

## **Heating and Air Conditioning (HAC)**

### **HAC 101 Basic Plumbing Systems**

3 Hours

Prerequisites: None

4 hours weekly (2-2)

The students will be introduced to basic plumbing systems and fittings. Water heater, sink, faucet, drain, piping systems, and toilet repair, installation, and maintenance will be covered. Special emphasis will be placed on all local plumbing codes and safety protocols following OSHA guidelines. Hands-on training on real-life equipment will be the focus.

### **HAC 102 Residential Electrical Wiring**

4 Hours

Prerequisites: None

6 hours weekly (2-4)

This course introduces students to the fundamental principles and practices of residential electrical wiring. Topics include electrical theory, safety procedures, circuit design, code compliance, and hands-on installation of electrical components commonly found in residential settings. Students will learn to interpret wiring diagrams, install receptacles, switches, lighting fixtures, and circuit breakers, and apply the National Electrical Code (NEC) to real-world scenarios. Emphasis is placed on safe work habits, proper tool usage, and basic troubleshooting techniques. This course is ideal for individuals pursuing careers in electrical trades, HVAC, or residential construction.

### **HAC 105 Basic Sheet Metal Layout**

3 Hours

Prerequisites: None

4 hours weekly (2-2)

A basic course for sheet metal pattern layout techniques as used in residential air conditioning and ventilation.

### **HAC 106 Advanced Sheet Metal Layout**

2 Hours

Prerequisites: HAC 105

4 hours weekly (0-4)

An advanced course for sheet metal layout techniques as used in residential and commercial air conditioning and ventilation systems. The triangulation method of sheet metal layout will be emphasized in this course.

### **HAC 107 Electrical Controls and Circuitry**

3 Hours

Prerequisites: ELT 102 or HAC 102

4 hours weekly (2-2)

The student is introduced to air conditioning, heating, and refrigeration controls circuitry as well as solid state electronic controls. Proper troubleshooting techniques as well as safety will be covered.

### **HAC 121 Heating I**

4 Hours

Prerequisites: None

6 hours weekly (2-4)

This introductory course covers the principles, components, and operation of residential and light commercial heating systems with an emphasis on gas furnaces and hot water boilers. Students will learn combustion fundamentals, venting requirements, and safety controls essential to proper system performance. Instruction includes identification of parts, sequence of operation, installation basics, and preventive maintenance procedures. Hands-on lab activities provide practice in measuring gas

pressure, checking ignition systems, verifying flue draft, and performing basic troubleshooting. By the end of the course, students will have a solid foundation in heating system operation and service, preparing them for more advanced HVAC coursework and entry-level employment opportunities.

### **HAC 122 HVAC Design and Home Performance**

4 Hours

Prerequisites: None

6 hours weekly (2-4)

This comprehensive course provides an in-depth exploration of HVAC (Heating, Ventilation, and Air Conditioning) design principles and home performance strategies. Designed for professionals and aspiring technicians, the course covers essential topics such as load calculations, system sizing, energy efficiency, indoor air quality, duct design, and building envelope considerations. Participants will gain practical knowledge on optimizing HVAC systems for residential and light commercial buildings while incorporating best practices for energy conservation and comfort. The course integrates real-world applications, including hands-on exercises, case studies, and the latest industry standards. By the end of the course, students will be equipped with the skills needed to assess, design, and implement high-performing HVAC solutions that enhance home efficiency and occupant comfort.

### **HAC 131 Refrigeration and Air Conditioning I**

4 Hours

Prerequisites: None

6 hours weekly (2-4)

This course covers the fundamentals of refrigeration, refrigeration cycle, and basic refrigeration systems. Compression systems, refrigeration controls, charging, evacuating, and

refrigeration tools and materials will be covered.

### **HAC 132 Refrigeration and Air Conditioning II**

4 Hours

Prerequisites: HAC 131

6 hours weekly (2-4)

This course focuses on advanced concepts and diagnostic procedures for residential refrigeration systems, including high-efficiency air conditioners, and residential refrigeration appliances. Students will refine their skills in system troubleshooting, airflow diagnostics, refrigerant charging, and performance optimization. Emphasis is placed on advanced electrical diagnostics, modern metering devices, and the transition to low-GWP refrigerants. Hands-on training includes use of digital gauges, recovery machines, and advanced leak detection equipment. The course prepares students for upper-level residential service roles and supports EPA Section 608 certification competencies.

### **HAC 142 Commercial Refrigeration**

4 Hours

Prerequisites: HAC 131

5 hours weekly (3-2)

This course is designed to introduce the student to the operation and application of commercial refrigeration, evaporators, condensers, compressors, expansion devices, and related system components. Troubleshooting and typical operating conditions will be studied.

### **HAC 207 Advanced Controls and Circuitry**

3 Hours

Prerequisites: HAC 102 & HAC 107

4 hours weekly (2-2)

This advanced course focuses on modern HVAC control strategies with an emphasis on variable speed technologies and integrated system efficiency. Students will gain hands-on experience with advanced control systems, including digital thermostats, communicating equipment, zoning applications, building automation interfaces, and energy management systems. Key topics include commissioning and programming of ECM motors, inverter-driven compressors, and modulating furnaces, along with diagnostics using manufacturer software and smart tools. The course also explores system optimization for comfort, indoor air quality, and energy savings, with attention to troubleshooting complex variable speed equipment and interpreting advanced fault codes. By the end of the course, students will be prepared to service, install, and fine-tune today's high-efficiency HVAC equipment in both residential and light commercial applications. Troubleshooting on all types of HVAC equipment will be covered.

### **HAC 222 Advanced Heating Systems**

3 Hours

Prerequisites: HAC 121, HAC 122

4 hours weekly (2-2)

This course provides students with a comprehensive understanding of heat pump technology, operation, and service. Emphasis is placed on the principles of refrigeration and thermodynamics as they apply to heat pump systems, including both air-source and ground-source designs. Students will learn installation practices, electrical and mechanical components, troubleshooting techniques, and performance testing. Topics also include defrost cycles, auxiliary/emergency heat operation, refrigerant management, and efficiency considerations. Hands-on lab exercises will reinforce classroom instruction, preparing students to diagnose, repair, and maintain

residential and light commercial heat pump systems. Mini-split heat pumps and variable capacity equipment will also be covered.

### **HAC 224 Geothermal Systems**

3 Hours

Prerequisites: None

4 hours weekly (2-2)

This course covers Geothermal as it is used in the HVAC industry. Basic concepts of geothermal installation, design, maintenance, and troubleshooting will be covered. Special emphasis will be placed on loop systems, loop flushing, and fusion piping.

### **HAC 240 Installation of HVAC Systems**

3 Hours

Prerequisites: HAC 121, HAC 131

5 hours weekly (1-4)

Student will develop advanced skills and knowledge of the installation and start-up of residential heating and air conditioning systems. Focuses on installation code requirements and start-up procedures for residential heating and air conditioning systems. Tools safety and add-on purchases will also be covered.

### **HAC 279 ICE Testing**

2 Hours

Prerequisites: None

2 hours weekly (2-0)

This course provides students with a comprehensive overview of HVAC testing practices across residential, commercial, and industrial systems. Emphasis is placed on performance verification, troubleshooting, and diagnostic testing of heating, cooling, refrigeration, and ventilation systems. Students

will gain hands-on experience with industry-standard testing equipment and procedures while preparing for nationally recognized ESCO Institute competency exams.