent on the job training, prior to enrollment into this intermediate course.



## 113 Electrical Common Components (18 hours / 60 days)

*Written by Chris Compton*

A logical continuation of 112 Electrical, this course covers common control components found in HVACR systems. Presentations and examples are given for specific devices and their electrical sequence of operation in normal HVACR applications. The final modules discuss wiring and schematic reading. Instruction aligns with ANSI/ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Modules cover:**

- Control Methods, Temperature & Pressure
- Residential Heat / Cool Thermostats at Low Voltage
- Really Good Relay Stuff
- Contractors / Starters with protection
- Power wiring
- Odds and Ends Around a Schematic

**Recommended Prerequisites:** you will want to have completed 111 HVACR Electrical DC Theory Plus, and 112 HVACR Electrical AC Theory Plus, or have a working knowledge of the content of those courses prior to enrollment into this advanced course. Please refer to each course description in the Catalog for the specific details. 113 Electrical is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. The ESCO Electrical Theory and Application e-book is viewable in the course.

## 114 Electrical Motors (21 hours / 60 days)

*Written by Bob Recko and Bruce Aitken (module 7)*

This course is dedicated to common single-phase and small three- phase electric motors. Presentations focus on basic motor theory, common types of motors, starting components and protection devices. You will also develop diagnostic skills for motor troubleshooting and replacement. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Modules cover:**

- Basic Electric Motor Theory
- Open and Hermetic Motors
- Capacitor Motors
- Three-phase Motors
- The Application of Electric Motors
- Diagnosing and Replacing Electric Motors
- ECM Motors

**Recommended Prerequisites:** you will want to have completed 111 HVACR Electrical DC Theory Plus, 112 HVACR Electrical AC Theory Plus, and 113 HVACR Electrical Common Components, or have a working knowledge of the content of those courses prior to enrollment into this advanced course. Please refer to each course description in the Catalog for the specific details. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification. The ESCO Electrical Theory and Application e-book is viewable in the course.

## 121 Systems Air Properties and Measurement (18 hours / 60 days)

*Written by Chris Compton*

Your introduction to HVAC comfort systems. In this course we discuss heat energy, the conditions of human comfort, the psychrometric chart and plotting various air conditions upon it. Included is the top-rated eBook on the topic entitled, “Psychrometrics Without Tears” to help you digest the important concepts of air and how the various properties relate to each other. We complete the course by introducing the terms, concepts, measurements, and calculations of moving air.

**Modules cover:**

- Heat Energy and Comfort
- Properties of Air
- Psychrometrics
- Total Heat In Air
- Measureing a Heavy Invisible Moving Volume
- Air Flow Measurement

**Recommended Prerequisites**: It is recommended that you have a good understanding of HVACR Fundamentals and have a working knowledge of those topics prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

## 122 Systems: Load Calculations (18 hours / 60 days)

*Written by Phil Rains*

Residential load calculations is a method to determine the heating and cooling BTU/H loads of structures prior to installing HVACR systems to meet those loads. ***You will need the required text:*** Air Conditioning Contractors of America (ACCA) Manual J, 8th Abridged Edition (MJ8-AE). This manual provides thorough instructions for estimating heat loss and heat gain for residential structures and helps to simplify complicated procedures that are often used on a variety of home applications. 122 Systems provides instruction for completing load calculations by hand, which is necessary prior to attempting any computerized load program. We focus on following the concepts of MJ8-AE while further simplifying the methodology emphasized in the manual. Students will utilize a "simple" residential structure and follow the steps to calculate both heat loss and heat gain for its location and outdoor design temperatures. This course also covers residential equipment selection focused on the heating and cooling equipment Btu/h loads of a structure.

**Modules cover:**

- Fundamentals of Load Calculations
- Heat Loss of a Structure
- Heat Gain of a Structure
- Example Heat Loss & Heat Gain Calculation
- Fundamentals of Equipment Selection
- Regional Load Calculation Exercises

**Recommended Prerequisites**: You will want to have a strong working knowledge of HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

## 123 Air Distribution (18 hours / 60 days)

*Written by Phil Rains*

123 Air Distribution begins with an in-depth discussion of the fundamentals of residential air flow, then turns the focus to residential duct design utilizing the Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D (required textbook) and ACCA Manual T (optional textbook). System selection, system performance characteristics, duct materials, blower performance, air –side devices and duct sizing procedures are covered in detail.

**Recommended Prerequisites**: You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE recertification.

**Modules cover:**

- Fundamentals of Air Flow
- Air Distribution Systems
- Fundamentals of Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D
- Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D
- Application of Air Conditioning Contractors of America (ACCA) Residential Duct Systems, Manual D Duct Sizing Procedures
- Application of Air Conditioning Contractors of America (ACCA) Air Distribution Basics for Residential and Small Commercial Buildings, Manual T
- Selection and Sizing of Supply Air Outlets and Return Air Inlets using the ACCA Manual T and Air Distribution Equipment Manufacturer Performance Data for an Example Residential Structure

## 131 131 Oil Heat I (18 hours / 60 days)

*Written by Bob Recko*

This course introduces the concept of combustion in basic terms. The focus is on the current direct-vent systems and the traditional high-pressure gun burner. It will prepare technicians to install, maintain, and repair residential and small commercial burner systems up to 400,000 BTUs/hour. We explore all the mechanical, electrical, and accessory devices commonly found in modern fuel oil heating systems. With this knowledge, you will build troubleshooting skills and identify applicable codes as they pertain to the installation and use of these systems. The NORA Oil Heat Manual e-book is provided as a downloadable file.

**Modules cover:**

- Characteristics of Fuel Oil & Principles of Combustion
- Types & Construction of Oil Burners
- Oil Burner Anatomy (part one)
- Oil Burner Anatom (part two)
- Fuel Oil Tanks & Piping
- Complete Heating Systems

**Recommended Prerequisites:** It is recommended that you have a good understanding of HVACR Fundamentals and have a working knowledge those topics prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

## 133 133 Gas Heat I (18 hours / 60 days)

*Written by Bob Recko*

This course provides knowledge and skills required to become a highly skilled technician who will install, maintain, and repair residential and small commercial Gas Heat Systems. We explore all the mechanical, electrical, and accessory devices commonly found in the modern Gas Heating Systems. With this knowledge, you will build troubleshooting skills and identify applicable codes as they pertain to the installation and use of these systems. Also extremely important is the focus on safety for the technician, the building, and its occupants.

**Modules cover:**

- Fuel Gas Composition
- Pressure Regulators, Burners & Heat Exchangers
- Standing Pilot Systems
- Electronic Ignition
- High Efficiency Furnaces
- Troubleshooting Gas Burner Systems

**Recommended Prerequisites:** It is recommended that you have a good understanding of HVACR Fundamentals and have a working knowledge of those topics prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

## 135 135 Heat Pumps (21 hours / 60 days)

*Written by Phil Rains*

An introduction to reverse-cycle heat pumps used in residential and light commercial applications. The course covers components and operational differences of a heat pump vs. a straight air conditioning system, troubleshooting, and solutions. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- What is a Heat Pump?
- Heat Pump Installation & Quality Criteria
- The Heat Pump Cooling Mode
- The Heat Pump Heating Mode
- The Heat Pump Defrost Mode
- Heat Pump Components
- Heat Pump Troubleshooting

137

## 137 Geothermal Heat Pump Systems (18 hours / 60 days)

*Written by Phil Rains*

You will gain an introduction to geothermal heat pumps as one of the most efficient heating and cooling technologies available today. The course focuses on geothermal (water source) heat pumps utilized for residential and light commercial applications.

**Recommended Prerequisites**: You will want to have a strong working knowledge of basic HVACR fundamentals and a good understanding of the refrigeration cycle prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Introduction to Geothermal Heat Pumps
- Geothermal Heat Pumps Mechanics
- Ground-Water (Open-Loop) Systems
- Closed-Loop Systems
- Equipment Selection Criteria & Economics
- Installation Setup, Startup & Troubleshooting

138

## 138 Introduction to Mini Splits (15 hours / 60 days)

*Written by Ryan Findley*

The 138 Introduction to Mini Splits is an intermediate course, totaling 15 instructional hours. Students will take one module at a time, in a systematic progression that moves through foundational knowledge, into the specific technologies focusing on Mini / Multi Split Systems. This program is NATE recognized for 15 hours of continuing education hours (CEHs) which are applicable to NATE re-certification.

**Modules cover:**

- Mini Splits - Foundation
- Refrigeration – 1 to 1 Systems
- Mini-Split Controls and Electronics
- Installation Practice
- Installation Accessories

*"This class is designed to get you up to speed on one of the biggest trends in our industry.....the ductless mini split. My goal for this class is for you to understand the basic inner workings of a mini split and become familiar with the product line, it's uses, and what it's not well suited for. At the end of this class you should be able to find important manufacturer information, identify components that might differ from a regular split system, as well as learn what best practices are. If you have any questions, please feel free to reach out! Let's get started!"*

*- Ryan Findley, Instructor.*

## 139 Electric Heat (15 hours / 60 days)

This online course provides an introduction and advanced training on the topic of Electric Heat and Electric Heating components relative to the HVAC systems that are likely to be found by a Technician in residential and light commercial applications. Subjects covered in this course include electric heat terms and identification of the basic components utilized, types of electric heat systems, as well as advanced theory and servicing of Electric Forced Air Furnaces.

