

HVACRedu.NET CURRICULUM

CHOSEN TO ACCOMPANY iCONNECT TRAINING UNITS INTO EDUCATIONAL MARKETS

iConnect[®]
TRAINING

SELECT CATALOG OFFERINGS



NORTH PARK INNOVATIONS GROUP, INC.

Individual Courses

Levels: Foundation, Intermediate, Advanced, Energy Efficient

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**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 Numbers
- 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 75% 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 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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 HVACR 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 ANSI/ ACCA Quality Installation and ANSI/ 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**104 HVACR 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.

Modules cover:

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

106**106 HVACR 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**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**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 ANSI/ACCA Quality Installation and ANSI/ 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

110 HVACR 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

111 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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. Students also receive access to the ESCO Electrical Theory and Application e-book, a downloadable file, as an additional learning resource.

Modules cover:

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

112

112 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. Also the ESCO Electrical Theory and Application e-book is included in the course as a downloadable file as an additional resource.

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

113 HVACR 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 ANSI/ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

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. Students also receive access to the ESCO Electrical Theory and Application e-book, a downloadable file, as an additional learning resource.

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

114

114 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ACCA/ASHRAE Standard 180 Quality Maintenance protocols.

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. Students receive access to the ESCO Electrical Theory and Application e-book, a downloadable file, as an additional learning resource.

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

121

121 HVACR 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.

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 ANSI/ACCA Quality Installation and ANSI/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:

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

122 HVACR 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.

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.

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

123 HVACR 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 HVACR 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.

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 ANSI/ ACCA Quality Installation and ANSI/ 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:

- 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

133

133 HVACR 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.

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 ANSI/ACCA Quality Installation and ANSI/ 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:

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

135

135 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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 HVACR 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

139

139 HVACR 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 & Troubleshooting Electrical
- Airflow Using Ohm's Law - Intro Quiz Review

141

141 HVACR 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.

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 ANSI/ACCA Quality Installation and ANSI/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:

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

142

142 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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 HVACR 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 ANSI/ ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180.

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.

Modules cover:

- Refrigerant Leak Detection
- Evacuation
- Charging Systems

153

153 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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

154 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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

155 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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

156 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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 HVACR 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 HVACR 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.

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.

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



159

159 HVACR 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 HVACR 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 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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

171 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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



186**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**191 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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:

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

201**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

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 ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

203

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 ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

204

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 ANSI/ACCA Quality Installation and ANSI/ 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 HVACR 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.

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 9 hours of continuing education (CEHs) applicable to NATE re-certification.

Module topics cover:

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

216

216 Commercial Building Lighting Systems (12 hours / 60 days)

Written by Chris Compton

Facilities maintenance technicians and building managers are expected to maintain the lighting systems in their buildings. This course guides students through a better understanding of how light works and the importance of proper environmental lighting for both safety and comfort of the building occupants. Introduction to commercial lighting equipment and how to distinguish between a maintenance task and when to call a licensed electrician is covered. Students will better understand various lighting control strategies and opportunities to recommend more efficient lighting technologies. There is no textbook required. This course is recognized for 12 hours of continuing education (CEHs) applicable to NATE re-certification.

Module topics cover:

- Introduction to Commercial Lighting
- Commercial Lighting Equipment
- Commercial Lighting Maintenance and Upgrades – Part 1
- Commercial Lighting Maintenance and Upgrades – Part 2

217

217 HVACR On Site Generation Systems (9 hours / 30 days)

Written by Chris Compton

The intent of this course is to give facilities 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 On Site Electrical Generation Systems utilized in Commercial Buildings. An overview of the fundamentals and background of Back-Up Generation Systems is first, then the course modules expand into the specifics of the components, operation and maintenance requirements of modern commercial building on site generation systems.

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 9 hours of continuing education (CEHs) applicable to NATE re-certification. A textbook is not required for this course.

Module topics cover:

- Generation Fundamentals
- Generation Systems
- Maintenance of Back-up Generators



221**221 HVACR 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**239 HVACR 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**241 HVACR 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 ANSI/ACCA Quality Installation and ANSI/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 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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 18 hours of continuing education (CEHs) which are applicable to NATE re-certification. This course has been approved by International Comfort Products, LLC.

