Objectives

**What you will learn**

* Explain the concepts of heat transfer, Btu, temperature, heat content, sensible heat, latent heat, pressure, gas laws, and work, and describe how they apply to air conditioning and refrigeration systems
* Describe the four basic components that make up the vapor-compression refrigeration cycle
* Identify the four major system components and explain their functions in the refrigeration system
* Properly install an air-conditioning system and put it into operation
* Troubleshoot mechanical and electrical problems in an air-conditioning and heat pump systems

**How you will benefit**

* You will be prepared to sit for the NATE Ready to Work Certificate exams
* You will be prepared to sit for the HVAC Excellence Employment Ready Certificate Exams
* You will be prepared to sit for the EPA 608 Refrigerant Handling Certification Exam
* Use real-world simulations included in this program to get "hands-on" experience
* Soft skills simulations included in the course will help sharpen your customer service skills

Outline

1. Introduction
   1. Heat, Temperature, and Pressure
   2. Matter and Energy
   3. Refrigeration and Refrigerants
2. Safety, Tools and Equipment, and Shop Practices
   1. General Safety Practices
   2. Tools and Equipment
   3. Fasteners
   4. Tubing and Piping
   5. Leak Detection, System Evacuation, and System Cleanup
   6. Refrigeration and Oil Chemistry and Management – Recovery, Recycling, and Reclaiming, and Retrofitting
   7. System Charging
   8. Calibrating Instruments
   9. Simulation: Safety Quiz
   10. Simulation: Soft Skills Quiz
3. Automatic Controls
   1. Basic Electricity and Magnetism
   2. Introduction to Automatic Controls
   3. Automatic Control Components and Applications
   4. Troubleshooting Basic Controls
   5. Advanced Automatic Controls-Direct Digital Controls (DDCs) and Pneumatics
4. Electric Motors
   1. Types of Electric Motors
   2. Application of Motors
   3. Motor Controls
   4. Troubleshooting Electric Motors
5. Commercial Refrigeration, Part 1
   1. Evaporators and the Refrigeration System
   2. Condensers
   3. Compressors
6. Commercial Refrigeration, Part 2
   1. Expansion Devices
   2. Special Refrigeration Systems
   3. Commercial Ice Machines
7. Commercial Refrigeration, Part 3
   1. Special Refrigeration Applications
   2. Troubleshooting and Typical Operating Conditions for Commercial Refrigeration
8. Air-Conditioning (Heating and Humidification)
   1. Electric Heat
   2. Gas Heat
   3. Oil Heat
   4. Hydronic Heat
   5. Indoor Air Quality
9. Air-Conditioning (Cooling)
   1. Comfort and Psychometrics
   2. Refrigeration Applied to Air-Conditioning
   3. Air Distribution and Balance
   4. Installation
   5. Residential Energy Auditing
   6. Typical Conditions
   7. Troubleshooting
10. All-Weather Systems
    1. Heat Gains and Heat Losses in Structures
    2. Air Source Heat Pumps
    3. Geothermal Heat Pumps
11. Domestic Appliances
    1. Domestic Refrigerators and Freezers
    2. Room Air Conditioners
12. Commercial Air-Conditioning and Chilled-Water Systems
    1. High-Pressure, Low-Pressure, and Absorption Chilled-Water Systems
    2. Cooling Towers and Pumps
    3. Operation, Maintenance, and Troubleshooting of Chilled-Water Air-Conditioning Systems
    4. Commercial, Packaged Rooftop, Variable Refrigerant Flow, and Variable Air Volume Systems
13. Simulation Challenge Mode: HVAC
14. Simulation Challenge Mode: Electricity for HVAC
15. Soft Skills and the HVACR Technician
    1. Communication
    2. Decision-Making
    3. Time Management
    4. Problem Solving
    5. Accepting Responsibility