Air Conditioning, Heating & Refrigeration Technology

The Air Conditioning, Heating and Refrigeration Technology (AHR) curriculum provides the basic knowledge for developing skills fundamental to working with residential and light commercial systems. Graduates are able to assist in the start-up, preventive maintenance, service, repair and installation of residential and light commercial systems. A.A.S. graduates can also articulate an understanding of system selection, air balancing, building automation, system applications and indoor air quality.

GET STARTED

The admissions application is required for all students taking curriculum classes – classes that carry credit toward a degree, diploma or credit certificate.

- Check or establish residency.
- Complete admissions application to CPCC.
- Create your CPCC Login (username and password).
- Log into your CPCC student email.
- Complete FAFSA to begin the financial aid process.
- Submit high school and external college transcripts; then have college transcripts evaluated.
- Take the ACCUPLACER test (If required).
- Sign-up and attend an orientation and advising session.
- Register and pay for classes, or confirm that you have a financial aid award by the payment due date.

FOR MORE INFORMATION

Air Conditioning, Heating & Refrigeration Department
Construction Technologies Division
704.330.4408
cpcc.edu/hvac

Consult with a faculty member or the program chair prior to registering.

**For transfer to a Bachelor of Arts degree program, students must successfully complete MAT 143. For transfer to a Bachelor of Science degree program, students must successfully complete MAT 171. Please see your faculty advisor for further details.

**Any from approved list
AHR 110. Introduction to Refrigeration
This course introduces the basic refrigeration process used in mechanical refrigeration and air conditioning systems. Topics include terminology, safety, and identification and function of components; refrigeration cycle; and tools and instrumentation used in mechanical refrigeration systems. Upon completion, students should be able to identify refrigeration systems and components, explain the refrigeration process, and use the tools and instrumentation of the trade.

AHR 112. Heating Technology
This course covers the fundamentals of heating including oil, gas, and electric heating systems. Topics include safety, tools and instrumentation, system operating characteristics, installation techniques, efficiency testing, electrical power, and control systems. Upon completion, students should be able to explain the basic oil, gas, and electrical heating systems and describe the major components of a heating system.

AHR 113. Comfort Cooling
This course covers the installation procedures, system operations, and maintenance of residential and light commercial comfort cooling systems. Topics include terminology, component operation, and testing and repair of equipment used to control and produce assured comfort levels. Upon completion, students should be able to use psychrometrics, manufacturer specifications, and test instruments to determine proper system operation.

AHR 114. Heat Pump Technology
This course covers the principles of air source and water source heat pumps. Emphasis is placed on safety, modes of operation, defrost systems, refrigerant charging, and system performance. Upon completion, students should be able to understand and analyze system performance and perform routine service procedures.

AHR 115. Refrigeration Systems
This course introduces refrigeration systems and applications. Topics include defrost methods, safety and operational control, refrigerant piping, refrigerant recovery and charging, and leak testing. Upon completion, students should be able to assist in installing and testing refrigeration systems and perform simple repairs.

AHR 130. HVAC Controls
This course covers the types of controls found in residential and commercial comfort systems. Topics include electrical and electronic controls, control schematics and diagrams, test instruments, and analysis and troubleshooting of electrical systems. Upon completion, students should be able to diagnose and repair common residential and commercial comfort system controls. This course covers the types of controls found in residential and commercial comfort systems. Topics include electrical and electronic controls schematics and diagrams, test instruments, and analysis and troubleshooting of electrical systems. Upon completion, students should be able to diagnose and repair common residential and commercial comfort system controls.

AHR 140. All-Weather Systems.
This course covers the principles of combination heating and cooling systems including gas-electric, all-electric, and oil-electric systems. Topics include PTAC's and package and split-system units. Upon completion, students should be able to understand systems performance and perform routine maintenance procedures.

AHR 151. HVAC Duct Systems I
This course introduces the techniques used to lay out and fabricate duct work commonly found in HVAC systems. Emphasis is placed on the skills required to fabricate duct work. Upon completion, students should be able to lay out and

Approved Technical Electives

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<tr>
<th>Course Number</th>
<th>Course Title</th>
<th>Credit Hours</th>
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<tr>
<td>AHR 215</td>
<td>Commercial HVAC Controls</td>
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<tr>
<td>AHR 255</td>
<td>Indoor Air Quality</td>
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</tr>
<tr>
<td>AHR 263</td>
<td>Energy Management</td>
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<tr>
<td>WBL 111</td>
<td>Work-Based Learning I</td>
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<tr>
<td>WBL 112</td>
<td>Work-Based Learning I</td>
<td>2</td>
</tr>
<tr>
<td>WLD 112</td>
<td>Basic Welding Processes</td>
<td>2</td>
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</tbody>
</table>
fabricate simple duct work.
AHR 160. Refrigerant Certification.
This course covers the requirements for the EPA certification examinations. Topics include small appliances, high pressure systems, and low pressure systems. Upon completion, students should be able to demonstrate knowledge of refrigerants and be prepared for the EPA certification examinations.

