Heating Ventilation Air-Conditioner and Refrigeration (HVAC/R)  
Program Syllabus

Hours/Credits: 714 / 55

Assigned Course Preparation Clock Hours: 230

Prerequisites: High School Diploma or GED

Program Description: The HVAC/R program is in which students will develop their skills and knowledge related to residential and commercial heating, ventilation, air conditioning, refrigeration and basic principles and practices of propane and natural gas service technician for small appliance installation and service Certification recognized for licensing in the State of Maine (HVAC/R). Topics covered include electricity, thermodynamics, combustion properties, principles of venting and ventilation, systems sizing and code interpretation, psychometrics, diagnostic, forced air furnaces, air distribution systems, and heating/cooling load analysis. This course gives students a substantial skill and knowledge foundation typically required for apprentice HVAC/R technicians. Course content provides school based and work based learning opportunities for students. Course content prepares students for entry-level employment, advanced training in HVAC/R, and entry into postsecondary education.

Program Objectives:
- Prepare students with the troubleshooting, repair, and safety skills needed for entry-level positions in the HVAC industry.
- Preparation for entry-level employment with independent HVAC contractors, property management companies, and large buildings such as hospitals and hotels.
- Give students a thorough grounding in the fundamentals of heating and cooling system design, installation, operation and analysis.
- An emphasis is also placed on proper safety practices and procedures, in the lab and the workplace, while installing, designing, troubleshooting and servicing HVAC/R systems.
- Prepare student to pass multiple industry certifications (EPA, NORA Bronze and CETP)

Methods of Instruction: All courses are delivered in a group & one-on-one instruction, using textbooks, educational materials, and field opportunities.

Schedule:
Full-time is Mon-Wed: 8:30am-5:00pm | Thu: 8:30am-3:00pm
Half-time is Mon-Thurs: 5:30-9:30pm
Program Outline:

HVAC-01IH
Course Title: Introduction to HVAC/R and Oil Technician (NORA)
In Class Clock Hours: 180
Assigned Course Preparation Clock Hours: 40
This course begins with an introduction to the HVAC/R industry including basic of heating, ventilation, air conditioning, tools, safety, equipment and piping. The course then moves on to oil (NORA – National Oilheat Research Alliance). The course combines 80 hours of classroom instruction with 80 hours of hands on training in a shop environment. Students develop their knowledge and skills related to residential and commercial oil heating. Upon completion of this course students can receive NORA Bronze certification. This course is recognized for licensing in the State of Maine, allowing students to sit for their Journeyman Oil Burner Technician after just 6 months of field experience. Topics covered include; heating oil and its properties, oil tanks and piping, fuel units, nozzles, combustion chambers, drafting & venting, combustion properties, basic electricity, ignition systems, motors controls, thermostats, hydronic and forced air systems, maintenance and service. This course gives students the skills to pass the NORA Bronze certification upon the completion of the program.

HVAC-02BI
Course Title: Basic Installation & Maintenance Practices
In Class Clock Hours: 160
Assigned Course Preparation Clock Hours: 40
Basic installation and maintenance practices introduce the student to airside systems, chimneys, vents and flues, hydronic and sheet metal and fiberglass duct systems, leak detection, evacuation, recovery and charging, alternating current, heat pumps, air quality equipment and EPA 608 certification.

HVAC-03ST
Course Title: Systems and Troubleshooting
In Class Clock Hours: 124
Assigned Course Preparation Clock Hours: 35
This course covers refrigeration, steam systems, refrigerants and oils, compressors, meter devices, retail refrigeration, hydronic systems, steam systems, water treatment, maintenance and troubleshooting practices.
HVAC-04SD
Course Title: System Designs
In Class Clock Hours: 160
Assigned Course Preparation Clock Hours: 40
Studies include construction and specifications, indoor air quality, building management systems, system start up and shutdown, refrigeration, heating and cooling system design and energy conservation equipment.

HVAC-GAS
Course Title: Gas
In Class Clock Hours: 90
Assigned Course Preparation Clock Hours: 30
Studies include principles and practices of propane, applying basic electricity principles to service propane appliances and appliance installation. This course also prepares students to pass a national certification exam and obtain a state license.
CETP Includes:
4.2 Placing Vapor Distribution System and Appliances into Operation,
4.3 Installing Appliances and Interior Vapor Distribution Systems,
7.0 Applying Basic Electricity Principle to Propane Equipment,
1.0 Basic Principle and Practices of Propane,
FGT 1.1 Natural Gas
NFPA 54 National Fuel Gas Code
NFPA 58 Liquefied Petroleum Gas Code

HVAC-EXT
Course Title: Externship (optional)
Hours: 80
In an HVAC externship is on the job experience with residential and/or commercial properties. The student could install, maintain and repair heating, air conditioning and refrigeration systems. He or she may also specialize in heating, air conditioning or refrigeration work during an externship or may specialize in installation or in maintenance and repair.

Textbooks and Materials:

HVAC/R Text Book:
- NORA Oil Heat Technician's Manual (Silver Certification Manual) $52.00
  Or
- NORA Silver Book DVD $14.00

**HVAC/R Additional Materials:**

- Beckett Oil Training Manual
- EPA 608 Refrigerant Certification: Quick Study Guide & CD
- NFPA-54 Gas Code Book
- NFPA-58 Gas Code Book
- Basic Principles & Practices of Propane Book 1.0
- Placing Vapor Distribution Systems and Appliances into Operations Book 4.2
- Installing Appliances and Interior Vapor Distribution Systems Book 4.3
- Applying Basic Electricity to Service Propane Appliances Book 7.0
- Fuel Gas Technician (Natural Gas) Book FGT 1.1

**The HVAC/R tools that are required for the course:**

1. Tool Bag
2. Casio FX 260 Solar Calculator
3. Safety Glasses
4. Multi-colored Pen
5. Offset Wrench
6. Digital Clamp-on Multi-meter
7. Gas Pressure Test Kit (manometer)
8. Yellow Jacket Manifold Gages with Hose Set
9. Refrigerant Pressure/temperature Chart
10. Hex Valve Adapter
11. 6 in 1 Screwdriver

**Certifications:**

**CETP**

Students may be tested for Gas Certification through CETP (The Certified Employee Training Program).

CETP is a formal body for training, testing and documentation to ensure that workers in the propane industry have the necessary knowledge and skills to perform their work safely and effectively.
EPA

- Students can test for the 4 certification exams for EPA 608.
- Type I Certification – Can only work on Small Appliance (5lbs or less of refrigerant).
- Type II Certification – Can only work on Medium, High and Very-High Pressure Appliances.
- Type III Certification – Can only work on Low-Pressure Appliances.
- Universal Certification – Someone who possesses Type I, Type II and Type III Certifications

NORA

National Oilheat Research Alliance is a collaborative program established by the oil heating industry to strengthen the industry by improving education and training for employees in the

- Bronze Certification is designed for beginner’s to learn and execute fundamental skills. This certification is the first step toward a rewarding career as an Oilheat Service Technician.