Certificate in Fundamentals of HVAC&R Technology

Curriculum Sequence and Course Descriptions

Semester 1 - Weeks 1-12
HV111- Fundamentals of Electricity as applied to HVAC-R 8 WEEKS
1. General safety/ OSHA Certification
2. Intro/ Basic electricity/magnetism
3. Series/Parallel Circuits, Electric Motors
4. Contactors, Relays, Transformers

HV112- Fundamentals of Refrigeration 4 WEEKS
1. Theory of Heat/ Laws of Thermodynamics
2. Basic Refrigeration Mechanical Components and Operation
3. Refrigerant Types and Applications
4. Refrigeration Trainer Assembly

Semester 2 – Weeks 13-24
HV113- Electrical and Mechanical for Refrigeration 5 WEEKS
1. Refrigeration Controls and Wiring
2. System Charging and Evacuation
3. Superheat/Subcooling
4. Tubing and piping techniques

HV114- EPA Refrigerant Recovery, Recycle and Reclaim 4 WEEKS
1. Refrigerants/Charging/Recovery/Evacuation
2. Epa Test Preparation and Certification
3. Setting Pressure Controls

HV211- Commercial Refrigeration and Ice Machines- 3 WEEKS
1. Controls and Defrost Systems
2. Mechanical Components
3. Ice Machines

Semester 3 – Weeks 25-37
HV212- Commercial Air conditioning and Heat Pumps -3 WEEKS
1. Ductless Mini Split Systems/Comfort and Psychometrics
2. Heat Pumps: Geothermal/Water Source
3. Packaged Roof Top Units/ Chillers and Cooling Towers

HV213- Gas Heating and Residential Air Conditioning -4 WEEKS
1. Combustion, Fuels, Types of Furnaces
2. Electrical Controls, Electrical Codes, and Wiring
3. Mechanical Components and Testing/ Installation and Maintenance
4. Troubleshooting

HV214-Oil Furnaces and Hydronic Heating - 5 WEEKS
1. Oil Burner Components, Combustion, and Fuels
2. Electrical Controls, Codes, and Wiring/ Combustion Efficiency Testing
3. Hydronic Components, Operation, Installation, and Troubleshooting
4. Review/HVAC Competencies

Certificate Outcomes

Upon successful completion of this HVAC&R Certificate, graduates are qualified to:

- Demonstrate the principles of refrigeration and air conditioning.
- Identify the principles of different refrigerants and their temperature-pressure relationships.
- Demonstrate knowledge of refrigeration and air conditioning components, including compressors, evaporators, metering devices, and condensers.
- Implement proper charging of refrigeration and air conditioning systems and proper leak protection methods.
- Solder and braze pipes and fittings.
- Pressure test and detect leaks in refrigeration systems.
- Recover, reclaim and recycle refrigerant in accordance with EPA and Mass. Dept. of Public Safety guidelines.
- Flare and swage tubing.
- Troubleshoot electrical and mechanical malfunctions of commercial and domestic units.
- Use HVAC&R tools and measuring devices effectively.
- Proper installation maintenance procedures of heating, refrigeration, air conditioning, and ventilation equipment.