Area of Interest: Apprenticeships

**Refrigeration and Air Conditioning Systems Mechanic (Apprenticeship)**

College Certificate  
24 Weeks  
Ottawa Campus

**Our Program**

*Make becoming a journeyperson the next step in your Refrigeration and Air Conditioning career.*

Applicants to the Refrigeration and Air Conditioning Systems Mechanic Algonquin College Certificate program must:

- be currently employed in the trade
- be formally registered as apprentices with the Ministry of Training, Colleges and Universities (MTCU)
- have a valid Offer of Classroom Training from the Ministry of Training, Colleges and Universities that includes your Ministry Client ID and approved Class Number

Eligibility is determined by the Ministry of Training, Colleges and Universities.

The Refrigeration and Air Conditioning Systems Mechanic trade is a compulsory trade in Ontario and requires Certification. To practice outside of Ontario, a Red Seal Endorsement is required.

Typically, air conditioning and refrigeration mechanics may hold other trade licenses, such as a Certificate of Qualification as a Gas Technician.

To learn more about apprenticeships, visit [http://www.earnwhileyoulearn.ca/](http://www.earnwhileyoulearn.ca/) and discover how to get started in this rewarding career.

**For Registered Apprentices:**

This 24-week program fulfills the in-class requirements for your apprenticeship. The overall program is divided into three 8-week sessions where you attend class and labs for 30 hours per week and then return to work to further your skills and experience for 8 to 12 months.

During your labs you learn about:

- thermodynamics
- heat transfer
- fluid mechanics
- thermofluids
- psychrometrics
- electromagnetism
- mechanical cooling cycles and components
- electricity and installation procedures
- pneumatics
- hydronics
• construction health and safety

At the end of this program, you qualify to write the exam to receive your federal Red Seal Certification to work across Canada in the Refrigeration and Air Conditioning Systems Mechanic trade and your Certificate of Qualification to work in Ontario. Once qualified, you can enter the industry as a journeyperson.

SUCCESS FACTORS

This program is well-suited for apprentices who:

• Enjoy working with their hands, constructing and repairing mechanical and electrical equipment.
• Have good spatial comprehension and mechanical aptitude.
• Have an aptitude for math and applied science.
• Have strong communication skills, both verbal and written.
• Enjoy logic based decision making.
• Are willing to work at heights, in confined spaces and out-of-doors in all conditions.
• Can work independently.
• Seek variety in their career.
• Enjoy challenges, problem solving and innovation.
• Enjoy working in a commercial or industrial environment.

Employment

Graduates are apprentices and mechanics employed as building systems and/or field service technicians, installers, designers, consultants, entrepreneurs, sales representatives, and parts counter clerks with a variety of employers, such as residential, commercial and industrial air conditioning and refrigeration contractors, subcontractors, engineering and design firms, research labs and museums, manufacturers, and government agencies and public utilities. It is very common for air conditioning and refrigeration mechanics to hold other trade licenses, specifically a Certificate of Qualification as a gas technician.

Program of Study

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<thead>
<tr>
<th>Level: 01 Courses</th>
<th>Hours</th>
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<tbody>
<tr>
<td>ACR1410 Introduction to Electricity and Controls for AC and R</td>
<td>72.0</td>
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<tr>
<td>ACR1412 AC and R System Operation and Components</td>
<td>72.0</td>
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<tr>
<td>ACR1413 AC and R Piping Installation</td>
<td>48.0</td>
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<td>ACR1711 AC and R System Installation and Maintenance</td>
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<tr>
<td>ACR1420 Electricity and Controls for AC and R Systems</td>
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<tr>
<td>ACR1421 AC and R Science and Blueprints</td>
<td>48.0</td>
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<tr>
<td>ACR1422 Installation of AC and R Systems and Components</td>
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<td>ACR1430 Electricity and Electronics for HVAC</td>
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<tr>
<td>ACR1431 HVACR Systems and Thermofluids</td>
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<td>ACR1432 HVACR Design, Distribution and Blueprints</td>
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Fees for the 2020/2021 Academic Year

Tuition Fees: $400 per level.

Incidental Fee: $150 per level.

Information Technology Fee: $43.86 per level.