**Prerequisite**: It is recommended that you have a good understanding of HVACR Fundamentals and Electrical, or have a strong working knowledge of those topics, prior to enrollment into this advanced course. This course is NATE recognized for 15 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Introduction to HVAC Electric Heat Systems
- Troubleshooting & Servicing Electric Furnaces I
- Troubleshooting & Servicing Electric Furnaces II
- Blower Motors & Troubkeshooting Electrical
- Airflow Using Ohm's Law - Intro Quiz Review

## 141 Refrigeration I (18 hours / 60 days)

*Written by Chris Compton*

HVACR Refrigeration 141 provides a thorough examination of the refrigeration cycle as it is applied to both air conditioning and refrigeration purposes, and presents a practical and systematic method to diagnose problems in the refrigeration cycle. If you understand the parameters governing the operation of the refrigeration cycle, you will be able to diagnose any piece of equipment.

**Modules cover:**

- Basic Refrigeration Cycle Physics
- Condensation and Condensors
- Expansion and Metering Devices
- Evaporation and Evaporators
- Compression and Compressors
- Measure the Normal Cycle

**Prerequisite:** It is recommended that you have a good understanding of HVACR Fundamentals, or have a working knowledge of them, prior to enrollment into this intermediate course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

## 142 142 Refrigeration II (18 hours / 60 days)

*Written by Chris Compton*

This course is a continuation and elaboration of HVACR Refrigeration I. Presentations describe the application of common accessories found in a system, piping arrangements, sizing considerations and system operation. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Prerequisites:** You will want to have completed 141 HVACR Refrigeration I, or have a working knowledge of the content of that course prior to enrollment into this advanced course. Please refer to the 141 course description in the Catalog for specific details. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Refrigerants
- Common Compressor Accessories
- Common High-Side Accessories
- Common Low-Side Accessories
- Piping System Sizing
- Common System Control Arrangements

## 143 143 Leak Detection, Evacuation and Charging Systems

*Written by Scott Oakley*

**(9 hours / 30 days)**

Refrigerant leak detection, evacuation, and charging are critical to ensure the reliability of any refrigeration system. This advanced course leads you through the information and procedures you need to perform the necessary tasks in step-by-step detail. You will learn How to identify when and where there is a leak, Leak detection methods, Reasons for system evacuation, Operation of a Vacuum Pump, Operation of a Micron Gauge, Importance of the correct charge, and Methods used to check a charge. You'll acquire all the knowledge you need to do the job right. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180.

**Modules cover:**

- Refrigerant Leak Detection
- Evacuation
- Charging Systems

**Recommended Prerequisites:** You will want to have completed 141 HVACR Refrigeration I, and 142 HVACR Refrigeration II, or have a working knowledge of the content of those courses prior to enrollment into this advanced course. Please refer to the 141 & 142 course descriptions in the Catalog for specific details. This course is recognized for 9 hours of continuing education (CEHs) applicable to NATE re-certification.

## 153 153 Control Systems Fundamentals (18 hours / 60 days)

*Written by Ron Auvil*

This course is designed to introduce HVACR Technicians, and others involved in the HVACR industry, to the Fundamentals of HVACR Control Systems. Videos included! This course will prepare students with a strong understanding of typical HVAC mechanical systems in a commercial building environment. In turn, the student will gain an understanding of the different types of control systems and concepts used in these commercial buildings. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. This course is NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification. ***Required Text***: HVAC Control Systems' by Ronnie J Auvil 4th Edition.

**Main topics cover:**

- HVAC Fundamentals
- Commercial Building Heating Systems
- Commercial Building Cooling Systems
- IAQ and Commercial Air Handling Units
- HVAC System Energy Sources
- Control Principles

## 154 Control System Types and BAS Basics (18 hours / 60 days)

*Written by Ron Auvil*

This course is designed to introduce HVACR Technicians, and others involved in the HVACR industry, to Electrical and electronic control systems as used in commercial buildings and HVAC systems. Videos included! Building Automation systems will then be discussed in detail, starting with older systems and proceeding to today's modern web-based systems. The student will understand types and methods of operator interfaces in commercial buildings, as well as the different types of BAS inputs and outputs in detail. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Main Topics include:**

- Control Systems
- Electrical Control Systems
- Electronic Control Systems
- Building Automation Systems & Controllers
- Operator Interfaces
- Building Automation System Inputs & Outputs

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals and completion of 153 Controls Systems Fundamentals prior to enrollment into this course. This course is NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification. **Required Text:** HVAC Control Systems' by Ronnie J Auvil 4th Edition.

## 155 BAS Installation and Strategies (18 hours / 60 days)

*Written by Ron Auvil*

This course is designed to equip HVACR Technicians, and others involved in the HVACR industry, with the skills and understanding needed to install and program typical modern BAS equipment. Videos included! This will be done in a vendor-independent manner. VAV terminal box, Air Handling Unit, and Central Boiler/Chiller Plant Programming will be used as examples. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Main Topics include:**

- Building Automation System Installation, Wiring & Testing
- Computer Networks & Web Based Control
- Direct Digital Control Strategies
- Supervisory Control Strategies
- Building Automation Retrofit of Existing Systems
- Controller Programming

**Recommended Prerequisites:** Completion of 153 Controls Systems Fundamentals, and 154 Control Systems Types and BAS Basics prior to enrollment into this advanced course. This course is NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification. **Required Text:** HVAC Control Systems' by Ronnie J Auvil 4th Edition.

## 156 BAS System Management and Advanced Technologies

*Written by Ron Auvil*

**(15 hours / 60 days)**

This course is designed to equip HVACR Technicians, and others involved in the HVACR industry, with the knowledge needed to implement advanced strategies in BAS regarding alarms trends and energy saving features. This course will also equip the technician to perform basic service troubleshooting of BAS and understand the role and structure of interoperable systems including BACNET and LON. The student will then be able to work with commissioning agents to ensure proper BAS operation and implementation. Videos included! Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180.

**Modules cover:**

- Building System Management
- Energy Audits and Utility Structures
- Building Automation System Troubleshooting
- Building Automation System Interoperability-Advanced Technologies
- Building Commissioning

**Recommended Prerequisites:** Completion of 153 Controls Systems Fundamentals, and 154 Control Systems Types and BAS Basics, and 155 BAS Installation and Strategies prior to enrollment into this advanced course. Required Text: HVAC Control Systems' by Ronnie J Auvil 4th Edition. This course is NATE recognized for 15 hours of continuing education (CEHs) which are applicable to NATE re-certification. .

## 157 157 Troubleshooting DDC Systems & Components (21 hours / 60 days)

*Written by Ron Auvil*

Tap into the experience of a Pro! Videos included! This class is designed for advanced level technicians who want to learn and enhance their BAS/DDC Troubleshooting skills. Dozens of In-depth multiple field troubleshooting scenarios are covered in detail in a 'ride-along in the service van' format. All scenarios are derived from actual service calls. Upon completion of this course the technician will have covered a minimum 75% of the most common service calls on BAS/DDC. Videos and hands-on access to a control system will be used to enhance the learning experience as well!

**Prerequisite:** Successful completion of BAS Program 153-156 or Equivalent Field experience. **Required Text:** HVAC Control Systems' by Ronnie J Auvil 4th Edition. This course is NATE recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Main Topics include:**

- Troubleshooting Tools & Safety; Overview of "Typical" DDC System Today
- Input Troubleshooting with Multiple, Typical Field Scenarios
- Output Troubleshooting with Multiple, Typical Field Scenarios
- Field Controller Level Troubleshooting Part 1
- Field Controller Level Troubleshooting Part 2 with Multiple, Typical Field Scenarios
- Basic Web-Based Control Systems Troubleshooting Part 1
- Web-Based Control Systems Troubleshooting Part 2 with Multiple, Typical, Field Scenarios

## 158 158 Troubleshooting Variable Air Volume (VAV) Systems

*Written by Ron Auvil*

**(21 hours / 60 days)**

Variable Air Volume (VAV) Systems are the most common type of large commercial HVAC System in use today. This course is designed for advanced level technicians and building maintenance personnel who are responsible for troubleshooting these Variable Air Volume (VAV) systems. This course will start with an in-depth overview of the history and types of VAV systems. Next up is a list of common needed troubleshooting tools. Control system components and layouts to include pneumatic and DDC are given. VAV air handling units and sequences of operation of all major types are
covered in depth. The most common troubleshooting scenarios of VAV air handling units are described as well. The vast majority of VAV terminal Box types are thoroughly covered, as well as components and control sequences. The course will finish up with and in-depth multiple field troubleshooting scenarios which are represented in detail. All scenarios are derived from actual service calls. Upon completion of this course the technician will have been exposed to a minimum 75% of the most common service calls on VAV systems.

