

**Associated Builders and Contractors, Inc. – Central Ohio Chapter
HVAC Program – NCCER *Contren Learning Series***

HVAC: Level One

03101-01 Introduction to HVAC (2.5 Hours)

Covers the basic principles of heating, ventilating, and air conditioning; and career opportunities in HVAC, training, and apprenticeship programs.

03102-01 Trade Mathematics (12.5 Hours)

Explains how to solve problems involving the measurement of lines, area, volume, weights, angles, pressure, vacuum, and temperature.

03103-01 Tools of the Trade (5 Hours)

Describes the purpose and use of tools such as wrenches, saws, hammers, drills, and measuring instruments, along with instructions on their safe use and maintenance.

03104-01 Copper and Plastic Piping Practices (5 Hours)

Covers the selection, preparation, joining, and support of copper, plastic piping, and fittings.

03105-01 Soldering and Brazing (7.5 Hours)

Covers tools, materials, and safety precautions and depicts step-by-step procedures for soldering and brazing copper piping.

03106-01 Ferrous Metal Piping Practices (5 Hours)

Covers various types of iron and steel pipe and fittings, and provides step-by-step instructions for cutting, threading, and joining ferrous piping.

03107-01 Basic Electricity (12.5 Hours)

Teaches power generation and distribution, electrical components, DC circuits, and electrical safety.

03108-01 Introduction to Cooling (30 Hours)

Covers the basic principles of heat transfer, refrigeration, and pressure-temperature relationships, and describes the components and accessories used in air conditioning systems.

03109-01 Introduction to Heating (15 Hours)

Covers heating fundamentals, types and designs of furnaces and their components, and basic procedures for installing and servicing furnaces.

HVAC: Level Two

03201-01 Air Distribution Systems (10 Hours)

Describes air distribution systems and their components, air flow measurement, ductwork installation principles, and the use of psychometric charts.

03202-01 Chimneys, Vents, and Flues (5 Hours)

Describes the principles of furnace venting and the proper methods for selecting and installing vent systems for gas-fired heating equipment.

03203-01 Maintenance Skills for the Service Technician (17.5 Hours)

Covers the application and installation of various types of fasteners, gaskets, seals, and lubricants, as well as the installation and adjustment of different types of belt drives, bearings, and couplings.

03204-01 Alternating Current (12.5 Hours)

Covers transformers, single-phase and three-phase power distribution, capacitors, the theory and operation of induction motors, and the instruments and techniques used in testing AC circuits and components. Also reviews electrical safety.

03205-01 Basic Electronics (5 Hours)

Explains the theory of solid state electronics, as well as the operation, use, and testing of the various electronic components used in HVAC equipment.

03206-01 Electric Heating (5 Hours)

Covers the operation and testing of electric furnaces and their components, with emphasis on the operation of electric furnace control circuits.

03207-01 Introduction to Control Circuit Troubleshooting (30 Hours)

Covers the operation, testing, and adjustment of conventional and electronic thermostats as well as the operation of common electrical, electronic, and pneumatic circuits used to control HVAC systems. Also explains how to analyze circuit diagrams for electronic and microprocessor based controls used in comfort heating and cooling equipment and how to troubleshoot systems that use these controls.

03208-01 Accessories and Optional Equipment (7.5 Hours)

Covers the basic principles, processes, and devices used to control humidity and air cleanliness, as well as devices used to conserve energy in HVAC systems.

03209-01 Metering Devices (7.5 Hours)

Covers the operating principles, applications, installation, and the adjustment of the various types of fixed and adjustable expansion devices used in air conditioning equipment.

03210-01 Compressors (15 Hours)

Explains the operating principles of the different types of compressors used in comfort air conditioning systems as well as basic installation service and repair procedures for these compressors.

03211-01 Heat Pumps (15 Hours)

Covers the principles of reverse cycle heating, describes the operation of the various types of heat pumps, and helps the trainee learn how to analyze heat pump control circuits. Includes heat pump installation and service procedures.

03212-01 Leak Detection, Evacuation, Recovery, and Charging (20 Hours)

Covers all the basic refrigerant handling and equipment servicing procedures that a technician must know in order to service HVAC systems in a manner that is safe for the environment.

