



[www.hvacredu.net](http://www.hvacredu.net)

## MASTER CATALOG

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HVACRedu.net is an ANSI Accredited Program Certificate Issuer for the online 4 year HVAC Apprenticeship Related Training Program; HVACRedu.net has earned Programmatic Accreditation from HVAC Excellence for everything in the catalog, and has earned Quality Matters course recognition from Maryland Online. In addition, all the technical courses are both NATE and BPI recognized for initial certification preparation and continuing education units. HVACRedu.net also won the 2011 Dealer Design Awards Gold in the Contractor Services category for the high quality online courses included in this catalog. Our Mission is quality education, student success, and exceptional customer service.

All the quality online educational courses described here are perfect for your busy schedule. You can study at your own pace at any time of the day or night, on any Internet connected computer anywhere without having to travel to a classroom. Our offerings are listed below by category: Assessments, Courses, Individual Modules, Contractor Business Courses, Special Purpose Courses, Review Courses, Certification Exam Prep Reviews, and Certificate Programs. Enroll by visiting our online Campus Store at <http://main.hvacrstore.net/>. Or, just click the highlighted title below for pricing and to enroll. We accept Visa/MasterCard and PayPal.



### Assessments

#### Technical Core Assessment (TCA)

If you're not sure where to start, or if you don't know what you should study first, start with this online assessment of your current knowledge. The Technical Core Assessment will indicate your strengths and weaknesses in 27 different knowledge areas of HVACR and Building Performance; and your results indicate your readiness for industry certification exams such as HVAC Excellence, NATE, or BPI. The Assessment is actually 27 separate assessments with nine (9) that focus on the HVACR Core knowledge areas, and the remainder aligned with HVACR specialty topics. They are given in a sequence (see below) starting with (1) 30 question exam on Safety. The questions for each exam are randomly selected from a pool of qualified questions for that knowledge area. Registration for the TCA does not require you to take all of the assessments. You can choose to take only those that are important to you, or you can take all of them. However, you must complete all the Core Assessments. It is not necessary to complete all of the assessments in one sitting. Allow 30 minutes for each assessment. You'll receive an email with your results and a Personal Education Plan (PEP) shortly after you complete the assessments. Your performance on the assessments will determine the structure of your PEP--our recommended list of reviews and courses that, when completed, will bring your knowledge up to the industry standards for excellence. This is a great way to assess your knowledge. Or, if you're a manager or supervisor, it is a great way to establish a training plan for new hires or your existing technicians. Plan to finish them all within 30 days after your enrollment. The knowledge areas covered are:

- HVACR Safety

- Safety Assessment (Core) - 30 Questions
- HVAC ET 2
  - HVAC Efficiency Technician 2 (Core) - 12 Questions
- HVACR Electrical
  - Electrical 1 Assessment (Core) - 20 Questions
  - Electrical 2 Assessment (Core) - 20 Questions
  - Electrical 3 Assessment (Core)- 20 Questions
  - Electrical 4 Assessment (Core) - 20 Questions
- HVACR Comfort Physics
  - HVAC Physics Assessment (Core) - 20 Questions
  - HVAC Air Properties Assessment (Core) - 20 Questions
- HVACR Comfort Cooling
  - Refrigeration Cycle Assessment (Core) – 20 Questions
  - Economizer Assessment – 20 Questions
  - Refrigeration Cycle Service & Maintenance Assessment - 20 Questions
  - Air Conditioning Troubleshooting Assessment - 20 Questions
- HVACR Comfort Heating
  - Comfort Oil Heating Assessment - 20 Questions
  - Comfort Gas Heating Assessment - 20 Questions
  - Comfort Hydronic Heating Assessment - 20 Questions
  - Comfort Heat Pump Specific Assessment - 20 Questions
- HVACR System Load Calculations
  - Systems Load Calculations Assessment - 20 Questions
- HVACR Air Distribution
  - Air Distribution Assessment – 20 Questions
- Building Science
  - Building Science Assessment – 20 Questions
- Home Performance
  - Home Performance Assessment – 20 Questions
- Building Automation Systems
  - Building Automation Systems I Assessment – 20 Questions
  - Building Automation Systems II Assessment – 20 Questions
  - BAS DDC Networking I Assessment - 20 Questions
  - BAS DDC Networking II Assessment - 20 Questions
  - BAS GUI Points Assessment - 20 Questions
  - BAS Basic DDC Programming Assessment - 20 Questions
- Hydronics
  - Hydronics Assessment - 20 Questions