**Main Topics include:**

- Troubleshooting Tools & Safety; Overview of "Typical" DDC System Today
- Input Troubleshooting with Multiple, Typical Field Scenarios
- Output Troubleshooting with Multiple, Typical Field Scenarios
- Field Controller Level Troubleshooting Part 1
- Field Controller Level Troubleshooting Part 2 with Multiple, Typical Field Scenarios
- Basic Web-Based Control Systems Troubleshooting Part 1
- Web-Based Control Systems Troubleshooting Part 2 with Multiple, Typical Field Scenarios

**Prerequisite:** Successful completion of BAS Program 153-157 or Equivalent Field experience. No textbook is needed or used. Will be using field manual pdf's from various vendors. Actual Job Prints will be used as needed. This course is NATE recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re-certification.

## 159 159 IT for HVAC Technicians (21 hours / 60 days)

This course will prepare both HVAC and Controls Technicians to work on today's modern web-based systems in a commercial HVAC Control System. This course will provide technicians with an introduction to Ethernet networking concepts, hardware, configuration, and troubleshooting. This course is aimed at HVAC technicians servicing automated control systems that are based on networked controllers. We will cover the basic operation of an Ethernet- based network, servers, and software tools. We'll follow that with examples of the 19 most common causes of network problems, including their symptoms, diagnosis, and remedies. Professional relationships and collaboration with facility IT staff is emphasized throughout. This course is NATE recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Modules cover:**

- Introduction ; Networking Personnel and Networking Basics Part 1
- Networking Personnel and Networking Basics Part 2
- HVAC Control System Networks
- Client Computers
- Servers
- Wireless Networking: Hardware Troubleshooting Tools
- Software Troubleshooting Tools; Troubleshooting Scenarios

## 160 160 Pneumatic HVAC Controls (24 hours / 60 days)

*Written by Ron Auvil*

Pneumatic HVAC Control Systems were the predominant type of commercial building control system for many years. They are still around today in 20-30% of commercial buildings but the technicians that installed and serviced them have retired! An HVAC Technician needs to have a thorough understanding of these Pneumatic Control Systems to be able to effectively service this marketplace. The instructor of this online course, Ron Auvil, started his career exclusively as a pneumatic controls technician and has served as a pneumatics consultant and trainer for decades. He will pass along to you the tips and tricks that he learned from the 'Master Pneumatics Technicians' that he worked with for many years! This course is designed for advanced level technicians and building maintenance personnel who are responsible for servicing and troubleshooting these Pneumatic Control systems.

**Modules cover:**

- The Air Compressor Station Pneumatic Actuators, Dampers, & Valves
- Pneumatic Loads; Pneumatic Thermostats
- Pneumatic Transmitters
- Pneumatic Receiver Controllers
- Pneumatic Auxiliary Devices
- Pneumatic Prints and Applications
- Troubleshooting Pneumatic Controls

**Prerequisite:** Successful completion of BAS Program 153-157 or equivalent field experience. **Textbook:** "Pneumatic Controls" by RSES is required; access to the e-book is included and provided in the course. In addition, we will be using field manual pdf's from various vendors. Actual Job Prints will be used as needed. This course is NATE recognized for 24 hours of continuing education (CEHs) which are applicable to NATE re-certification.

## 161 161 Boilers I (18 hours / 60 days)

*Written by Ken Donovan*

An introduction to the concepts and terminology of heating and power boilers, focusing on commercial and industrial boilers.

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180. This course is recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Modules cover:**

- Introduction to the Industry
- Classifying Boilers
- Combustion
- The Heat Exchanger
- Controlling Energy Sources
- Boiler Accidents / Hazards

**Required Textbok:** Low Pressure Boilers, 4th Edition, 2012, Frederick M. Steingress, Daryl R. Walker
ISBN: 978-0-8269-43651

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## 171 Boilers Low Pressure License Prep (28 hours / 90 days)

*Written by Ken Donovan and Keith Conrod*

This course introduces the concepts and terminology of heating and power boilers, focusing on commercial and industrial boilers. The course covers the required knowledge for proper and safe low pressure boiler system operations and includes an introduction to hydronic heating systems. Students are enrolled for a 90 day term.

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180. This course is recognized for 28 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Modules cover:**

- Introduction to the Industry
- Classifying Boilers
- Combustion
- The Heat Exchanger
- Controlling Energy Sources
- Boiler Accidents / Hazards
- Pumps
- Heat Transfer Units
- System Accessories

**Required Textbok:** Low Pressure Boilers, 4th Edition, 2012, Frederick M. Steingress, Daryl R. Walker
ISBN: 978-0-8269-43651

## 186 Economizers ADEC / DCV (24 hours / 60 days)

HVAC Economizer systems are an often misunderstood, yet essential component of successful energy efficiency and air comfort/quality strategies in commercial building applications. The goal of this course is to provide the working field technician and HVAC student with an understanding of the importance of correctly installed and operating economizers, what they are, how they work, and how the service technician can maintain, troubleshoot, and ensure the correct operation of these systems. This course is applicable to Title 24 in the State of California, and adheres to the ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This Economizers ADEC / DCV course is NATE recognized for 24 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Introduction to Economizers
- Applied Economizers
- Air Properties and Psychrometrics
- Applied Psychrometrics
- Economizer DDC Operations - Honeywell
- Economizer Operations – Trane
- Belimo – ZIP Economizer
- Demand Control Ventilation (DCV)

## 191 Hydronics I (18 hours / 60 days)

*Written by Keith Conrod*

This course is designed to introduce students to the concepts and terminology of hydronic heating. The main focus will be on residential / small commercial installations. 191 begins a series of courses that address hot water heating systems.

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. **RECOMMENDED TEXTBOOK**:: *"Modern Hydronic Heating: For Residential and Light Commercial Buildings, Delmar, 3rd Edition" ISBN 13-9780766816374*

**Modules cover:**

- What is Hydronic Heating?
- Materials and Tools
- Boilers
- Pumps
- Heat Transfer Units
- System Accessories

## 201 High Efficiency HVAC (12 hours / 60 days)

*Written by Chris Compton*

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle service issues when required. The course begins with a basic introduction of the layout of the various components of an HVAC system utilized in large and small commercial facilities. Then the modules expand into the specifics of chilled water, refrigeration, and heat rejection systems. The course continues with a focus on central chiller, fan coils, and chilled beam systems. And the course finishes up with a focus on Demand Controlled Outside Air (DCOA), packaged and variable refrigerant flow systems.

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. This course is recognized for 12 hours of continuing education (CEHs) applicable to NATE re-certification.

**Module topics cover:**

- Introduction and Airside
- Chilled Water, Refrigeration &Heat Rejection
- Central Chiller, Fan Coil & Chilled Beam Systems
- DCOA, Packaged and Variable Refrigerant Flow Systems

## 202 High Efficiency HVAC System Maintenance – Central Chillers

*Written by Chris Compton*

**(6 hours / 30 days)**

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle service issues when required. The course focuses upon Commercial Central Chiller Systems, with a basic introduction as to the layout of the various components utilized in large and small commercial facilities. Then the modules expand into the specifics of chilled water systems and the required maintenance and record keeping to insure efficient operation of the Chiller Systems.

**Module topics cover:**

- Central Chiller Maintenance – Daily and Weekly
- Central Chiller Maintenance – Monthly and Annual

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

## 203 High Efficiency HVAC System Maintenance – Cooling Towers

**(6 hours / 30 days)**

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle service issues when required. The course focuses upon Commercial Cooling Tower Systems, with a basic introduction as to the layout of the various components utilized in large and small commercial facilities. Then the modules expand into the specifics of cooling towers and the required maintenance to insure efficient operation of the cooling tower systems.

**Module topics cover:**

- Cooling Tower Overview – Daily and Monthly Maintenance
- Cooling Tower Overview – Annual and Seasonal Maintenance

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

## 204 High Efficiency HVAC System Maintenance - Air Handlers and Roof Top Units

**(6 hours / 30 days)**

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle service issues when required. The course focuses upon Commercial Air Handlers and Roof Top Units, with a basic introduction as to the layout of the various components utilized in large and small commercial facilities. Then the modules expand into the specifics of each type of system and the required maintenance to insure efficient operation of Air Handlers and RTUs. .

**Module topics cover:**

- Air Handler Maintenance
- Maintenance of Roof Top Units

**Recommended Prerequisites:** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

## 205 205 High Efficiency Ventilation (9 hours / 30 days)

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle service issues when required. This course focuses upon Ventilation Systems in Commercial Buildings. An overview of the science and background of indoor air quality is first, then the course modules expand into the specifics of the components utilized in the operation of modern commercial building ventilation systems.

**Module topics cover:**

- Indoor Air Quality Overview
- Ventilation Systems I
- Ventilation Systems II

**Recommended Prerequisites:** you will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 9 hours of continuing education (CEHs) applicable to NATE re-certification.

## 221 221 Indoor Air Quality Basics (18 hours / 60 days)

*Written by John Kreiger and Chris Dorsi*

You already know it is your job to provide services related to the comfort of air temperatures inside your clients' buildings. However, temperature management is not the only thing you need to know. This course will help you better understand the various elements of air quality, introduce the science of air quality, and give you some tips on how to identify and address the potential dangers of poor indoor air quality. The course does not address issues of allergies or chemically sensitive clients outside the basics of indoor air quality. You will learn indoor air properties, air flow, ventilation, moisture, and air filtration systems. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Module topics cover:**

- IAQ Basics
- Properties of Air
- Air Flow Basics
- Ventilation
- Moisture Management
- Air Filtration

## 239 Everything About Belts (3 hours / 30 days)

This is an entry-level course in a single module designed for those who need a basic understanding of drive belts and how they are utilized in residential and commercial HVACR systems. Types of drive belts, their selection, installation and maintenance are discussed in detail. The content of this course follows the recommended topics for basic study of HVACR. This course is NATE recognized for 3 hours of continuing education (CEHs) applicable to re-certification.

