



## MASTER CATALOG

Revised August 31, 2010

This NATE and BPI recognized quality online education is 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: Courses, Individual Modules, Reviews, NATE Exam Prep Reviews, Technical Core Assessments, and Certificate Programs.

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

Courses are open-entry, self-paced, open-exit. 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. As with "in-class" courses, you have instructor support as well. 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. A minimum passing score of 75% overall is required for successful completion.

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 CEHs and BPI CEU's 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).

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

### **R - 410A Refrigerant Technology for HVACR Technicians (10 hours)**     *Special Industry Qualification Course*

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 then successfully complete the final examination, you will comply with many equipment manufacturers' policies requiring safety and service "certification" prior to purchasing equipment containing R - 410A refrigerant. Because this course is a special qualifications course, it does not come with an instructor. However, a complete reference manual is included and is shipped upon enrollment. 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 5 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

### **101 HVACR Fundamentals (18 hours)**

*Foundation*

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:

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

### **102 HVACR Safety (18 hours)**

*Foundation*

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)**

*Foundation*

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
- Introduction to Sheet Metal Duct Layout and Fabrication
- Methods of Layout and Development

### **107 Principles of Building Science (28 hours)**

*Green*

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. This course is both BPI and NATE recognized for 28 hours of continuing education (CEU's/CEHs) applicable to re-certification. 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

At the end of each module is a comprehensive exam of the material covered. Students also receive a reference book that is provided as a study guide for the course. This course is available on [GrEEncollarEdu.net](http://www.schoolofgreen.net) <<http://www.schoolofgreen.net>> This course allows 90 days enrollment to complete. Must obtain a grade of 75% or higher to obtain CEU/CEH recognition.

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

*Foundation*

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)**

*Intermediate*

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, 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)***Advanced*

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. 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 (18 hours)***Advanced*

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. 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:

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

**121 HVACR Systems Air Properties and Measurement (18 hours)***Intermediate*

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 (CEHs) 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)***Advanced*

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 HVAC/R 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. 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). 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

### **131 HVACR Oil Heat I (18 hours)**

*Intermediate*

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)**

*Advanced*

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. 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)**

*Intermediate*

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)**

*Intermediate*

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. 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

#### **141 HVACR Refrigeration I (18 hours)**

*Intermediate*

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)**

*Advanced*

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. 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)**

*Intermediate*

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)**

*Advanced*

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. 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

### **153 Building Automation Systems DDC Networking I (18 hours)**

*Advanced*

This course is designed to introduce HVACR Technicians, and others involved in the HVACR industry, to basic networking concepts and terminology. This course will help those desiring to work in the building automation field, to establish a strong foundation of standard network terminology and concepts. 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 identified below:

- Introduction to Networks
- OSI and Other Network Models
- Taking It From the Topology
- Stringing It All Together
- Transporting Data
- Network Addressing

### **154 Building Automation Systems DDC Networking II (18 hours)**

*Advanced*

This course is designed to introduce HVACR Technicians, and others involved in the HVACR industry to Direct Digital Controls networking types, concepts, and terminology. 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 identified below:

- Control Drawings
- DDC Controller Fundamentals
- DDC Systems Architecture
- BACnet
- Open Systems and LonWorks Platform
- Specifications

### **155 Building Automation Systems GUI Points (18 hours)**

*Advanced*

This course is designed to introduce HVACR Technicians, and others involved in the HVACR industry, to the common types of interfaces used with DDC networks. The most common web based interface will be simulated and used by the student. Basic energy management strategies for several HVAC systems are also covered. The students will use a Graphic User Interface (GUI) and control drawings to identify hardware and software points on common commercial HVAC equipment. **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 identified below:

- Operator Interface Methods
- Scheduling
- Chilled Water System Controls
- Condenser Water Controls
- Hot Water System Controls
- Air Handling Units Controls

### **156 Building Automation Systems Basic DDC Programming (18 hours)**

*Advanced*

This course is designed to introduce HVACR Technicians and others involved in the HVACR industry to the fundamentals of programming logic. The students will learn about logic flow diagrams, and some of the different types of programming found in the industry. The student will also study the programming logic of the systems covered in 155. 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 identified below:

- Basic Programming Logic 1
- Basic Programming Logic 2
- Chilled Water Systems Programming
- Condenser Water Systems Programming
- Hot Water Systems Programming
- Air Handling Programming

**161 HVACR Boilers I (18 hours)**

*Intermediate*

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 (18 hours)**

*Intermediate*

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 18 hours of continuing education (CEHs) which are applicable to NATE re-certification, and BPI recognized for 14 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

**191 HVACR Hydronics I (18 hours)**

*Intermediate*

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)**

*Foundation*

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:

1. IAQ Basics
2. Properties of Air
3. Air Flow Basics
4. Ventilation
5. Moisture Management
6. Air Filtration

### **241 HVACR Intro to Cooling System Troubleshooting (18 hours)**

*Advanced*

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, necessary components in a cooling system, and more. This course requires a good understanding of the refrigeration cycle before you begin. A prerequisite is to be at least to the knowledge level provided in our 141 HVACR Refrigeration course. 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).

