EXCELSIOR COLLEGE

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CENTER FOR PROFESSIONAL DEVELOPMENT

HVAC TECHNICIAN

320 Hours/60 Days Per Module/Instructor-Facilitated
Course Code: **CPD073** || Course Cost: **$3095**

OVERVIEW

The HVAC Technician Online Training Program is a comprehensive HVACR training program for heating, ventilation, air conditioning, and refrigeration installers and technicians. This program is for you if you're interested in getting started in an entry-level position in the HVACR industry, or if you're seeking continuing education for upgrading skills or becoming certified or licensed.

The program focuses on learning objectives that have been identified by HVACR industry groups as key knowledge for an HVACR technician.

If you wish to see what the industry recommends for study, AHRI (Air Conditioning, Heating, and Refrigeration Institute) and NATE (North American Technician Excellence) both have an HVAC curriculum guide posted on their Web sites.

The HVAC Technician Online Training Program has 16 sections, with a subscription length of 60 days per section. Each section contains 6 modules. The modules cover specific HVACR concepts and incorporate reading assignments, Web site tours, applied exercises, quizzes, industry terminology definitions, video clips, animations, images, and printable handouts.

Competencies
Included within the HVAC Technician Program are a number of competency check-off sheets . You're encouraged to work directly with a local contractor or technician to get hands-on experience and have your skills verified.

After you complete a module, print the related competency list and demonstrate your abilities under the supervision of a qualified technician. This enforces the online learning with hands-on experience and creates industry relationships that will support you as a new HVACR technician.

Upon registering, you’re given an initial sixty days to complete each module in this program. Should you need more time beyond the sixty days, an extension of one month is available with a fee of $45 or an extension of two months is available with a fee of $75. Fees and extensions apply per module.

OBJECTIVES

Upon successful completion of this program, you'll:

- Demonstrate proper safety practices and procedures while installing, designing, troubleshooting and servicing HVACR systems
- Gain competency in the area of fossil fuel combustion systems found in residential and light commercial buildings
- Demonstrate competency in the area of refrigerant handling
- Understand the importance of good work habits, communication practices, and computation skills
- Demonstrate a high level of ability to access industry technical information on the Web
- Obtain required overall industry competencies in the areas of HVACR

This program will prepare you to pass any of the following certification exams:

- The entry-level local gas fitters exam and or fuel oil license exam in areas where licenses are issued
- The EPA Refrigerant Handlers Certification Exam for a Type 1 and Type 2 license (for residential and commercial HVACR systems)
- The Industry Competency Exams in Residential HVAC or Light Commercial HVAC administered by the Air-conditioning and Refrigeration Institute
- The NATE (North American Technician Excellence) Service-level certifications, consisting of the Installation core exam and one Specialty exam in air conditioning, heat pump, gas, oil, or air distribution

MATERIALS INCLUDED

- *Refrigeration and Air Conditioning Technology, 6th Edition*
- *NORA Oilheat Manual*
- *Low Pressure Boilers, 3rd Edition*
- *Manual J AE Residential Load Calculations, 8th Edition*

OUTLINE

101 Fundamentals: This first session is designed to explore the common aspects of HVAC/R technology. Discussion will focus on such topics as heat transfer methods, basic terminology and definitions, and applied physics for HVAC/R systems. Six modules cover:

- Introduction to the industry
- HVAC/R measurements
- Heat energy
- Pressure
- Gas works
- Air works
- Final Exam

102 Safety: The second half covers the primary safety considerations of the HVAC/R workplace. Presentations and coursework are in six modules that cover:

- Hazard communication Labels, Materials Safety Data Sheets, and Safety Training
- Personal protective equipment (PPE)
- Personal safety in confined space and ladders
- Electrical lockout/tagout
- Fire extinguishers and compressed gas safety
- Back protection and Scaffolds/Lifts, and Fall Protection
- Final Exam

111 Electrical: Basic electrical theory such as Ohms Law, circuit schematic symbols, circuit characteristics, will be discussed as it specifically applies to DC & AC circuits in the HVAC/R industry. The first six modules cover:

- Introduction to the industry
- What is energy?
- Atomic theory
- Basic circuits
- Parallel Circuits
- Power
- Final Exam

112 Electrical: A continuation of the Electrical 1 course, concepts presented and discussed are oriented towards alternating current production and application, specifically to devices utilized in HVAC/R systems. The second six modules cover:

- Magnetism
- Alternating current
- Loads, Resistive, and Inductive
- Capacitors
- Impedance and power distribution
- Transformers
- Final Exam

113 Electrical: The first portion of this course covers common control components found in HVAC/R systems. Presentations and examples are given for specific devices and their electrical sequence of operation in normal HVAC/R applications. The final module of this first half discusses wiring and schematic reading.