## 241 Intro to Cooling System Troubleshooting (18 hours / 60 days)

*Written by Phil Rains*

This course is provided to instruct the entry level HVAC technician in the common service procedures performed on conventional residential/light commercial cooling systems. These include electrical circuits, mechanical compression refrigeration cycle, necessary components in a cooling system, and more. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites:** This course requires a good understanding of the refrigeration cycle. You will want to have completed 141 HVACR Refrigeration I, or have a working knowledge of the content of that course prior to enrollment into this advanced course. Please refer to the 141 course description in the Catalog for the specific details. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification.

**Module topics cover:**

- Cooling System Service Overview
- Cooling Service Tools/Equipment, Safety, and Quality
- Cooling System Components
- Cooling System Air Flow
- Cooling System Electrical Troubleshooting Basics
- Cooling System Mechanical Troubleshooting Basics

## 242 242 R-410A Refrigerant Technology (18 hours / 60 days)

*Written by Phil Rains*

This R-410A Qualification course [you will receive a uniform patch and a wallet card for 75% or higher scores] is designed to familiarize the technician with the differences between R-22 and R-410A. Background, regulations, impact on the industry, and application requirements are presented. The course provides the technician with practical knowledge for safe performance of service techniques on systems containing R-410A. When you have successfully completed this course, you will receive a certificate of completion that complies with many equipment manufacturers' policies requiring safety and service "certification" prior to purchasing equipment containing R-410A refrigerant. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Modules cover:**

- R - 410A Refrigerant Background
- R - 410A Refrigerant Regulatory Requirements
- R - 410A Refrigerant Basics
- R - 410A Refrigerant Safety, Handling & Service Equipment
- R - 410A System Components, Retrofitting, and Charging
- R - 410A System Operation & Troubleshooting

**Recommended Prerequisites:** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification. This course has been approved by International Comfort Products, LLC.

## 243 243 Advanced Troubleshooting (21 hours / 60 days)

*Written by Chris Hickman, James Eller, and Phil Rains*

This comprehensive course will help technicians move through a procedure to follow safety guidelines, identify the source of problems in HVACR systems, use diagnostic tools, and to address the problem properly. Often technicians start their investigation with only the customer's call, "It died yesterday!" Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

**Recommended Prerequisites** You will want to have a strong working knowledge of basic HVACR fundamentals prior to enrollment into this advanced course. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification.

**Modules cover:**

- Electrical Troubleshooting
- roubleshooting Controls
- Troubleshooting Instrumentation
- Troubleshooting Air Side
- Troubleshooting Refrigeration
- Troubleshooting Combustion
- Troubleshooting Hydronics

## 244 244 RSES Hydrocarbon Refrigerants Training (3 Instructional hours / 30 days)

The US Clean Air Act and the Environmental Protection Agency is phasing out ozone depleting refrigerants like R-22. As a result, technicians will be handling other refrigerants like Hydrocarbons. This course introduces you to hydrocarbons as refrigerants, covers the associated regulations and standards, and gets you familiar with their properties and how to handle them safely. In addition there is a summary of the refrigerant cycle as it relates to hydrocarbon refrigerants, system components, and the proper safe servicing procedures of hydrocarbon refrigerant systems.

**Course topics include:**

- Introduction to the use of Hydrocarbons as Refrigerants
- HC Regulations and Standards
- Refrigerant Properties and Safety
- The Refrigerant Cycle
- System Components
- Servicing Procedures

**Recommended Prerequisites:** you will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Course content was provided by RSES. This course is NATE recognized for 3 hours of continuing education (CEHs) applicable to re-certification. This course allows 30 days enrollment to complete.

## 245 Compressor Failure Analysis w/ Bob Feathers

*(Mr. Compressor)*

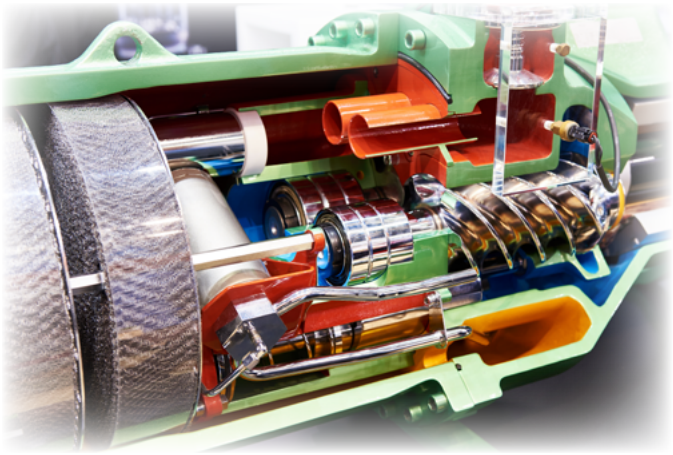
*Written by Bob Feathers and Chris Compton*

**(5 hours / 60 days)**

This is a 11 video / 5 hour series of Compressor tear downs performed by and commented on by Bob Feathers, also known as "*Mr. Compressor*". He dissects a range of manufacturer's reciprocating semi-hermetic commercial compressors that have failed and points out the clues that point to the reason for failure.

***"A Compressor Doesn't Fail, A System Fails"!*** - Chris Compton

**Prerequisites:** Because of the advanced topics discussed in this video series, it is recommended that you complete the first four courses of the Commercial Refrigeration Program. This course is recognized for 5 hours of continuing education (CEHs) applicable to NATE re-certification.



## 261 Commercial Boiler Fundamentals

**(6 hours / 30 days)**

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle maintenance and service issues when required. The course focuses upon Commercial Boiler Systems, with an introduction as to the various components and systems utilized in large and small commercial facilities.

**Module topics cover:**

- Large Boiler Overview
- Small Boilers

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

## 262 Industrial Steam Boiler Fundamentals

**(9 hours / 30 days)**

This course is aimed at providing maintenance staff an understanding of industrial boilers that generate steam and the related equipment, accessories, and controls for them. Some systems run on low pressure, others on high pressure; some use recirculated water, others use incoming water. Also, it is important to understand water treatment and chemical issues in steam systems.

**Module topics cover:**

- Small Boiler Overview
- Steam Boier Terms, Codes & Accessories
- Water Treatment for Steam Systems

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 9 hours of continuing education (CEHs) applicable to NATE re-certification.

## 263 263 High Efficiency Commercial Boilers (6 hours / 30 days)

This course is aimed at providing maintenance staff an understanding of the specific issues and advantages of high efficiency condensing boilers utilized in commercial hydronic and steam heating systems. Options such as economizers for large boiler systems and high efficiency venting for all systems are introduced. Related equipment, accessories, and controls are also discussed.

**Module topics cover:**

- Small Condensing Boilers
- High Efficiency Options for Larger Boilers

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE recertification.

## 264 264 Industrial Steam Boiler Maintenance (9 hours / 30 days)

Boilers work best when properly maintained. This course presents the necessary and recommended daily, weekly, monthly, semi-annual, annual, and contractor maintenance tasks; and shows best practices for documenting and record-keeping that the maintenance was performed on schedule. When performed properly and on schedule, the tasks contribute to keeping an industrial steam boiler system operating efficiently.

**Module topics cover:**

- Daily Maintenance and Record Keeping
- Industrial Steam Boiler Maintenance – Weekly & Monthly
- Industrial Steam Boiler Maintenance – Semi-Annual, Annual, and Contractors

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 9 hours of continuing education (CEHs) applicable to NATE re-certification.

## 265 265 Small Commercial Boiler Maintenance (3 hours / 30 days)

This course is contained in a single learning module. Small Commercial Boiler systems require scheduled maintenance and this course will offer students the basic steps for how to inspect boilers daily, monthly, and periodically. Guidance is provided for situations requiring extensive maintenance; when to notify third party service providers.

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 3 hours of continuing education (CEHs) applicable to NATE re-certification.

## 266 266 Large Commercial Boiler Maintenance (6 hours / 30 days)

This course provides instruction on how to inspect, perform simple maintenance checks, and keep accurate records on daily, weekly, monthly, and annual schedule. These tasks contribute to the Large Commercial Boiler System's efficient operation. The course also helps students identify when to call in third party service providers.

**Module topics cover:**

- Record Keeping and Daily-Weekly Maintenance
- Monthly-Annual Record Keeping and Maintenance

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

## 291 Commercial Water Heating (12 hours / 60 days)

The intent of this course is to give maintenance staff a feel for the equipment present in their buildings. With this understanding, you will be better able to perform and handle service issues when required. The course begins with a basic introduction to standard and high efficiency water heater systems utilized in large and small commercial facilities. Then the modules expand into the specifics of maintaining proper operation and maintenance of both types of systems.

**Module topics cover:**

- Water Heating Fundamentals
- High Efficiency Water Heating
- Water Heating Maintenance
- High Efficiency Water Heating Maintenance

**Recommended Prerequisites** You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. Instruction aligns with ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 12 hours of continuing education (CEHs) applicable to NATE re-certification.