### **Courses** – *Foundation, Intermediate, Advanced, Green*

Courses are open-entry, self-paced, open-exit (unless described otherwise). You have access to each course for 60 days (unless stated otherwise). Spend as much time as needed on a certain page or subject or move along more quickly. Most courses include instructor support unless described “without a mentor”. If the course or program you select does not come with a mentor, you can “add a mentor” for a small additional fee. If you have questions for the instructor, just send an e-mail and you will have an answer within 24 hours. Our course learning modules cover specific HVACR concepts by incorporating a presentation that utilizes some or all of the following: text reading assignments, web site tours, applied exercises, online quizzes, industry terminology definitions, video clips, animations, images and downloadable/printable handouts. Each module concludes with a 20 question module specific exam and the course concludes with a 25 question comprehensive final exam. Students are required to earn a minimum passing score of 75% overall for successful completion and complete the online End of Course 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 dictated by numerous industry groups such as ANSI/ACCA Quality Standards, AHRI, BPI, PAHRA, PHCC, RSES, and others. Each course is recognized for NATE Continuing Education Hours and BPI Continuing Education Units applicable to NATE and BPI 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).

Advanced Courses descriptions also include 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. **Courses – Foundation, Intermediate, Advanced, Green**

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

*Foundation*

*Written by Chris Compton*

This online course provides an introduction to the HVACR basic fundamentals and terminology. The content of the course is dedicated to applied physics concepts that are utilized in HVACR systems. Subjects include topics on measurements, heat, pressure, gas properties, and air properties. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards and includes RSES tutorials. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six modules cover:

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

### **102 HVACR Safety** (18 hours/60 days)

*Foundation*

*Written by Chris Compton*

This online course covers the basic safety considerations of the HVACR workplace. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards and includes RSES tutorials. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Presentations and coursework are in six modules that cover:

- Labels, Materials Safety Data Sheets, and Safety Training
- Personal Protective Equipment (PPE)
- Personal Safety in Confined Space and on Ladders
- Fire Extinguishers and Compressed Gasses
- Electrical Lockout / Tagout
- Back Safety, Scaffolds/Lifts, and Fall Protection

### **103 HVACR Basic Sheet Metal** (18 hours/60 days)

*Foundation*

*Written by Mark Clemons*

This course is designed to 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 & Maintenance Standards. This course is NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). The main topics for the course are:

- 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 and Development

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

*Foundation*

*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 no exams and therefore we cannot provide a certificate of completion for this course. However, 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 BPI recognized for 3 continuing education units (CEUs). Copper Works course contains six learning modules covering:

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

### **107 Principles of Building Science** (28 hours/60 days)

*Green*

*Written by Roger DesRosiers and Kent Compton*

This is the first online course of its kind. It was developed and written in partnership with nationally recognized building science experts and is full of scientific facts, interactive exercises, pictures, videos, graphics, and text. Everything an individual in the building, remodeling, or trade industry needs to know to make buildings perform more efficiently. The PBS course has also been designed to help prepare individuals on the path to various NATE, NARI, BPI, RESNET, and other industry credentials related to green building performance. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. Students receive a downloadable reference book that is provided as a study guide for the course. This course is BPI recognized for 14 hours of continuing education and NATE recognized for 28 hours (CEU's/CEHs) applicable to re-certification. This course allows 60 days enrollment to complete. The Principles of Building Science course contains nine learning modules covering:

- House as a System
- Air Flow Basics
- Heat Flow, Insulation & Windows
- Framing & Air Sealing
- Moisture Management
- Conditioning Strategies
- Ventilation
- Combustion Safety
- Indoor Air Quality Basics

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

*Foundation*

*Written by Chris Compton*

This online course is 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 & Maintenance Standards and includes RSES tutorials. This online course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six modules cover:

- Introduction to the Industry
- What is Energy
- Atomic Theory
- Basic Circuits
- Parallel Circuits
- Power

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

*Intermediate*

*Written by Chris Compton*

An online continuation of the Electrical 111 course, concepts presented and discussed are oriented towards alternating current production and application to devices utilized in HVACR systems. We will cover 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 & Maintenance Standards and includes RSES tutorials. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six modules cover:

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

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

*Advanced*

*Written by Chris Compton*

This online course covers common control components found in HVACR systems, a logical continuation of the 112 course. 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 & Maintenance Standards and includes RSES tutorials. 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. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). The six modules cover:

- Control Methods, Temperature & Pressure
- Residential Heat / Cool Thermostats @ Low Voltage
- Really Good Relay Stuff
- Contractors go / Starters go with protection
- Power wiring
- Odds and ends around a schematic

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

*Advanced*

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

This online 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. We will also develop diagnostic skills for motor troubleshooting and replacement. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. Recommended Prerequisites: you will want to have completed 111 HVACR Electrical DC Theory Plus, and 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 NATE recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 10.5 continuing education units (CEUs). Seven 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 HVACR Systems Air Properties and Measurement** (18 hours/60 days)

*Intermediate*

*Written by Chris Compton*

This online course is the introduction to HVAC comfort systems. In this course we will discuss heat energy, the conditions of human comfort, the psychrometric chart and plotting various air conditions upon it. We will complete the course by introducing the terms, concepts, measurements, and calculations of moving air. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. This course is NATE recognized for 18 hours of continuing education (CEUs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six 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 II, Load Calculations** (18 hours/60 days)

*Advanced*

*Written by Phil Rains*

This online course introduces you to residential load calculations. This is a method to determine the heating and cooling BTU/H loads of structures prior to installing HVACR systems to meet those loads. The required text is the Air Conditioning Contractors of America (ACCA) Manual J, 8<sup>th</sup> Abridged Edition (MJ8-AE). The 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. This course will provide instruction for completing load calculations by hand, which is necessary prior to attempting any computerized load program. We will focus on following the concepts of MJ8-AE while simplifying the methodology emphasized in the manual even further. 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 basic HVACR fundamentals prior to enrollment into this advanced course. This course is NATE recognized for 18 hours of continuing education (CEUs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). This course is presented in the following six modules:

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

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

*Advanced*

*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 and ACCA Manual T. 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 NATE recognized for 18 hours of continuing education (CEUs) applicable to NATE recertification, and BPI recognized for 9 continuing education units (CEUs). Module topics are:

- Fundamentals of Air Flow
- Air distribution Systems
- Fundamentals of Air 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 HVACR Oil Heat I** (18 hours/60 days)

*Intermediate*

*Written by Bob Recko*

This online course is designed to introduce the concept of combustion in basic terms. The focus will be 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 will explore all the mechanical, electrical, and accessory devices commonly found in the modern fuel oil heating systems. With this knowledge, we will build troubleshooting skills and identify applicable codes as they pertain to the installation and use of these systems. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six modules cover:

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

### **132 HVACR Oil Heat II** (18 hours/60 days)

*Advanced*

*Written by Chris Faucher*

This course is a continuation Of Oil 131 which covered the basic concepts of Oil Heat. In this course we will offer a review of Basic Electrical Principles that are needed for a technician to effectively diagnose electrical problems in Oil Heat Systems as well as other electrical subjects such as operating, safety and primary controls. Oil tank installation concerns, especially code requirements will be studied. NFPA 31 will be referenced along with the equivalent local code from where a student may live and work. The annual tune up and combustion efficiency will also be part of this course. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. Recommended Prerequisites: you will want to have completed 131 HVACR Oil Heat I, or have a working knowledge of the content of that course prior to enrollment into this advanced course. Please refer to each course description in the Catalog for the specific details. This course is NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six modules cover:

- The Oil Burner Circuit
- Control Wiring and Operational Safety Controls
- Primary Controls
- Oil Tank Installation
- The Annual Tune Up
- Combustion Efficiency Testing

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

*Intermediate*

*Written by Bob Recko*

This course will provide knowledge and skills towards becoming a highly skilled technician who will install, maintain, and repair residential and small commercial Gas Heat Systems. We will explore all the mechanical, electrical, and accessory devices commonly found in the modern Gas Heating Systems. With this knowledge, we 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. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Six modules cover:

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

- Troubleshooting Gas Burner Systems

**135 HVACR Heat Pump / Air to Air** (21 hours/60 days)

*Advanced*

*Written by Phil Rains*

This course is designed as an introduction to reverse-cycle heat pumps used in residential and light commercial applications. Content covers the components and operational differences of a heat pump vs. a straight air conditioning system; and components, troubleshooting, and solutions. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. 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 NATE recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 10.5 continuing education units (CEUs). Modules cover:

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

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

*Advanced*

*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 will focus on geothermal (water source) heat pumps utilized for residential and light commercial applications. A prerequisite to this course is a good understanding of the refrigeration cycle. 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 NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Modules cover:

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

**141 HVACR Refrigeration I** (18 hours/60 days)

*Intermediate*

*Written by Chris Compton*

HVACR Refrigeration 141 is designed to provide a thorough examination of the refrigerant circuit as it is applied to both air conditioning and refrigeration purposes, and to provide a practical and systematic method to diagnose problems in the refrigerant circuit. If you understand the parameters governing the operation of the refrigerant circuit, you will be able to diagnose any piece of equipment. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards and includes RSES tutorials. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Modules cover:

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

**142 HVACR Refrigeration II** (18 hours/60 days)

*Advanced*



*Written by Chris Compton*

This course is a continuation and elaboration of HVACR Refrigeration 1. Presentations will describe the application of common accessories found in a system, piping arrangements, sizing considerations and system operation. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards and includes RSES tutorials. Recommended 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 each course description in the Catalog for the specific details. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Modules cover:

- Refrigerants
- Compressor accessories and applications
- Low side accessories and applications
- High side accessories and applications
- Piping system sizing and applications
- Capacity control methods

### **151 Building Automation Systems I** (18 hours/60 days)

*Intermediate*

*Written by Bob Recko*

A good understanding of common HVAC systems is a prerequisite for this course. Building controls are very different from the typical controls found in most residential and commercial systems and equipment. Technicians should have a sense of what a building complex consists of, what control systems consist of, what control requirements need to be met and what choices are available in building design to meet the needs of the building. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. The Honeywell Engineering Manual is included in this course as a downloadable file. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Module topics are:

- Building and HVAC Systems
- Air Circulation and Air Quality
- Control System Characteristics
- Process Characteristics and Control Systems
- Control System Components
- Control System Categories

### **152 Building Automation Systems II** (18 hours/60 days)

*Advanced*

*Written by Bob Recko*

This course is an introduction to the primary concepts that lead to the dominant building controls systems, DDC and all its variants including Energy Management. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. Recommended Prerequisites: you will want to have completed 151 Building Automation Systems I, or have a strong working knowledge of the content of that course prior to enrollment into this advanced course. Please refer to each course description in the Catalog for the specific details. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Module topics are:

- Psychrometrics
- Pneumatic Control Basics
- Pneumatic Controls
- Electric Controls
- Electronic Controls Fundamentals
- Microprocessor Based/DDC

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

*Intermediate*

*Written by Ken Donovan*

This course is designed to introduce the concepts and terminology of heating and power boilers. The main focus of the course will be on commercial and industrial boilers. Instruction aligns with ANSI/ACCA Quality Installation &

