# Heating, Ventilation, and Air Conditioning Technology

## Utility and Energy Systems Program

**Heat and Air Conditioning/Building Maintenance**  
*Associate in Applied Science Degree*  
*Certificate of Achievement*

**HVAC/R-Energy Mgmt Engineering Tech**  
*Associate in Applied Science Degree*

For Information:  
Contact the Utility & Energy Systems located in West Campus Building, Room M127 or by phone at (517) 483-1570.

Degree descriptions and requirements can be found at [www.lcc.edu/utility/hvac](http://www.lcc.edu/utility/hvac)

## Course Descriptions

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Units</th>
<th>Prerequisite</th>
<th>Description</th>
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<tbody>
<tr>
<td>HVAC 100</td>
<td>Fundamentals of HVAC</td>
<td>3</td>
<td>Reading Level 3 and Writing Level 2</td>
<td>This course is an introduction to the mechanical refrigeration cycle and its individual components. Compressors, evaporators, condensers and metering devices as well as their functions are covered in detail. Exercises in psychrometrics and an introduction to system design are also covered. (F,Sp,Su)</td>
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<tr>
<td>HVAC 102</td>
<td>Industrial/Construction Safety</td>
<td>2</td>
<td>Reading Level 3 and Writing Level 2</td>
<td>This course requires students to be certified in CPR and First Aid as part of the course grade. Training will occur as part of traditional on-campus sections. On-line students have the option of attending CPR and First Aid sessions at LCC's West Campus. Students who cannot travel to LCC will need to make other arrangements to become certified.</td>
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<tr>
<td>HVAC103</td>
<td>HVAC/R Piping</td>
<td>2</td>
<td>Minimum 2.0 in (HVAC 102 or ELTE 102 or METS 102 or WELD 102 or concurrently)</td>
<td>This course is designed to teach students about the common types of pipes used in the HVAC/R industry. Topics will include safety, tools and fasteners, common types of pipe, pipe joints, pipe fittings, and general guidelines for working with pipe and tubing. Hands-on experience with piping is included. (F,Sp,Su)</td>
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<tr>
<td>HVAC105</td>
<td>Sheet Metal Fabrication &amp; Installation</td>
<td>2</td>
<td>Minimum 2.0 in (HVAC 102 or ELTE 102 or METS 102 or WELD 102 or concurrently) and (minimum 2.0 in (MATH 050 or concurrently) or Math Level 4)</td>
<td>Designed to aid the installer in the skills and techniques for the proper duct sizing, layout, and installation of a residential air distribution system. Topics include sheet metal layout, identification of sheet metal fittings, and their use. Safe and proper use of tools and equipment used in the trade. (F,Sp,Su)</td>
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<tr>
<td>HVAC110</td>
<td>Applied Electricity I</td>
<td>3</td>
<td>Minimum 2.0 in (HVAC 102 or ELTE 102 or METS 102 or WELD 102 or concurrently) and Math Level 3</td>
<td>An introduction to basic electricity (AC and DC) using both theory and applied study methods. Topics will include electrical components, symbols, basic schematic diagrams, Ohm's Law applied to series and parallel circuits and motor types and usages. In conjunction with lab exercises, meters and their proper usage will be covered. (F,Sp,Su)</td>
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<tr>
<td>HVAC111</td>
<td>Applied Electricity II</td>
<td>3</td>
<td>Minimum 2.0 in (HVAC100 and HVAC110)</td>
<td>The study of motors with an emphasis on theory, troubleshooting and servicing. Motor controls, control circuits, protection devices and discussion of energy conservation as related to motors will be covered in detail. (F,Sp)</td>
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<tr>
<td>HVAC120</td>
<td>Heating I</td>
<td>3</td>
<td>Minimum 2.0 in (HVAC100 and HVAC110)</td>
<td>This course covers basic construction and function of components in residential gas and oil fired furnaces with detail on theory, application, troubleshooting, and servicing standard heating systems. Installation procedures and codes are also covered. Additional equipment studied will include humidifiers, air cleaners and vent dampers. (F,Sp)</td>
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</table>
HVAC130  Air Conditioning I  3
Prerequisite: Minimum 2.0 in (HVAC100 and HVAC110)
This course covers the fundamentals and principles of residential air conditioning systems. Students will learn soldering and brazing of tubing, wiring, component testing, evacuation procedures, charging and maintenance of both split systems, as well as small packaged units. (F,Sp)

HVAC201  Mechanical Code  4
Prerequisite: Minimum 2.0 in (HVAC120 and HVAC130)
A fundamental course designed to acquaint the student with the methods and techniques used in field inspection of mechanical systems. The Michigan Mechanical Code and excerpts from the International Fuel Gas Code and Michigan Residential Code will be discussed. (F,Sp)

HVAC220  Heating II  3
Prerequisite: Minimum 2.0 in (HVAC111 and HVAC120)
This course covers the fundamentals and principles of electronic ignition systems including troubleshooting and servicing. The major emphasis is placed on high efficiency and condensing furnaces to include sequence of operation, troubleshooting, servicing, and proper installation. (F,Sp)

HVAC221  Introduction to Hydronics  3
Prerequisite: Minimum 2.0 in HVAC120
Covers hot water and steam residential heating systems, piping and all accessories, safety controls, expansion tanks, zone valves, installation procedures and codes. Students perform testing, troubleshooting, adjusting and servicing of components to insure maximum efficiency. (F,Sp)

HVAC230  Air Conditioning II  3
Prerequisite: Minimum 2.0 in (HVAC111 and HVAC130)
This course covers advanced air conditioning, light commercial equipment, water cooled units, cooling towers, and the wiring of both control and line voltage circuitry. The latest in test equipment and meters will aid the student in becoming proficient in servicing and maintaining commercial equipment. (F,Sp)

HVAC231  Heat Pump  3
Prerequisite: Minimum 2.0 in HVAC230
This course deals entirely with heat pumps (air-to-air, water-to-air) and their installation, servicing, proper application or heat pump components, and extensive wiring schematics. (F)

HVAC240  Refrigeration I  3
Prerequisite: Minimum 2.0 in HVAC230 or concurrently
This course includes domestic refrigeration as applied to refrigerators, freezers and de-humidifiers. Course content includes applications, operation and servicing of sealed systems, electrical and cabinet styles. (F)

HVAC241  Refrigeration II  3
Prerequisite: Minimum 2.0 in HVAC240
This course provides instruction in light commercial refrigeration to include low and medium temperature applications as applied to ice machines, walk-ins, reach-ins, and display cases. (Sp)

HVAC251  Fundamentals of Direct Digital Controls  3
Prerequisite: Minimum 2.0 in HVAC230
Recommended: Basic Windows computer skills
Basic fundamentals and principles of direct digital controls will be covered through demonstrations of computer basics, control strategies for computer based energy management systems, and installation components according to industry standards. (F)

HVAC280  EPA 608 Certification Review  1
Prerequisite: None
Recommended: HVAC130 or HVAC field experience
This course prepares students for the EPA Section 608 Certification test which is required to work on appliances containing CFC, HCFC or HFC refrigerants. This course will not certify technicians in EPA Section 609 - Automotive Air Conditioning. Students who successfully complete the course will take the proctored EPA Section 608 Certification Test. (F,Sp)