## 292 Water Treatment for HVACR Systems (24 hours / 60 days)

Water is a major component in many types of HVACR systems. The quality and suitability of that water is critical to ensure the reliable and efficient operation of those systems. This intermediate level course introduces you to the concepts, information and procedures you need to know to understand the importance of water quality. You will learn, in detail, about the attributes of water and its relationship to HVACR systems. Specific water quality requirements are discussed and methods of controlling and creating suitable water quality conditions are introduced. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180. This course is recognized for 24 hours of continuing education (CEHs) applicable to NATE re-certification.

**Module topics cover:**

- Hydrologic Cycle
- Chemistry of Water
- Solubility
- Evaporation and Solubility
- Heating Maintenance
- Makeup, Blowdown and More
- Pretreatment
- Limits and Sampling
- Testing

## 293 Water Treatment for HVACR Systems II (21 hours / 60 days)

Water is a major component in many types of HVACR systems. The quality and suitability of that water is critical to ensure the reliable and efficient operation of those systems. This intermediate levelcourse introduces you to the concepts, information and procedures you need to know to understand the importance of water quality. You will learn, in detail, about the attributes of water and its relationship to HVACR systems. Specific water quality requirements are discussed and methods of controlling and creating suitable water quality conditions are introduced. Instruction aligns with ACCA Quality Installation and ACCA/ ASHRAE Standard 180. This course is recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification..

**Module topics cover:**

- Scale and Corrosion Control
- Microbiological Control
- Cooling System Types and Issues
- Cooling System Treatment and Testing
- Boiler Treatment – Types of Boilers
- Boiler Water Treatment History
- Boiler Treatment Course

## 402 Packaged Chillers: 25 - 150 Tons (9 hours / 30 days)

*Written by Ron Auvil*

This course is designed for advanced level technicians and building maintenance personnel who are responsible for operation, maintenance, and troubleshooting of chiller systems in commercial buildings. Packaged chillers such as those used in small and medium tonnage applications will be covered in this course. Emphasis will be given to operating characteristics, main components, maintenance, control, and troubleshooting. This course is recognized for 9 hours on continuing education, (CEHs), applicable to NATE re-certification.

**Modules cover:**

- Introduction; AHU and Chilled Water System Overview
- Packaged Air-Cooled Chillers
- Packaged Chiller Control, Operation, and Maintenance

## 403 Water Cooled Mid & Large Tonnage Chillers 150+ Tons

*Written by Ron Auvil*

**(15 hours / 60 days)**

This course is designed for advanced level technicians and building maintenance personnel who are responsible for operation, maintenance, and troubleshooting of chiller systems in commercial buildings. We will cover larger chiller systems, to include screw and centrifugal chillers, as well as cooling towers. Emphasis will be given to operating characteristics, main components, maintenance, control, and troubleshooting. The vast majority of chiller types are thoroughly covered, as well as components and control sequences. The course will finish up with detailed, in-depth multiple field troubleshooting scenarios. All scenarios are derived from actual service calls. Upon completion of this course the technician will have been exposed to a minimum 70% of the most common service calls on commercial chiller systems. The prerequisites are successful completion of the 402 HVACR Packaged Chillers 25 – 150 Tons Course or equivalent field experience. This course is recognized for 15 hours of continuing education, (CEHs), applicable to NATE re-certification.

**Modules cover:**

- Centrifugal Chillers
- Screw Chillers
- Cooling Towers
- Typical Chiller Plant Layout
- Mid and Large Tonnage Chiller Diagnostics and Troubleshooting

## 410 Metasys Basic Operator (21 hours / 60 days)

*Written by Ron Auvil*

This hands-on course will train building personnel to make the most effective and efficient use of the common features of the Metasys system extended architecture facility management system. This course is NATE recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Prerequisite:** Fundamental understanding of computer use

**COURSE TOPICS:**

- Metasys System Extended Architecture Overview
- Basic Navigation of the System with the User Interface
- Command Objects
- Scheduling
- Alarms
- Trending

**Note: Your instructor, Ron Auvil, has taught thousands of Metasys Operators across the US over the past 20+ years.**

**About The Instructor:**

Ron Auvil has 42+ years of HVAC and Controls Experience. This includes 38 years teaching experience. He has worked as a senior controls technician for Johnson Controls. He has also taught HVAC controls classes across the United States for Johnson Controls, Honeywell, and others. He has written the definitive textbook on pneumatic and DDC control systems 'HVAC Control Systems' 4th Edition, from American Technical Publishers.

## 411 411 JCI HVAC PRO - N2 ASC Controllers (21 hours / 60 days)

*Written by Ron Auvil*

This course will train building personnel to upload, download, commission, and troubleshoot the most common problems with UNT, VAV, VMA, and AHU Controllers. This course is NATE recognized for 21 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Prerequisites:** Basic Computer and HVAC Systems Knowledge. To complete the hands on activities the student will need a functioning ASC Controller, N2 interface device, and a computer with HVAC Pro software.

**COURSE TOPICS:**

- Introduction and Product Overview; File Types and Locations
- HVAC Pro Overview
- Downloading and Commissioning ASC's
- UNT Controller
- VAV Controller
- VMA Controller
- AHU Controller; Sideloops

**Note: Your instructor, Ron Auvil, has taught this topic to thousands of JCI Technicians and end-users over the past 20 years.**

**About The Instructor:**
Ron Auvil has 42+ years of HVAC and Controls Experience. This includes 38 years teaching experience. He has worked as a senior controls technician for Johnson Controls. He has also taught HVAC controls classes across the United States for Johnson Controls, Honeywell, and others. He has written the definitive textbook on pneumatic and DDC control systems 'HVAC Control Systems' 4th Edition, from American Technical Publishers.

## 412 412 Johnson Controls DX 9100 Controllers - Operations and Service

*Written by Ron Auvil* **(24 hours / 60 days)**

If you want to troubleshoot and service Johnson Controls DX-9100 Controllers this class is for you! Emphasis is placed on real world troubleshooting and operation scenarios. This course is NATE recognized for 24 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Prerequisites:** Basic Computer and HVAC System Knowledge; To complete the hands-on activities the student will need a functioning DX-9100, N2 interface device, and a computer with GX-9100..

**COURSE TOPICS:**

- Introduction; DX and XT/XP Hardware
- DX Keypad/Display; Viewing and Calibrating DX Controllers
- Creating and Downloading DX Applications
- Creating Inputs and Constantss
- Creating Outputs and Expansion Points
- PID's and Other Control Modules;
- Numeric Module Overview
- PLC Logic

**About The Instructor:**
*Ron Auvil has 42+ years of HVAC and Controls Experience. This includes 38 years teaching experience. He has worked as a senior controls technician for Johnson Controls. He has also taught HVAC controls classes across the United States for Johnson Controls, Honeywell and others. He has written the definitive textbook on pneumatic and DDC control systems 'HVAC Control Systems' 4th Edition, from American Technical Publishers.*

## 413 413 JCI PCT/CCT MSTP Controllers (24 hours / 60 days)

*Written by Ron Auvil*

This course is designed for those who need to know the basics of using the PCT Tool. This course is NATE recognized for 24 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**Prerequisites:** Basic computer knowledge and HVAC Systems knowledge. To complete the hands on activities the student will need a functioning MSTP controller, MAP sensor, and computer with PCT or CCT.

Participants will receive an overview of the Facility Explorer MSTP Field Controller system, create programs from standard tree systems using the programmable Controller and Commissioning Tool, then connect using the MAP sensor to upload and download code into the controllers after setting up the hardware and software to communicate properly.

**COURSE TOPICS:**

- Introduction and MSTP Product Overview
- Communications/MAP Gateway/Bluetooth
- PCG Hardware
- Creating and Simulating Programs Using Standards Tree
- Upload – Download
- Simulation and Commissioning
- PCV VAV Box Controllers; PCX Expansion Modules; PCA - Advanced Controllers
- Adding and Modifying IO Sideloops

**Note: Your instructor, Ron Auvil, has taught this topic to thousands of JCI Technicians and end-users over the past 20 years.**

**About The Instructor:**

*Ron Auvil has over 40 years of HVAC and Controls Experience. He has worked as a senior controls technician for Johnson Controls. He has also taught HVAC and Controls classes across the United States for Johnson Controls, Honeywell, and others. He has written several textbooks; 'HVAC and Refrigeration Systems', 'HVAC Control Systems' and 'IT for HVAC Technicians', all both from American Technical Publishers.*

## 421 421 Commercial HVAC Bootcamp

*(18 hours / Intermediate)*

This six module series is designed for new hires and those transitioning from residential systems to commercial building HVAC and control systems. Common HVAC mechanical and control system types and configurations are presented and discussed. The course is generic and not focused on one manufacturer or type. Emphasis is put on real-world troubleshooting and operation scenarios. It will cover common commercial HVAC systems and multiple generations of controls.