- Control Methods, Temperature, and Pressure
- Residential Heat/cool Thermostats at Low voltage
- Really Good Relay Stuff
- Contractors go/Starters go with protection
- Power wiring
- Odds and ends around a schematic
- Final Exam

114 Electrical: The second portion of the 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 and motor troubleshooting.

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

121 Systems Properties & Measurement: The first half of this course is an introduction to HVAC comfort parameters. Topics covered include human comfort, air properties, intro to psychrometrics, and airflow measurement methods and calculations.

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

141 Refrigeration I: This course will serve as an introduction to the mechanical compression refrigeration cycle and the components necessary for operation. Students will be introduced to the common components and the terms and definitions of the cycle. HVAC/R Fundamentals is required prior to taking this course.

- Basic refrigeration cycle physics
- Compression and compressors
- Condensation and condensers
- Expansion and metering devices
- Evaporation and evaporators
- Measure the Normal cycle
- Final Exam

142 Refrigeration II: The second half of the course is a continuation and elaboration of HVAC/R Refrigeration 1. Presentations will describe the application of common accessories found in a system, piping arrangements, sizing considerations and system operation.

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

131 Oil Heat: The first portion of this course is to introduce the concept of combustion at a fundamental level. The focus will be on the current high-pressure gun oil burner.

- Characteristics of Fuel Oil and Priciples 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 System
- Final Exam

133 Gas Heat: The second half of the course covers combustion basics for natural gas and propane fuels as found in residential and light commercial applications. Presentations cover the common types of gas heating equipment.

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

161 HVAC/R Boilers: 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.

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

191 Hydronics: The second half of this course introduces the popular Hydronic heating system. The focus of this portion will be to prepare the learner to understand the installation and operation of a residential Hydronic system.

- System concept
- Materials and Tools
- Boilers
- Pumps
- Heat Transfer Units
- System Accessories
- Final Exam

135 Heat Pumps: The first half of this course is designed for a technician as an introduction to reverse-cycle air source heat pumps. Content covers the components and operational differences of a heat pump vs. a straight cooling system. A prerequisite is the HVAC cooling 1 course.

- 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
- Final Exam

151 HVAC/R Controls I: A good understanding of common HVAC systems is a prerequisite of this course—The Building and HVAC Systems

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

122 Systems II: The second half of this course is devoted to developing an ability to perform residential / light commercial heat-loss calculations (for heating systems) and size heating duct systems.

- Heat Loads Introduction
- Conduction Loads
- Solar Gain
- Infiltration & Ventilation Loads
- Duct Loads
- Complete Heat Loads

COMPUTER REQUIREMENTS

This program can be taken on a Mac (OS 10.3 or later) or PC (Windows XP or later). Macintosh users will want to use Mozilla Firefox 1.5 or higher. You must have Java, JavaScript, and cookies enabled. You will also need to disable your pop-up blocker for the hvcrlearn.com site.

INSTRUCTOR BIO

Chris Compton has a total of 28 years of experience in the HVACR field. He's certified at the Installation and Service level in all five of the NATE certifications. In 1998 he was selected as one of the top 10 outstanding Trades and Industry Educators in the U.S. by ACTE (Association of Career and Technical Education, formerly AVA, American Vocational Association). He received

the Imperial award from RSES for his CMS (Commercial Refrigeration) in 1997 and is a CMS member of RSES.

Seven years ago, Chris Compton was an HVACR instructor at North Idaho College looking for a way to implement HVACR curriculum on the Internet. He saw a unique opportunity to help traditional students as well as non-degree seeking students, people interested in starting a career in HVACR, contractors, the industry in general, and all those searching for a way to educate their workers to be successful in the ICE and NATE exams.

Since then, Chris has taken many tele-learning courses on how to set up online curriculum, the psychology behind online learning, how to create Web pages, and video instruction and design for the Web. Currently, Chris is the project director and content development manager (as well as chief cook and bottle washer) of an online company.