AHR 180. HVACR Customer Relations.
This course introduces common business and customer relation practices that may be encountered in HVACR. Topics include business practices, appearance of self and vehicle, ways of handling customer complaints, invoices, telephone communications, and warranties. Upon completion, students should be able to present themselves to customers in a professional manner, understand how the business operates, complete invoices, and handle complaints.

AHR 211. Residential System Design.
This course introduces the principles and concepts of conventional residential heating and cooling system design. Topics include heating and cooling load estimating, basic psychrometrics, equipment selection, duct system selection, and system design. Upon completion, students should be able to design a basic residential heating and cooling system.

AHR 212. Advanced Comfort Systems.
This course covers water-cooled comfort systems, water-source/geothermal heat pumps, and high efficiency heat pump systems including variable speed drives and controls. Emphasis is placed on the application, installation, and servicing of water-source systems and the mechanical and electronic control components of advanced comfort systems. Upon completion, students should be able to test, analyze, and troubleshoot water-cooled comfort systems, water-source/geothermal heat pumps, and high efficiency heat pumps.

AHR 213. HVACR Building Code.
This course covers the North Carolina codes that are applicable to the design and installation of HVACR systems. Topics include current North Carolina codes as applied to HVACR design, service, and installation. Upon completion, students should be able to demonstrate the correct usage of North Carolina codes that apply to specific areas of the HVACR trade.

AHR 215. Commercial HVAC Controls.
This course introduces HVAC control systems used in commercial applications. Topics include electric/electronic control systems, pneumatic control systems, DDC temperature sensors, humidity sensors, pressure sensors, wiring, controllers, actuators, and controlled devices. Upon completion, students should be able to verify or correct the performance of common control systems with regard to sequence of operation and safety.

This course covers the principles of designing heating and cooling systems for commercial buildings. Emphasis is placed on commercial heat loss/gain calculations, applied psychrometrics, air-flow calculations, air distribution system design, and equipment selection. Upon completion, students should be able to calculate heat loss/gain, design and size air and water distribution systems, and select equipment.

AHR 235. Refrigeration Design.
This course covers the principles of commercial refrigeration system operation and design. Topics include walk-in coolers, walk-in freezers, system components, load calculations, equipment selection, defrost systems, refrigerant line sizing, and electric controls. Upon completion, students should be able to design, adjust, and perform routine service procedures on a commercial refrigeration system.

AHR 255. Indoor Air Quality
This course introduces the techniques of assessing and maintaining the quality of the indoor environment in residential and commercial structures. Topics include handling and investigating complaints, filter selection, humidity control, testing for sources of carbon monoxide, impact of mechanical ventilation, and building and duct pressures. Upon completion, students should be able to assist in investigating and solving common indoor air quality problems.

AHR 263. Energy Management.
This course covers building automation computer programming as currently used in energy management. Topics include night setback, duty cycling, synchronization, schedule optimization, and anticipatory temperature control. Upon completion, students should be able to write programs utilizing the above topics and connect computer systems to HVAC systems.

Prerequisites: Take One: AHR 125 or AHR 215
Air Conditioning, Heating & Refrigeration Technology

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**FIRST SEMESTER**
- AHR 110 Introduction to Refrigeration: 5 Credit
- ELC 111 Introduction to Electricity: 3 Credit
- AHR 160 Refrigerant Certification: 1 Credit
- AHR 180 HVAC Customer Relations: 1 Credit
- WOL 110 Basic Construction Skills: 3 Credit
- BPR 130 Print Reading – Construction: 3 Credit

**SECOND SEMESTER**
- AHR 130 HVACControls: 3 Credit
- AHR 133 Comfort Cooling: 4 Credit
- AHR 112 Heating Technology: 4 Credit
- MAT 110* Mathematical Measurements and Literacy: 3 Credit
- ENG 111 Writing and Inquiry: 3 Credit

**THIRD SEMESTER**
- ENG 112 Writing and Research in the Disciplines: 3 Credit
- COM 231 Public Speaking: 3 Credit
- ** Humanities Course: 3 Credit

**FOURTH SEMESTER**
- AHR 114 Heat Pump Technology: 4 Credit
- AHR 213 HVAC Building Codes: 2 Credit
- AHR 211 Residential System Design: 3 Credit
- AHR 212 Advanced Comfort Systems: 4 Credit

**FIFTH SEMESTER**
- AHR 215 Commercial HVAC Controls: 2 Credit
- AHR 255 Indoor Air Quality: 2 Credit
- AHR 263 Energy Management: 2 Credit
- ** Social/Behavioral Science: 3 Credit
- ** Technical Elective: 3 Credit

Total credit hours for degree: **67**

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<td>Architectural Building Information Modeling I</td>
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<tr>
<td>ELC 117</td>
<td>Motors and Controls</td>
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<tr>
<td>ELC 125</td>
<td>Diagrams and Schematics</td>
</tr>
<tr>
<td>ELC 128</td>
<td>Introduction to Programmable Logic Controller</td>
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<tr>
<td>WBL 110</td>
<td>World of Work</td>
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