Apprentices are responsible for supplying their own textbooks as required. Books and supplies can be purchased at the campus store. Expenses total approximately $1,000 for each in-school level.

Students are responsible for parking and locker fees, if applicable.

All students are responsible to supply their own personal protective equipment (such as CSA-approved safety footwear, non-tinted protective eyewear, hearing protection, gloves, hard hat, fire-resistant coveralls) as required in each lab environment.

Admission Requirements for the 2021/2022 Academic Year

Program Eligibility

- Eligibility is determined by the Ministry of Labour, Training and Skills Development.
- Applicants must be formally registered as apprentices and be released by their sponsor to attend the College.

Admission Requirements for 2020/2021 Academic Year

Program Eligibility

- Eligibility is determined by the Ministry of Training, Colleges, and Universities.
- Applicants must be formally registered as apprentices and be released by their sponsor to attend the College.

Application Information

REFRIGERATION AND AIR CONDITIONING SYSTEMS MECHANIC (APPRENTICESHIP)
Program Code 0500X01FWO

Registration for Apprenticeship programs takes place through the Ministry of Training, Colleges and Universities. For further information, contact:

Ministry of Training, Colleges and Universities
347 Preston Street 3rd Floor, Suite 310
Ottawa, ON K1S 3H8

https://www.ontario.ca/page/start-apprenticeship
Telephone: 613-731-7100
Toll-free: 1-877-221-1220

Additional Information

For more information, contact Trevor Root, Program Coordinator, at 613-727-4723 ext. 2464 or mailto:trevor.root@algonquincollege.com.

Course Descriptions

ACR1410 Introduction to Electricity and Controls for AC and R

Electricity forms the power source and control method of a typical air conditioning and refrigeration (AC and R) system. The apprentice learns the fundamentals of electrical and electromagnetic operation, including the use and measurement of voltage, current, resistance and capacitance in both theoretical and applied settings. The apprentice also develops a theoretical understanding of power and inductance. The knowledge is applied to the operation of single phase motors, heaters and related auxiliary components. The apprentice becomes proficient at
identifying safety and operation controls and how they relate to a control system. The apprentice also studies the creation and use of wiring diagrams, including schematic, ladder and pictorial types. Theoretical concepts are explored through the use of lectures and research assignments and then applied in a lab through equipment disassembly, and the use of simulators and test equipment.

Prerequisite(s): none
Corerequisite(s): none

**ACR1412 AC and R System Operation and Components**

The complexity of installing and servicing ACR systems requires an understanding of the four crucial mechanical components and a multitude of auxiliary components. The apprentice learns the key concepts behind an electro-mechanical vapour compression refrigeration system. The apprentice also learns key concepts of physics as they relate to ACR, including thermal energy, pressure-temperature relationships, changes of operating state, as well as pressure and vacuum measurements and application. Typical system pressures and temperatures and the application of various refrigerants and lubricants are a key focus. The theoretical concepts are explored through the use of lectures and research assignments and then applied in a lab through equipment disassembly, and the use of simulators and test equipment.

Prerequisite(s): none
Corerequisite(s): none

**ACR1413 AC and R Piping Installation**

Brazing and soldering are the common techniques for installing and modifying flow components and piping in ACR systems. The apprentice learns the safe use of air-acetylene and oxy-acetylene torches as they relate to ACR. The process of igniting, adjusting and extinguishing torches is covered, as well as hot work safety and preparation. Soldering and brazing of copper are key focuses, using both sil phos and high silver brazing materials. The apprentice demonstrates the ability to braze copper tubing to trade standard. The skills learned are transferrable to any air-fuel or oxy-fuel process. The apprentice also learns correct techniques for pressure testing and evacuating refrigeration piping.

Prerequisite(s): none
Corerequisite(s): none

**ACR1420 Electricity and Controls for AC and R Systems**

Troubleshooting and repair in the field of ACR requires an in-depth knowledge of electrical principles and application. The apprentices learn the science behind the operation of electric motors, capacitors and motor starting accessories, as well as the practical skills required to install, service, specify and replace electrical and electro-mechanical components. Installation and troubleshooting of electrical and electronic components in industrial, commercial, institutional and residential refrigeration and air conditioning systems are examined. The theoretical concepts are explored through the use of lectures and research assignments and then applied in a lab through equipment disassembly, and the use of simulators and test equipment.