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

243

243 HVACR 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 ANSI/ACCA Quality Installation and ANSI/ 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
- Troubleshooting 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.

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.

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

245

245 HVACR 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

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 ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180 Quality Maintenance protocols. This course is recognized for 6 hours of continuing education (CEHs) applicable to NATE re-certification.

262

262 HVACR Industrial Steam Boiler Fundamentals

(6 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 Boiler 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 ANSI/ACCA Quality Installation and ANSI/ 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 HVACR 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.

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 6 hours of continuing education (CEHs) applicable to NATE recertification.

Module topics cover:

- Small Condensing Boilers
- High Efficiency Options for Larger Boilers

264

264 HVACR 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.

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 9 hours of continuing education (CEHs) applicable to NATE re-certification.

Module topics cover:

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

265

265 HVACR 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 ANSI/ACCA Quality Installation and ANSI/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 HVACR 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.

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 6 hours of continuing education (CEHs) applicable to NATE re-certification.

Module topics cover:

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

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

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.



301 Performing the Comprehensive Building Assessment (40 hours / 60 days)

Designed to introduce students to the comprehensive building assessment process, this intermediate course is geared toward conducting visual building inspections, performing diagnostic testing, and determining residential building improvement opportunities in the field; then documenting a home's performance, prioritizing improvements, and preparing a work scope that will guide the homeowner's decision making process for making the improvements.

Students will start out learning the systems, tools and techniques commonly encountered during visual observations, including evaluation of envelope components, mechanical systems and base loads such as appliances and lighting. They will then step into diagnostic testing, learning first how to work safely. Students will learn how to set up and use the blower door for building pressurization/depressurization testing, and how to incorporate the resulting data into decision making. Students will learn combustion safety testing (including worst case depressurization, draft and spillage testing), and how to test various appliances for CO including: furnaces, boilers, water heaters and other combustion appliances. Students will also learn basic duct diagnostic testing. Finally, students will be taught how to use assessment information and diagnostic results to develop a work scope which can then be presented to a customer. Approximately 10 hours of animations are included in the instruction. This course will refer to the BPI Building Analyst as well as to various industry codes and standards. It helps prepare individuals for BPI Building Analyst Certification and NATE HVAC Efficiency Analyst Certification (Senior Level). Instruction aligns with ANSI/ACCA Quality Installation and ANSI/ ACCA/ ASHRAE Standard 180 Quality Maintenance protocols.

Recommended Prerequisites You will want to have a solid working knowledge of building science concepts, house-as-a-system concepts, and basic HVACR fundamentals prior to enrollment into this intermediate course. Please refer to each course description in the Catalog for the specific details. This course is NATE recognized for 40 hours of continuing education (CEHs). This course allows 60 days enrollment to complete.

Performing the Comprehensive Building Assessment course contains learning modules covering:

- Observation Techniques and Data Collection
- Exterior & Interior Assessment and Building System Analysis
- Blower Door and Zonal Pressure Diagnostics, Ventilation Rates
- Combustion Safety Testing and Analysis
- Duct Diagnostics
- Work Scope Development and Customer Relations
- Intercas Simulation Experience – a comprehensive combustion appliance safety training simulation

402 HVACR 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

403 HVACR 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 75% 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

410 Metasys Basic Operator Class (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 and Scheduling
- Alarms
- Trending
- Totalization and Using Graphics

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.



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.

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

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.

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.

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

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.