**Associated Builders and Contractors, Inc. – Central Ohio Chapter
HVAC Program – NCCER *Contren Learning Series***

HVAC: Level Three

03301-02 Preventive Maintenance (20 Hours)

Describes the purpose of preventive maintenance and outlines the procedures for servicing gas and oil furnaces, electric heating equipment, cooling equipment, and heat pumps.

03302-02 Troubleshooting Gas Heating (12.5 Hours)

Covers tools and instruments used in troubleshooting gas heating appliances and offers trainees the opportunity to isolate and correct faults under the instructor's supervision.

03303-02 Troubleshooting Electric Heating (5 Hours)

Reviews the operation of electric heating appliances as trainees will spend time in the lab learning to isolate and correct faults in such equipment.

03304-02 Troubleshooting Oil Heat (10 Hours)

Teaches trainees to identify the common causes of problems in oil furnaces and offers hands-on experience in isolating and correcting oil furnace malfunctions.

03305-02 Troubleshooting Cooling (20 Hours)

Covers the basic techniques and equipment used in troubleshooting cooling equipment; explains how to troubleshoot cooling equipment malfunctions in the lab.

03306-02 Troubleshooting Heat Pumps (12.5 Hours)

Following a review of heat pump operation and heat pump control circuits, the trainee will work with the instructor in the lab to isolate and correct faults in the heating, cooling, auxiliary heat, and defrost functions of heat pumps.

03307-02 Troubleshooting Accessories (10 Hours)

In hands-on lab sessions, trainees learn how to troubleshoot humidifiers, electronic air cleaners, economizers, zone controls, and heat recovery ventilators.

03308-02 Troubleshooting Electronic Controls (7.5 Hours)

Explains how to analyze circuit diagrams for electronic and microprocessor-based controls used in comfort heating and cooling equipment, and how to troubleshoot systems that use these controls.

03309-02 Hydronic Heating and Cooling Systems (30 Hours)

Covers operating principles, piping systems, preventive maintenance, and servicing of boilers, chillers, chilled water systems, absorption systems, steam systems, and steam traps. Includes balancing procedures for chilled water systems.

03310-02 Airside Systems (15 Hours)

Describes the systems, equipment, and operating sequences used in a variety of commercial airside system configurations, such as constant volume single-zone and multi-zone, VVT, VAV, and dual-duct VAV.

03311-02 Air Properties and Air System Balancing (20 Hours)

Explains air properties, related gas laws, and psychrometric principles and psychrometric charts. Covers tools, instruments, and methods used to balance air systems.

HVAC: Level Four

03401-03 Construction Drawings and Specifications (25 Hours)

Discusses techniques for reading and using blueprints, specifications, and shop drawings. Uses blueprints from the Core Curriculum.

03402-03 Indoor Air Quality (10 Hours)

Introduces indoor air quality and its effect on the health and comfort of building occupants. Provides guidelines for performing a building IAQ survey and identifies equipment and methods used to test for and achieve good indoor air quality.

03403-03 Energy Conservation Equipment (7.5 Hours)

Introduces the trainees to various heat recovery/reclaim devices and other energy reduction and recovery apparatus.

03404-03 Energy Management Systems (15 Hours)

Explains how computers and microprocessor controls are used to manage zoned HVAC systems in residential and commercial buildings. Includes an introduction to computers and computer networks.

03405-03 Water Treatment (10 Hours)

Covers the kinds of water problems encountered in heating and cooling systems and identifies various water treatment methods and equipment.

03406-03 System Startup and Shutdown (22.5 Hours)

Covers procedures for the start-up of hot water and steam heating systems, chilled water systems, and forced air distribution systems. Emphasis is on start-up after initial equipment installation or after an extended period of shut-down. Procedures to prepare the same kinds of systems for extended periods of shut-down are included.

03407-03 Heating and Cooling System Design (30 Hours)

Explains the factors that affect the heating and cooling loads are calculated, and shows how load information is used to select heating and cooling equipment. Covers types of duct systems as well as their selection, sizing, and installation.

03408-03 Commercial and Industrial Refrigeration (22.5 Hours)

Covers components and operation of refrigeration systems, with emphasis on systems used for cold storage and other commercial food preservation applications. Also covers the components and operation of ice-making machines.