*The modules making up the course are:*

- Introduction to Commercial Buildings and Comfort
- AHU Configurations; Economizers and Mixed Air Systems.
- Control systems
- VAV Boxes
- Chilled Water Systems
- Boilers

*Ron Auvil has over 40 years of HVAC and controls experience. He has worked as a Senior Controls Technician for Johnson Controls. He has also taught HVAC and Controls classes across the United States for Johnson Controls, Honeywell, and others. Mr. Auvil is a member of the faculty and has authored several courses currently available from HVACRedu.net. These include the Building Automation Systems series and many others. He has written extensively, including the textbooks 'HVAC and Refrigeration Systems' and 'HVAC Control Systems' both from American Technical Publishers.*

422

## 422 DDC Bootcamp

*(18 hours / Intermediate)*

The vast majority of commercial buildings today utilize Direct Digital Control (DDC) systems. Any technician working in a commercial building must have a basic understanding of these systems. Technicians choosing a career path in controls must have an even greater understanding of these systems.

This six module series is designed for new hires and those transitioning from residential systems to commercial building HVAC and control systems. Direct Digital Control system types and configurations are presented and discussed. The course is generic and not focused on one manufacturer or type. Emphasis is put on real-world troubleshooting and operation scenarios. It will cover common commercial HVAC systems and multiple generations of controls.

*The modules making up the course are:*

- Overview of Typical System Today
- Field Controllers
- Inputs
- Outputs
- Control Strategies and Operator Tasks
- Web Based Control Systems

*Ron Auvil has over 40 years of HVAC and controls experience. He has worked as a Senior Controls Technician for Johnson Controls. He has also taught HVAC and Controls classes across the United States for Johnson Controls, Honeywell, and others. Mr. Auvil is a member of the faculty and has authored several courses currently available from HVACRedu.net. These include the Building Automation Systems series and many others. He has written extensively, including the textbooks 'HVAC and Refrigeration Systems' and 'HVAC Control Systems' both from American Technical Publishers.*

## 441 441 Commercial Refrigeration I (24 hours / 60 days)

*Written by Dick Wirz*

We will compare things you're already familiar with like space temperatures and common components of basic AC systems to those of commercial refrigeration systems. We will examine evaporators, condensers, compressors, metering devices, controls and accessories, and the refrigerants commonly used in commercial refrigeration. We will review the important terminology. At the end of this course we will cover some system troubleshooting, giving you a chance to put your knowledge to work on the 9 most common system problems. And you will understand when to apply TROT (The Rule Of Thumb) in the absence of a manufacturer's recommendation.

**Recommended Prerequisites**: You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this advanced course. This course is recognized for 24 hours of continuing education (CEHs) applicable to NATE re-certification. **Required Text:** Commercial Refrigeration for HVACR Technicians – by Dick Wirz.

**Modules cover:**

- Refrigeration Principles
- Evaporators
- Condensers
- Compressors
- Metering Devices
- Controls and Accessories
- Refrigeration System Troubleshooting Part 1
- Refrigeration System Troubleshooting Part 2

## 442 442 Commercial Refrigeration II (18 hours / 60 days)

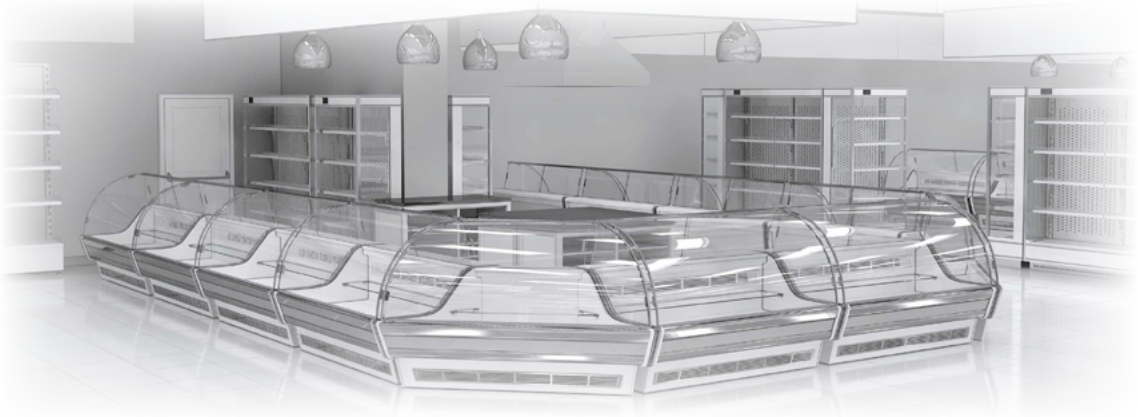
*Written by Dick Wirz*

This course is a continuation of 441 HVACR Commercial Refrigeration I. Again, we will compare things you're already familiar with like basic AC systems to those of commercial refrigeration systems. We will examine compressor motor controls, retrofitting, recovery, evacuation, and charging; various supermarket refrigeration systems, walk-in refrigerators and freezers, and commercial ice machines so you can identify the components, their functions, and the refrigerants belonging with each application. After you have a good understanding of the equipment, we'll explore appropriate temperatures for products kept in that equipment. And finally, you will understand when to apply TROT (The Rule Of Thumb) in the absence of a manufacturer's recommendation.

**Modules cover:**

- Compressor Motor Controls
- Retrofitting, Recovery, Evacuation, and Charging
- Supermarket Refrigeration
- Walk-in Refrigerators and Freezers
- Ice Machines
- Product Temperatures for Preservation and Health – Refrigeration Business Tips

**Recommended Prerequisites**: You will need a strong working knowledge of HVACR Fundamentals prior to enrollment into this course. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. Required Text: Commercial Refrigeration for HVACR Technicians – by Dick Wirz



# 444 [444 Rack Tech Program](#) (30 hours / 90 days)

*Written by Bob Feathers*

The 444 Rack Tech is an advanced program totaling 30 instructional hours. Students will take one course at a time in a systematic progression that moves through market refrigeration and the specific technologies focusing on Parallel and Unparallel Rack Systems and Applications.

The need for Refrigeration Mechanics is ever evolving:

- Old systems still need to be maintained.
- Retrofit opportunities.
- New technologies and refrigerant requirements.
- System controls / Energy savings.
- Food safety and monitoring are very important.

This program is NATE recognized for 30 hours of continuing education (CEHs) which are applicable to NATE re-certification.

**The modules making up the Program are:**

- Intro to Supermarket Applications I
- Intro to Supermarket Applications II
- Oil Management
- Head Pressure Control
- Heat Reclaim
- Liquid Distribution
- Case Temp Control
- Defrost Applications
- Compressor Protection
- System Capacity Control

**Prerequisites:** This advanced program is designed for HVACR technicians, facilities managers, and commercial maintenance technicians who have already completed an educational program for HVACR and/or have current industry work experience in the field. The program will build on your existing knowledge of HVACR fundamentals and equipment and help you learn commercial supermarket applications and systems.

306

## 306 Operations Management (18 hours / 60 days)

*Written by Larrie Mendoza, Phil Rains, and Bill Parlapiano*

As a contractor or operations manager, there are many challenging elements to overseeing your HVACR work flow. It's up to you to establish and follow-through on business practices that make your company profitable. This course will help by addressing the best practices in the primary areas of your company's operations that impact your profit margin. You will learn basic business practices and procedures to help manage your work flow, maximize resources and minimize delays and loss of time. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE.

**Module topics cover:**

- Personnel Management and Communication Skills
- Design Criteria
- Installation
- Materials Management
- Resource Scheduling - Cost Management Awareness
- Industry Paperwork and Recordkeeping

310

## 310 Product & Service Pricing for Profit (15 hours / 60 days)

*Written by Tom Grandy*

This is the first in a series of Online Courses for Contracting Businesses, developed in collaboration with nationally acclaimed Grandy and Associates. This 15 hour course covers everything you need to calculate a realistic hourly rate for your installation and service jobs; budgeting and cash flow; equipment replacement costs; field labor costs; material sales; customer response cards; discussion of flat rate pricing; overhead; company matching taxes; fixed and variable overhead; net profit; overhead absorption; break-even rate; markup vs. profit; calculation of hourly rate; overhead cost per hour and an evaluation of the "what if" process. This course is specifically designed to help you consider all the costs of running a profitable business and setting your pricing at levels that keep your business going and growing.

**Module topics cover:**

- Budgeting and Cash Flow
- Equipment and Replacement Costs
- Field Labor Costs
- Material Sales – Overhead Costs
- Net Profit

311

## 311 Fifteen Things All Successful Companies Have in Common

*Written by Tom Grandy*

**(15 hours / 60 days)**

This is the second in a series of Online Courses for Contracting Businesses, developed in collaboration with nationally acclaimed Grandy and Associates. This 15 hour course describes in detail what all successful companies have learned; "what it takes to survive and prosper". The five modules cover the 15 important topics that every business must know to make it in the Contracting Industry. Each topic provides a fresh insight into how to run a very profitable business in today's marketplace. We saved the best for last, which is the section on tax tips --***this section alone will provide enough tax savings to pay for this program.*** At the end of each section there is a list of additional resources to expand your knowledge of that subject.