Maintenance Standards. This course is NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Modules cover:

- Boiler Fundamentals
- Classifying Boilers
- Combustion
- The Heat Exchanger
- Controlling energy Sources
- Boiler Accidents/Hazards

**171 HVACR Boilers Low Pressure License Prep** (30 hours/90 days)

*Intermediate*

*Written by Ken Donovan and Keith Conrod*

This online course is designed to introduce the concepts and terminology of heating and power boilers. The main focus of the course will be on commercial and industrial boilers. The content covers the required knowledge for proper and safe low pressure boiler system operations. Individual Mentored students are enrolled for a 90 day term. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. This course is NATE recognized for 28 hours of continuing education (CEHs) which are applicable to NATE re-certification, and BPI recognized for 15 continuing education units (CEUs). The content is covered in the 9 modules outlined below:

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

**186 Economizer** (Certificate Course – 21 hours/60 days)

*Advanced*

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 insure the correct operation of these systems. This certificate 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 course is NATE recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 10.5 continuing education units (CEUs). The learning modules included in this course are:

- Introduction to Economizers
- Applied Economizers
- Economizer Air Properties & Psychrometrics
- Applied Psychrometrics
- Economizer DDC Operations - Honeywell
- Economizer Operations - Trane

**191 HVACR Hydronics I** (18 hours/60 days)

*Intermediate*

*Written by Keith Conrod*

This is the initial course on hydronic heating systems. This online course begins a series of courses that address hot water heating systems. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Module topics covered:

- System concept
- Materials and Tools
- Boilers
- Pumps

- Heat Transfer Units
- System Accessories

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

*Foundation*

*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 client's 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 NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs).

Modules address the following topics:

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

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

*Advanced*

*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 including electrical circuits, mechanical compression refrigeration cycle, and necessary components in a cooling system, and more. This course requires a good understanding of the refrigeration cycle before you begin. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards and includes RSES tutorials. Recommended 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 each course description in the Catalog for the specific details. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). Module topics are:

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

**242 HVACR R-410A Refrigerant Technology for HVACR Technicians** (18 hours/60 days)

*Advanced*

*Written by Phil Rains*

This R-410A Qualification course is designed to familiarize the technician with the differences between R-22 and R-410A. Background, regulations, impact on the industry, and application requirements will be presented. The course will also provide the technician with practical knowledge for safe performance of service techniques on systems containing R-410A. If you understand the parameters of this course and successfully complete the exams at the end of each module, 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 & Maintenance Standards. 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 NATE recognized for 18 hours of continuing education (CEHs) which are applicable to NATE re-certification, and BPI recognized for 9 continuing education units (CEUs). This course has been approved by International Comfort Products, LLC. Six Modules cover:

- R - 410A Refrigerant Background
- R - 410A Refrigerant Regulatory Requirements

- R - 410A Refrigerant Basics
- R - 410A Refrigerant Safety, Handling, and Service Considerations
- R - 410A System Components, Retrofitting, and Charging
- R - 410A System Troubleshooting

**243 HVACR Advanced Troubleshooting** (21 hours/60 days)

*Advanced*

*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 & Maintenance Standards. 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 NATE recognized for 21 hours of continuing education (CEHs) applicable to NATE re-certification, and BPI recognized for 10.5 continuing education units (CEUs). The course is divided into 7 modules covering the topics listed below:

- Electrical Troubleshooting
- Advanced Controls Troubleshooting
- Troubleshooting instrumentation
- Troubleshooting the Air Side of Systems
- Troubleshooting Refrigeration
- Troubleshooting Combustion
- Troubleshooting Hydronics

**244 Hydrocarbon Refrigerants Training** (3 instructional hours/30 days)

*Intermediate*

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 will introduce technicians to hydrocarbons as refrigerants, cover the associated regulations and standards, and get 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 content was provided by RSES. This course is NATE recognized for 3 hours of continuing education (CEHs) and BPI recognized for 1.5 CEU's applicable to re-certification. This course allows 30 days enrollment to complete. Must earn a grade of 75% or higher to obtain CEH recognition. Hydrocarbon Refrigerants Training Course contains learning modules covering:

1. Introduction to the use of Hydrocarbons as Refrigerants
2. HC Regulations and Standards
3. Refrigerant Properties and Safety
4. The Refrigerant Cycle
5. System Components
6. Servicing Procedures

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

*Green Intermediate*

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 homeowners 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 utilize the data obtained in making decisions. 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 & Maintenance Standards. Recommended Prerequisites: you will want to have completed 107 Principles of Building Science, Principles of Green Buildings, or a similar course; or have a solid working knowledge of building science concepts, house-as-a-system concepts, and basic HVACR fundamentals prior to enrollment into this advanced 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) and BPI recognized for 20 CEU's applicable to re-certification. This course allows 60 days enrollment to complete. Must earn a grade of 75% or higher to obtain CEH recognition.

Performing the Comprehensive Building Assessment course contains learning modules covering:

7. Observation Techniques and Data Collection
8. Exterior & Interior Assessment and Building System Analysis
9. Blower Door and Zonal Pressure Diagnostics, Ventilation Rates
10. Combustion Safety Testing and Analysis
11. Duct Diagnostics
12. Work Scope Development and Customer Relations

## Contractor Business Courses

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

*Advanced*

*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 the work flow and minimize delays, loss of time, and resources. This course is NATE recognized for 18 hours of continuing education (CEHs) applicable to NATE re-certification. Module topics are:

1. Industry Paperwork and Recordkeeping
2. Personnel Management and Communications Skills
3. Systems Integration: Design
4. Systems Integration: Installation
5. Materials Management
6. Resource Scheduling and Cost Management Awareness

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

*Foundation*

*Written by Tom Grandy*

This is the first in a new series of Online Courses for Contracting Businesses, developed in collaboration with nationally acclaimed Grandy and Associates. This 15 hour course covers everything a contractor needs to calculate a realistic hourly rate for their 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 contractors consider all the costs of running a profitable business and setting their pricing at levels that keep their business going and growing. Module topics are:

1. Budgeting and Cash Flow
2. Equipment and Replacement Costs
3. Field Labor Costs
4. Material Sales – Overhead Costs
5. Net Profit
6. Worksheet Handouts

### 311 Fifteen Things All Successful Companies Have in Common (15 hours/60 days)

*Foundation*

*Written by Tom Grandy*

This is the second in a new 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 in this course cover the 15 important topics that every business must know to make it in the Contracting Industry. This is valuable information that is a 'Must Have' in today's marketplace. Each of the topics provides a fresh insight into how to run a very profitable business. 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 that can help expand your knowledge of the topic that is being covered. Module topics are:

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

## Review Courses

A review is a rich online course you may move through at your own pace without an instructor. Each Review Course allows 30 days enrollment to review the materials. Assessments can be taken multiple times to gain knowledge competencies and exam practice. However, you do not receive a certificate of completion.

### [050 HVACR Applied Math Review \(15 course hours\)](#)

*Foundation*

*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 of the four basic math functions; addition, subtraction, multiplication and division. Each of the four functions is exercised using HVACR workplace applications. Each of the four math functions are applied to:

- Whole numbers
- Fractions
- Decimals

### [EPA 608 Refrigerant Usage Certification Prep Review](#)

*Foundation*

*By RSES*

This course is a selection of four learning modules designed to provide all the necessary information for a technician to prepare for the EPA 608 Certification exam. Successful completion of all four modules will prepare technicians for the Universal level. It is rich with visuals, animations, and checkpoint tests to enforce your learning experience. Use the modules as an introduction, or a review just before you take the exam.