Prerequisite(s): none
Corerequisite(s): none

**ACR1421 AC and R Science and Blueprints**

A skilled tradesperson working in the ACR field must be able to select and verify the application and capacity of equipment. Conditions and requirements for storage, preservation and production of products, as well as comfort applications are examined. The use of sketches, blueprints and plans as they relate to the design, construction and service of ACR systems and entire buildings, are examined. The fundamentals behind application, sizing and design of standard and custom systems are studied. The apprentice demonstrates the ability to verify the capacity of an existing refrigeration system. The science of pressure-enthalpy diagrams, calculations and their application is studied. Fundamental skills are developed through lectures and assignments, and supplemented by measurements and calculations performed in the lab.
ACR1422 Installation of AC and R Systems and Components

Proper techniques are critical to a high quality ACR installation. Apprentices learn high level skills in the installation of major and minor ACR components. Sizing and selection of components and entire systems is covered in depth. System pressure testing, evacuation and charging are all examined. The use of material handling equipment, hoisting and rigging practices including crane use, signaling and load lifting, and the moving and setting of loads form a key component of this course. The apprentice demonstrates competency in selecting and applying slings, shackles, hooks, chain, wire rope and other material handling equipment. Discussion and lectures are used to explain methods and techniques, and lab work is a focus. Apprentices demonstrate the ability to perform high quality work, safely, while demonstrating the skills to move heavy loads properly. Typical operating pressures and temperatures are investigated.

ACR1430 Electricity and Electronics for HVAC

Electricity and its various applications, through either electrical, electro-mechanical or electronic methods is central to every ACR system. Apprentices continue to expand their knowledge of single and three phase motors including compressors and fans. Electrical control system terminology and pneumatic control components are discussed. Troubleshooting of control circuits is covered. Apprentices learn to identify and describe electronic control systems including input/output sensors and electronic controllers. Methods of communicating with and programming control systems and energy conservation methods and strategies are examined. The knowledge required is developed through a blend of classroom instruction, including lectures and assignments, as well as time spent wiring, verifying, energizing and measuring electrical equipment in the lab.

ACR1431 HVACR Systems and Thermofluids

Understanding the science behind the common term "air conditioning" requires an understanding of the principles involved in heat transfer and the condensation of humidity. Typical ACR systems are examined; apprentices learn the operation of heat pump systems, lithium bromide absorption systems, cooling towers and related accessories. Refrigerant piping methods and installation requirements are covered. Shaft alignment procedures and control system operations are discussed. Apprentices also learn the terms used in psychrometrics. Participants construct and analyze psychrometric diagrams to determine the operating parameters of air conditioning systems. Fundamental skills are developed through lectures and assignments, and supplemented by measurements and calculations performed in the lab.

ACR1432 HVACR Design, Distribution and Blueprints

The ability to examine a schematic, diagram, drawing, plan or blueprint, and quickly ascertain the location and specifications of equipment, piping and wiring or other components is a key ability of skilled tradespeople. Apprentices learn to interpret building drawings, and sources of building heat gain and loss are discussed. Apprentices learn the layout and components of air distribution systems. The operation, application and servicing of blowers and fans are discussed. Air filtration, ventilation and indoor air quality requirements are covered. Apprentices learn the concepts of sizing ACR systems for comfort cooling applications. The bulk of the learning comes from classroom assignments, research projects and lectures. The proper application of the required skills is proven through the examination and creation of drawings in both the classroom as well as the lab environment.
ACR1711 AC and R System Installation and Maintenance

Service and installation skills are foundational to a career in ACR. Key points include working safely, fire safety, lock out/tag out, fall protection and working on construction sites. Environmental issues related to trade, codes, acts and regulations are examined. The selection and use of general and specialized hand and power tools and measurement instruments are covered. The apprentice learns procedures for the inspection and maintenance of ACR systems, including charging and recovering refrigeration. Codes and regulations are examined through lectures and research assignments. Proficiency in the selection and use of tools and equipment is developed in the lab environment.

Prerequisite(s): none
Corequisite(s): none