**Module topics cover:**

- Realistic Labor Rates; Budgeting; Business Plan
- Marketing Plan; Marketing Tools; Collections Policy
- Networking, Planning for Growth; Maintenance Agreement Program
- Company Newsletter, Flat Rate Pricing; Customer Response Cards
- Customer Service Training, Bank Line of Credit, Tax Minimization Plan

101-S

## 101 Principios Básicos (18 horas / 60 dias)

*Escrito por Chris Compton*

Este curso en línea ofrece una introducción a los fundamentos básicos y la terminología de HVACR. El contenido del curso se dedica a aplicar conceptos físicos que se utilizan en sistemas de HVACR. Se tratan los temas de las mediciones, el calor, la presión, y las propiedades del gas y del aire. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento, e incluye tutoriales de RSES. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

**Módulos incluyen:**

- Mediciones
- Energía Térmica
- Presión
- Propiedades de Gas
- Propiedades de aire
- Introducción a la industria HVACR

111-S

## 111 Electricidad - Teoría y más de la corriente continua

*Escrito por Chris Compton*

**(18 horas / 60 dias)**

Este curso en línea es una introducción a la teoría eléctrica, como el electrón, la ley de Ohm, los símbolos del esquema del circuito, los características del circuito y las medidas que se aplican a los circuitos CC Y CA en la industria HVACR. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento, e incluye tutoriales de RSES. Este curso en línea es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

**Módulos incluyen:**

- Fundamentos de la seguridad eléctrica
- ¿Qué es la energía?
- Teoría atómica
- Circuitos básicos
- Circuitos en paralelo
- Potencia

112-S

## 112 Electricidad – Teoría y más de corriente alterna

*Escrito por Chris Compton*

**(18 horas / 60 dias)**

Una continuación en línea del curso 111 Electricidad, los conceptos que se presentan y analizan son orientados a la producción de la corriente alterna y su aplicación a los dispositivos utilizados en sistemas de HVACR. Cubriremos el magnetismo, la corriente alterna, dos tipos de cargas, los condensadores, y los valores de los dispositivos de carga y sus cálculos, además de los transformadores.

**Curso Previo Recomendado:** Se recomienda que tenga un buen conocimiento de los fundamentos de la teoría de corriente continua como lo tratado en el curso 111, o entrenamiento en el trabajo antes de hacer este curso. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

**Módulos incluyen:**

- Magnetismo
- Corriente alterna
- Cargas resistivas e inductivas
- Condensadores
- Resistencia
- Transformadores

## 121-S 121 Sistemas - propiedades y medición del aire (18 horas / 60 dias)

*Escrito por Chris Compton*

Este curso en línea es la introducción de sistemas de confort de HVAC. En este curso trataremos la energía térmica, las condiciones de confort humano, el gráfico de la psicrometría y el trazado de diversas condiciones de aire. Vamos a completar el curso con la introducción de los términos, conceptos, mediciones y cálculos del aire en movimiento. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento.

**Módulos incluyen:**

- Energía térmica y confort
- Propiedades del Aire
- Psicrometría
- Calor total del aire
- Medir un pesado volumen invisible en movimiento
- Medición del caudal de aire

**Curso Previo Recomendado:** Se recomienda que tenga un buen conocimiento de los fundamentos básicos de HVACR, o entrenamiento en el trabajo antes de hacer este curso. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE.

## 141-S 141 Refrigeración I (18 horas / 60 dias)

*Escrito por Chris Compton*

141 HVACR Refrigeración se ha diseñado para proporcionar un análisis exhaustivo del circuito de refrigerante, ya que se aplica a ambos aire acondicionado y refrigeración, y para proporcionar un método práctico y sistemático para el diagnóstico de problemas en el circuito de refrigerante. Si entiende los parámetros que rigen el funcionamiento del circuito de fluido refrigerante, será capaz de diagnosticar cualquier tipo de equipo. La instrucción se alinea con las normas de ACCA para la instalación de calidad y el mantenimiento.

**Módulos incluyen:**

- Física básica del ciclo de refrigeración
- Condensación y condensadores
- Dispositivos de expansión y medición
- Evaporación y evaporadores
- Compresión y compresores
- Medir el ciclo normal

**Curso Previo Recomendado:** Se recomienda que tenga un buen conocimiento de los fundamentos básicos de HVACR, o entrenamiento en el trabajo antes de hacer este curso. Este curso es reconocido por 18 horas de educación continua (CEHs) aplicables a la re-certificación de NATE


## Online Faculty, Student Services, and Tech Support

**Online Faculty**

When HVACR industry professionals reach the pinnacle of their careers, they come teach with HVACRedu.net! We've been graced with an exceptional group of professionals, here to share their vast knowledge with you. Not only have they written the course content, but they teach it as well. You can learn online, watch their videos, and read their textbooks as you immerse yourself in the experience and knowledge of the best in the industry. If you have questions while enrolled in a course, just email, chat, or phone your instructor who will get back to you within 24 hours during regular business hours (maybe longer on weekends). Instructors hold many industry credentials including the Certified Master HVACR Educator (CMHE), and have completed an online training program for faculty. Together, they have vast years of work experience, and are dedicated to working hard to keep your learning on track.

**Student Services Crew**

Our Student Services Crew ensures a smooth enrollment process, and they personally answer your questions along the way. They monitor student activity and progress in each course and reach out to any students who appear to be struggling, before they get too far behind. They help students progress through their courses and programs and help whenever special circumstances come up that interrupt or delay a student's learning. They have become known as the "nice ladies" of HVACRedu.net. One of their areas of specialty is to stay in touch with employers who have enrolled one or more of their technicians in a training program. They provide the employer with activity and progress reports along the way. They also celebrate students when they complete their studies. This group of professionals is the reason HVACRedu.net stands out above the competition and the reason so many of our students successfully complete their learning.

**Tech Support**

Sometimes the electronic world can be glitchy, especially if you're new to using your computer for learning online. If something wacky happens, you can bet our team of technology specialists can quickly find the solution for you.

Student Handbooks are available for each situation. . . from individual course enrollments all the way through comprehensive career educational programs. If you would like a handbook before you enroll, but you couldn't find it, just let us know and we'll email it to you. info@hvacredu.net

# Subscription Program

You can access our entire Subscription Catalog, over 800 hours of online Assessments, Courses, Continuing Education Units, and Reviews **for an entire year** (one course at a time, of course). Learn and earn the credentials that prove you and your technicians are the best. Click here for the Annual Subscription Catalog to see everything that is included in this program.

You and your technicians can prepare for:

- Technical Competency
- State licensing exams
- EPA—Environmental Protection Agency 608
- HVAC Excellence
- NATE-- North American Technician Excellence
- R-410A Refrigerant Handling Qualification

1. All our online courses are asynchronous - available 24 hours every day, no waiting for a course to begin, no travel.
2. We assess student learning at the end of each learning module and at the end of each course topic.
3. So that you know your investment is well spent, we provide the employer with student tracking and notifications every 14 days. Progress reports upon request.
4. Mile Markers—students earn a Certificate of Completion for each course successfully completed at 75% or above.
5. Technicians may refresh/review just before sitting for exams—online reviews increase their chance for success.
6. Technicians can add more industry certifications or knowledge of special areas of HVACR by choosing additional online courses from our Subscription Catalog.
7. Courses include audio and video elements, simulations, handouts, and more.
8. Each learner can access their course when it fits into their own schedule, as long as they are devoting about 6 hours of study time per week. This ensures course completion during the enrollment period. Learners have the freedom to move through their course more quickly when they have available study time
9. You have phone and email access to an instructor to assist / mentor with any course.
10. New courses are continually being developed to meet the educational needs of our ever-expanding industry.