Core

Type I

Type II

Type III

## **Certification Exam Prep Review**

Each review comes with random selection exams that include immediate feedback. With these exams available on demand, you can continually test yourself and improve the areas that you need most. However, you do not receive a certificate of completion. Instruction aligns with ANSI/ACCA Quality Installation & Maintenance Standards.

Online learning tools include:

- \* Downloadable study handouts
- \* User-friendly navigation
- \* Linked resource sites for additional study
- \* 30-day access
- \* Video clips on key points

### **Core Certification Review**

This online review is designed to prepare technicians for the NATE Core Service Certification exam. The review covers in detail the same main topics as the NATE Core Service:

- \*HVAC Fundamentals
- \*HVAC Air Side Knowledge
- \*HVAC Electrical Knowledge

### **Air Conditioning Certification Review**

This online review program is designed to prepare technicians for the NATE Air Conditioning Certification exam at the Service level. The review is done in four very comprehensive sections covering:

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

### **Air to Air Heat Pump Certification Review**

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

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

### **Gas Heating (Air) Certification Review**

This online review is designed to prepare technicians for the NATE Gas Heating (Air) Service Certification exam at either the Installation or Service level. The review is done in three very comprehensive sections covering:

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

### **Hydronics Gas Certification Review**

This online review is designed to prepare technicians for the NATE Hydronics Gas Service Certification exam at either the Installation or Service level. The review is done in three very comprehensive sections covering:

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

### **Hydronics Oil Certification Review**

This online review is designed to prepare technicians for the NATE Hydronics Oil Service Certification exam at either the Installation or Service level. The review is done in three very comprehensive sections covering:

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

### **Oil Heating (Air) Certification Review**

This online review is designed to prepare technicians for the NATE Oil Heating (Air) Service Certification exam at either the Installation or Service level. The review is done in three very comprehensive sections covering:

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



### Text Books for Courses

Course	Text
Fundamentals 101 Safety 102 Sheet Metal 103 Electrical 111 Electrical 112 Electrical 113 Electrical 114 Systems 121 & 122 Heating Gas 133 & 134 Heat Pumps 135 Refrigeration 141 & 142  Troubleshooting 241 & 243 Operations Management 306	Delmar: Refrigeration and Air Conditioning Technology, 5 <sup>th</sup> Edition (Hardcover), Whitman, Johnson, Tomczyk, ISBN 1-4018-3765-4 or Delmar: Refrigeration and Air Conditioning Technology, 6 <sup>th</sup> Edition (Hardcover), Whitman, Johnson, Tomczyk, ISBN 13: 9781428319363 or ISBN 10: 1428319360 or AHRI: Fundamentals of HVACR 1 <sup>st</sup> Edition, 2009, Stanfield & Skaves Prentice Hall ISBN: 13:978-0-13-222367-6 & 10:0-13-222367-8
Systems 122 (Required)	ACCA Manual J (AE) Residential Load Calculations 8 <sup>th</sup> Edition, 2003 ISBN 1-892765-28-4
Oil Heat 131 & 132	No textbook required. The NORA Oil Heat Manual is provided in the course as a downloadable file.
BAS 151 & 152	No Textbook Required-Honeywell Manual is provided in the course as a downloadable file
BAS 153	CISCO Networking for Dummies ISBN 0-7645-1668-X
BAS 154, 155, & 156	The Fundamentals of HVAC Direct Digital Control 2 <sup>nd</sup> Edition, 2001 ISBN 097044711-6
Boilers 161 Boilers 171 (Required)	Low Pressure Boilers, 6th Edition, Frederick M. Steingress, Daryl R. Walker ISBN 978-0-8269-4358-3
Hydronics 191	Modern Hydronic Heating 3rd Edition ISBN 13-9780766816374
Principles of Building Science 107 R410-A Refrigerant Technology	No Textbook Required-a reference manual is included with the course
Performing the Comprehensive Building Assessment 301	No Textbook Required
Home Performance Apprenticeship Program (in development)	SRMI: Residential Energy, 4 <sup>th</sup> Edition, Krigger & Dorsi ISBN 978-1-880120-09-5

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