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

### **243 HVACR Advanced Troubleshooting (21 hours)**

*Advanced*

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. 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

### **301 Performing the Comprehensive Building Assessment (30 hours)**

*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. 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. This course is NATE recognized for 30 hours of continuing education (CEHs) and BPI recognized for 15 CEU's applicable to re-certification. This course allows 90 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:

1. Observation Techniques and Data Collection
2. Exterior & Interior Assessment and Building System Analysis
3. Blower Door and Zonal Pressure Diagnostics, Ventilation Rates
4. Combustion Safety Testing and Analysis
5. Duct Diagnostics
6. Work Scope Development and Customer Relations

Recommended Prerequisites: Students should have taken the Principles of Building Science, Principles of Green Building or a similar course, or have a solid understanding of building science concepts and house-as-a-system prior to enrollment.

### **306 Operations Management (18 hours)**

*Advanced*

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, and BPI recognized for 9 continuing education units (CEUs).

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

## Review Courses

A review is a rich online course you may move through at your own pace without an instructor.

### **050 HVACR Applied Math Review (15 course hours)**

*Foundation*

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*

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

## NATE 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. 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

### NATE Core Service 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

### NATE Air Conditioning Service 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

### NATE Air to Air Heat Pump Service 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

### NATE Gas Heating (Air) Service 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

### NATE Hydronics Gas Service 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

### NATE Hydronics Oil Service 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

### NATE Oil Heating (Air) Service 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

## Assessments

### Technical Core Assessment (TCA)

If you're not sure where to start or what you should study first, start with this online assessment of your current knowledge. It is a series of 13 exams that are designed to assess your knowledge as it relates to the HVACR Core Knowledge and your readiness for industry certifications such as NATE. The total assessment consists of 270 randomly selected questions. Your scores on the assessments will help us prepare an individualized learning plan, customized just for you. This is a great way to assess yourself. 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. Registration for the TCA does not require you to take all 13 of the assessments. You can take only those that are important to you or all of them. You'll receive an email with your results and an individualized learning plan shortly after you complete the assessment.

- HVACR Safety
- HVACR Electrical 1
- HVACR Electrical 2
- HVACR Electrical 3
- HVACR Electrical 4
- HVACR Applied Physics
- HVACR Air Properties
- Refrigeration Cycle Service & Maintenance
- Air Conditioning Troubleshooting
- Comfort Oil Heating
- Comfort Gas Heating
- Comfort Hydronic Heating
- Comfort Heat Pump

## Certificate Programs

### HVACR Service Core Program

**160 (or more) instructional hours**

The HVAC Service Core program is a comprehensive online HVACR education program encompassing heating, ventilation, air conditioning, and refrigeration. It is specifically structured to prepare technicians to successfully pass the initial NATE Core Service Exam and to enrich the skills of installers and technicians who are:

- Just beginning in the HVACR industry
- Continuing education for upgrading knowledge and skills, or
- Preparing for certifications or licenses (NATE or ICE)

The content presented in each course focuses on learning objectives that have been identified by HVAC/R industry groups (ARI, NATE, RSES, ACCA, and PAHRA) as key knowledge for an HVAC/R technician. This program is offered completely online and consists of one (1) math review and eight (8) courses in a specific educational sequence for the HVAC Service Core Certificate. Even though it is self-paced, students receive a 60 day enrollment for each course. Students are registered for one course at a time. Upon successful completion of each course (a score of 75% or higher), students are registered into the next course and receive a certificate of completion for the completed course. After successful completion of the math review and all eight courses students receive a Certificate of Completion for the Service Core Program. **The courses making up the Service Core**

**Program are:**

- R. 050 Applied Math Review
1. 101 Fundamentals
2. 102 Safety
3. 111 Electrical DC Theory Plus
4. 112 Electrical AC Theory Plus
5. 113 Electrical Common Components
6. 114 Electrical Motors
7. 121 Systems Properties & Measurement
8. 141 Refrigeration I

For course descriptions, find the corresponding course number at the beginning of this catalog.

### Building Automation Systems Program (Controls)

**108 (or more) instructional hours**

The BAS Online Certificate Program provides entry level knowledge for those aspiring to become Direct Digital Controls (DDC) Technicians. It starts with the fundamentals of building controls and then works through general web based DDC networking knowledge. Next, it is on to control drawing fundamentals and a simulated Graphic User Interface (GUI) used to practice troubleshooting and DDC point identification. Finally, students are introduced to some common types of DDC programming. The last two courses of the program allow students to practice applying DDC technology to common pieces of commercial HVAC equipment. The Courses making up the Building Automation Systems Certificate Program are:

- 151 Building Automation Systems I
- 152 Building Automation Systems II
- 153 Building Automation Systems DDC Networking I
- 154 Building Automation Systems DDC Networking II
- 155 Building Automation Systems GUI Points
- 156 Building automation Systems Basic DDC Programming

For course descriptions, find the corresponding course number at the beginning of this catalog.

### Text Books for Courses

Course	Text (All available through Campus Store)
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 HVAC/R 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, 154, & 155	CISCO Networking for Dummies ISBN 0-7645-1668-X
BAS 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