***RULES: This program offers a great price for the best online technician training, and there are a few rules.***

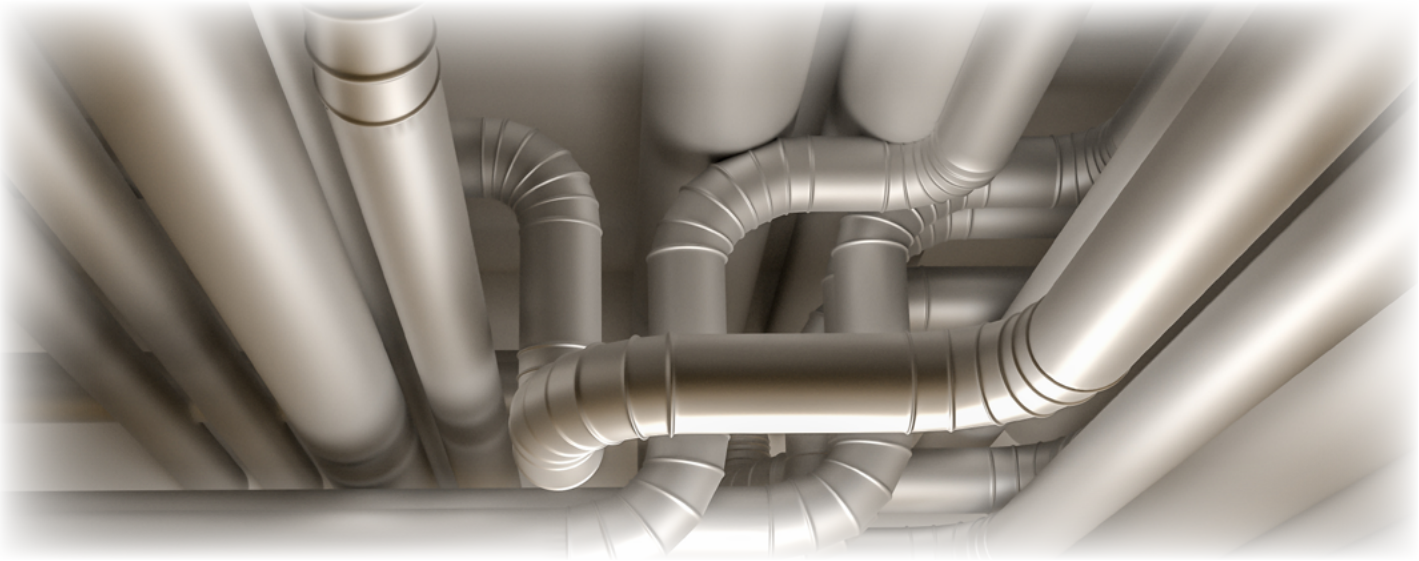
1. The start date of the one-year (365 days) annual subscription begins on the date payment is received.
2. Additional technicians may be added at any time at the same price.
3. Each technician may enroll in only one course at a time.
4. Advanced technicians, who already hold NATE or HVAC Excellence Certifications, are free to select any course to earn CEU's or to refresh, expand, or upskill current knowledge.
5. Enrolled Contractors / Owners / Supervisors are free to select any course.
6. You will be automatically enrolled into the Subscription Lobby upon completion of payment. Here you will find the required Orientation course followed by access to any course in the subscription catalog. No need to wait, you can get started right away!
7. Certificates of Completion are issued automatically to those who earn a score of 70% or higher in a course.
8. There is no cap to the number of courses each technician may complete during the annual subscription; complete as many courses as you wish.
9. A list of premium courses (not included in the Annual Subscription program) is at the end of the Subscription catalog. If you want to enroll in any of these, just email studentservices@hvacredu.net to request a 15% discount code. Purchase directly from our online store and enter the code for your 15% discount.
10. We'll remind you when your annual subscription is due to expire. If you want to renew your subscription, simply re-purchase the Annual Subscription through our online store. 365 days will be added to your enrollment period, so you don't expire, and can continue with your studies.

***If you have any questions, or if we can be of assistance:***

Email: info@hvacredu.net

Phone: (888) 655-4822

www.hvacredu.net



# TEXTBOOKS FOR COURSES

| COURSE/PROGRAMS | TEXT |
|---|---|
| 101, 103, 104, 109 Fundamentals/Basic<br>111, 112, 113, 114 Electrical + SEE BELOW<br>121, 122 Systems + SEE BELOW<br>133 Gas Heating<br>135, 137 Heat Pumps<br>141, 142 Refrigeration<br>201, 202, 203, 204, 205 High Efficiency<br>221 IAQ, 239 Belts<br>241, 243 Troubleshooting<br>242 R-410A Refrigerant<br>306 Operations Management<br>(Recommended-student purchase) | *Cengage: Refrigeration and Air Conditioning Technology,*<br>by Bill Whitman, Bill Johnson, John Tomczyk, Eugene Silberstein<br>9th edition: ISBN-13: 978-0357122273 or ISBN-10: 0357122275<br>8th Edition: ISBN-13: 978-1305578296 or ISBN-10: 1305578295<br>or<br>*Goodheart-Willcox: Modern Refrigeration and Air Conditioning,*<br>by Andrew D. Althouse, Carl H. Turnquist, Alferd F. Bracciano and Daniel C. Bracciano<br>21st Edition (2019): ISBN-13: 978-1635638776 or ISBN-10: 1635638771<br>20th Edition (2016): ISBN-13: 978-1631263545 or ISBN-10: 1631263544<br>or<br>*AHRI: Fundamentals of HVACR,* Stanfield & Skaves, Prentice Hall<br>3rd Edition (2016): ISBN-13: 978-0134016160 or ISBN-10: 0134016165<br>2nd Edition (2012): ISBN-13: 978-0132995221 or ISBN-10: 0132995220 |
| NATE Certified HVAC Technician Program<br>(Required and included with the program) | *Cengage: Refrigeration and Air Conditioning Technology,*<br>by Bill Whitman, Bill Johnson, John Tomczyk, Eugene Silberstein<br>9th edition: ISBN-13: 978-0357122273 or ISBN-10: 0357122275 |
| 111, 112, 113 & 114 Electrical<br>(Required and included with the course) | *ESCO Electrical Theory and Application* e-book is included in these courses. |
| 121 Air Properties & Measurements<br>(Required and included with the course) | Psychrometrics without Tears e-book is included in this course. |
| 122 Systems<br>(Required-student purchase) | *ACCA Manual J (AE) Residential Load Calculations*, 8th Edition,<br>Full (2016): ISBN-13: 978-1892765352 or ISBN-10: 1892765357 |
| 123 Air Distribution<br>(Required-student purchase) | *ACCA Manual D Residential Duct Systems*,<br>2016 ISBN-13: 978-1892765352 or ISBN-10: 1892765357 |
| 131 Oil Heat<br>(Required and included with the course) | The *NORA Oil Heat Manual* is provided in this course as a downloadable file |
| 153, 154, 155 & 156<br>(Individual courses - recommended student purchase) | *HVAC Control* Systems, 4th Edition, (2017) by Ronnie J. Auvil, American Technical Publishers<br>ISBN-13: 978-0826907790 or ISBN-10: 0826907792 |
| HVACR Building Automation Systems Program<br>(Required and included with program) | *HVAC Control* Systems, 4th Edition, (2017) by Ronnie J. Auvil, American Technical Publishers<br>ISBN-13: 978-0826907790 or ISBN-10: 0826907792 |
| 160 Pneumatic Controls<br>(Required and included with the course) | *Pneumatic Controls* by RSES, e-book access is provided in this course |
| 161 & 171 Boilers<br>(Required-student purchase) | *Low Pressure Boilers*, 4th Edition, 2012, Frederick M. Steingress, Daryl R. Walker<br>5th Edition (2018): ISBN-13: 978-0826943729 or ISBN-10: 0826943721<br>4th Edition (2012), ISBN-13: 978-0826943651, ISBN-10: 9780826943651 |
| 186 HVACR Economizers ADEC/DCV<br>(Required and included with the course) | *Psychrometrics without Tears* e-book is included in these courses. |
| 191 Hydronics<br>(Recommended-student purchase) | Cengage: *Modern Hydronic Heating: For Residential and Light Commercial Buildings*<br>4th Edition (2023): ISBN-13: 978-1337904919 or ISBN-13: 9780357620502 |
| 441 & 442<br>(Individual courses required - student purchase) | Cengage: *Commercial Refrigeration for Air Conditioning Technicians*,<br>4th Edition (2022) ISBN: 978-0-357-45370-4 |
| Commercial Refrigeration Program<br>(Required and included with the program) | Cengage: *Commercial Refrigeration for Air Conditioning Technicians*,<br>4th Edition (2022) ISBN: 978-0-357-45370-4 |
| 010, 015, 050, 106, 110, 139, 143, 157, 158, 159, 216, 217, 244, 245, 261, 262, 263, 264, 265, 266, 291, 292, 301, 310, 311, 402, 403, 410, 411, 412, 413, OSHA 10 & 30, BHE Construction & BHE HVAC, EPA 608 | No textbook required |
| Apprentice Program Years 1,2,3 and 4<br>(Apprentices will need to purchase these 4 books in year 1 and use the same books throughout the four-year program)<br>(Required-student purchase) | Cengage: *Refrigeration and Air Conditioning Technology,*<br>by Bill Whitman, Bill Johnson, John Tomczyk, Eugene Silberstein<br>9th edition: ISBN-13: 978-0357122273 or ISBN-10: 0357122275<br>and<br>*International Fuel Gas Codes 2021*<br>ISBN: 13: 978-1609839666 ISBN: 10: 1609839668<br>and<br>*International Mechanical Codes 2021*<br>ISBN: 13: 978-1622702749, ISBN: 10: 1622702743<br>and<br>International Residential Codes 2021<br>ISBN-13: 978-1609839574, ISBN-10: 1609839579 |

You may purchase your textbook(s) anywhere you choose. We suggest a reputable online bookseller. 10/31/2023

# SUGGESTED HAND TOOLS LIST FOR STUDENTS

*11/10/2020 List provided by HVAC Excellence / ESCO Group*

10% Discount through Johnstone Supply • Discount available through TruTech Tools

Safety glasses
Work gloves
Adjustable wrenches (8” & 10”)
Ball peen hammer (12oz or larger)
Flare nut wrench set or
Flaring set ¼” to ¾”
Flashlight
Gauge manifold set with 36” hose minimum
Hex key wrench set long (9” long)
Multimeter (with clamp-on ammeter)
Nut Drivers ¼”, 5/16”, & 3/8”
Pliers Diagonal cutting
Pliers Linesman
Pliers Long nose
Pliers Terminal crimpers (AGW 10-22 wire size)
Pliers Tongue and groove
Schrader valve core tool
Screwdriver Phillips #2
Screwdriver Pocket Flat & Phillip
Screwdriver Slotted ¼”, & 5/16”
Service valve wrench (multi sized)
Swaging tool ¼” to ¾”
Tape measure (10ft or longer)
Thermometer (Digital thermocoup0le type)
Tool box
Tube cutter
Tubing Reamer

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## CONTACT US:


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