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

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



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



TEXTBOOKS FOR COURSES

COURSE/PROGRAMS	RECOMMENDED TEXTBOOKS
101, 103, 104, 109 Fundamentals/Basic 111, 112, 113, 114 Electrical & SEE BELOW 121, 122 Systems 133 Gas Heating 135, 137 Heat Pumps 141, 142 Refrigeration 201, 202, 203, 204, 205 High Efficiency 221 IAQ 239 Belts 241, 243 Troubleshooting 242 R-410A Refrigerant 306 Operations Management (Recommended) NATE Certified HVAC Technician Program (Required and included with the course)	Cengage: <i>Refrigeration and Air Conditioning Technology</i> , 8th Edition by Bill Whitman, Bill Johnson, John Tomczyk, Eugene Silberstein ISBN: 13:978-1305578296 or Goodheart-Willcox: <i>Modern Refrigeration and Air Conditioning</i> , 19th Edition (2014) by Andrew D. Althouse, Carl H. Turnquist, Alferd F. Bracciano and Daniel C. Bracciano ISBN: 13:978-1619601994, ISBN: 10:1619601990 or AHRI: <i>Fundamentals of HVACR</i> , 1st Edition, 2009, Stanfield & Skaves, Prentice Hall ISBN: 13:978-0-13-222367 & 10:0-13-222367-8
111, 112, 113 & 114 Electrical (Required and included with the course)	<i>ESCO Electrical Theory and Application</i> e-book is included in these courses.
121 Air Properties & Measurements (Required and included with the course)	<i>Psychrometrics without Tears</i> e-book is included in these courses.
122 Systems (Required)	<i>ACCA Manual J (AE) Residential Load Calculations</i> , 8th Edition, 2003 ISBN: 10:1892765-357
123 Air Distribution (Required)	<i>ACCA Manual D Residential Duct Systems</i> , ISBN: 10:1892765500
131 Oil Heat (Required and included with the course)	The <i>NORA Oil Heat Manual</i> is provided in this course as a downloadable file
153, 154, 155 & 156 HVACR Controls/Building Automation Systems Programs (Required and included with program, but not included with individual courses)	<i>HVAC Control Systems</i> , 4th Edition, by Ronnie J. Auvil American Technical Partners ISBN: 978-0-8269-0779-0
160 Pneumatic Controls (Required and included with the course)	<i>Pneumatic Controls</i> by RSES, e-book access is provided in this course
161 & 171 Boilers (Required)	<i>Low Pressure Boilers</i> , 4th Edition, 2012, Frederick M. Steingress, Daryl R. Walker ISBN: 978-0-8269-43651
186 HVACR Economizers ADEC/DCV (Required and included with the course)	<i>Psychrometrics without Tears</i> e-book is included in these courses.
191 Hydronics (Recommended)	Cengage: <i>Modern Hydronic Heating: For Residential and Light Commercial Buildings</i> 3rd Edition, ISBN: 13-9780766816374
Apprentice Program Year 1,2,3 and 4 (Apprentices will need to purchase books in year 1 and use the same books throughout the four year program) (Required)	Cengage: <i>Refrigeration and Air Conditioning Technology</i> , 8th Edition by Bill Whitman, Bill Johnson, John Tomczyk, Eugene Silberstein ISBN: 13:978-1305578296 and <i>International Fuel Gas Codes 2018</i> ISBN: 13:978-1609837419, ISBN: 10:160983741X and <i>International Mechanical Codes 2018</i> ISBN: 13:978-1609837433, ISBN: 10:1609837436 and <i>HVAC Control Systems (4th edition)</i> , American Technical Publishers, by Ronnie J. Auvil ISBN-978-0-8269-0779-0
441 & 442 Commercial Refrigeration (Required and included with program, but not included with individual courses.)	Cengage: <i>Commercial Refrigeration for Air Conditioning Technicians</i> , 3rd Edition ISBN 978-1305506435
010, 015, 050, 106, 110, 139, 157, 158, 159 216, 217, 244, 261, 262, 263, 264, 265, 266 291, 301, 402, 403, OSHA 10 & 30, BHE Construction & BHE HVAC	No textbook required

You will find information about whether your course requires or recommends a textbook in the course description or the online Campus Store. Some courses require a textbook and some do not. Some courses include the textbook as a downloadable PDF or eBook reading assignments. If you already have the required textbook(s), you do not need to purchase more. If you have any questions about textbooks, please send an email to: info@hvacredu.net.

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

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VISION:

Our vision is to transform the HVACR and related industries into a learning community where state and nationally recognized industry licenses and certifications are achievable and maintained; where new workers enter the industry through a structured employer-sponsored corporate training program; and where technicians have a place to continue to upskill their knowledge in keeping with new equipment, energy efficiencies, methods, and technologies.

POWER YOUR CAREER to the NEXT LEVEL

