

HEATING, REFRIGERATION AND AIR CONDITIONING TECHNICIAN

Program Outline

Major:	HRAC
Length:	2 Years
Delivery:	4 Semesters, plus 1 work term
Credential:	Ontario College Diploma, Co-op
Effective:	2017-2018
Location:	Barrie, Owen Sound
Start:	Fall (Barrie, Owen Sound)

Description

Students gain the required skills to install, service, and maintain the environmental systems for residential buildings, including working with a variety of gas appliances, as well as an introduction to refrigeration and air conditioning. Students examine energy efficient and environmentally friendly approaches; and read, utilize, and produce Heating, Refrigeration, and Air Conditioning (HRAC) drawings using industry standard software. Students gain the required skills to obtain the Technical Standards and Safety Authority (TSSA) Gas Technician 2 (G.2) exams in order to become a licensed gas technician.

Career Opportunities

Graduates are primarily prepared for a career as a gas technician. However, employment may also be found in the areas of technical support and sales within the HRAC industry. Graduates are introduced to transferable practical skills, as well as industry relevant applied math and science, in order to facilitate the transition into a variety of other trades (such as sheet metal, air conditioning, refrigeration, plumbing, and pipe fitting). For those who want to work in these trades, an apprenticeship is required after graduation.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- relate effectively to heating, refrigeration, and air conditioning supervisors, coworkers, and customers;
- work safely and in accordance with all applicable acts, regulations, legislation, and codes to ensure personal and public safety;
- select and use a variety of heating, refrigeration, and air conditioning tools and equipment safely and properly;
- solve math and applied science problems required to effectively install and maintain heating, refrigeration, and air conditioning systems, and associated components;
- prepare and interpret electrical, mechanical, and piping drawings;
- install, service, and troubleshoot heating, refrigeration, air conditioning systems, and associated components;
- develop strategies for ongoing personal and professional development, which will lead to enhanced work performance and career opportunities, and keep pace with industry changes;
- employ environmentally sustainable practices within the profession;
- apply basic entrepreneurial strategies to identify and respond to new opportunities.

Practical Experience:

Co-operative Education is a mandatory component of all Co-op programs at Georgian College; it has been designed as a process by which students integrate their academic education with work experience related to their programs of study. This integration affects much more than simply earning a salary, including the adjustment to the work environment and the development of professionalism. It also reinforces skills and theory learned during academic semesters, develops professional contacts, job knowledge and career path, improves human relations and communication skills, and promotes personal maturity and financial independence.

Students are requested to register, attend and participate in their scheduled co-operative education classes. These classes are scheduled for all first year students and are expected to be completed in order for students to proceed successfully to their first co-op work experiences. To ensure students are eligible to proceed onto any co-op work experience, students should refer to Promotional Status and Eligibility for Co-op as outlined in the College Calendar. Co-op policies and procedures can be located on our website: www.georgiancollege.ca/student-services/co-op-and-career-services/students-tab/

Georgian College follows the Co-operative Education guidelines set out by the Canadian Association for Co-operative Education (CAFCE) and Education at Work Ontario (EWO) by supporting the learning outcomes designed for the program specific graduate profile and curriculum as set out by the Ministry of Training, Colleges and Universities.

External Recognition:

This program is accredited by the Canadian Association for Co-operative Education.

The Program Progression:

Fall Intake - Barrie, Owen Sound

Sem 1	Sem 2	Sem 3	TSSA G2 Exam	Work Term 1	Sem 4
Fall 2017	Winter 2018	Summer 2018	Summer 2018	Fall 2018	Winter 2019

Articulation:

A number of articulation agreements have been negotiated with universities and other institutions across Canada, North America and internationally. These agreements are assessed, revised and updated on a regular basis. Please contact the program co-ordinator for specific details if you are interested in pursuing such an option. Additional information can be found on our website at <http://www.georgiancollege.ca/admissions/credit-transfer/>

Admission Requirements:

OSSD or equivalent, with

- Grade 12 English (C or U)
- Grade 12 Mathematics (C or U)

Mature students, non-secondary school applicants (19 years or older), and home school applicants may also be considered for admission. Eligibility may be met by applicants who have taken equivalent courses, upgrading, completed their GED, and equivalency testing. For complete details refer to: www.georgiancollege.ca/admissions/policies-procedures/

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may also be considered for admission; refer to the Credit Transfer Centre website for details: www.georgiancollege.ca/admissions/credit-transfer/

Additional Information:

Gas Technician work in Ontario requires Gas Technician license (Ontario Certificate of Qualification), which is governed by Technical Standards and Safety Authority (TSSA). The college facilitates Gas Technician 3 (G.3) and Gas Technician 2 (G.2) Ontario Certificate of Qualification Examinations on campus at the end of the first and third semesters, respectively. The cost of each examination is not included in the tuition fee.

Students must have successfully completed the TSSA Gas Technician 3 (G.3) exam prior to going out on their co-op work term.

Gas Technician (GAST) program students wanting to transfer to the Heating, Refrigeration and Air Conditioning (HRAC) program are required to:

- meet graduation requirements of the Gas Technician (GAST) program
- meet the admission requirements of the Heating, Refrigeration and Air conditioning (HRAC) program including a 12C or U math course or equivalent
- complete and submit a request for program change form

Successful applicants will be exempted from the first 3 semesters of the Heating, Refrigeration and Air Conditioning (HRAC) program

Graduation Requirements:

- 18 Mandatory Courses
- 2 Communications Courses
- 3 General Education Courses
- 1 Co-op Work Term

Graduation Eligibility:

To graduate from this program, the passing weighted average for promotion through each semester, from year to year, and to graduate is 60%. Additionally, a student must attain a minimum of 50% or a letter grade of P (Pass) or S (Satisfactory) in each course in each semester unless otherwise stated on the course outline.

Mandatory Courses

- DRFT2003 Drafting Techniques
- ELEC1010 Introduction to Electricity
- ELEC1011 Basic Electricity and Controls
- ELEC1012 Electrical Troubleshooting Applications
- FITN1002 Fitness and Wellness
- GAST1003 Introduction to Gas Appliances
- GAST1013 Professional Practices
- GAST1014 Piping and Tubing Systems
- GAST1015 Gas Appliances
- GAST1016 Piping, Forced Air and Space Heating

GAST1017 Venting
GAST1018 Water Heaters and Hydronic Heating
GAST1019 Gas Code Applications
GAST1020 Buildings and Air Handling
GNED1000 Environmental Concerns
HRAC2000 Refrigeration and Air Conditioning 1
MATH1007 Mathematics Techniques
SCIE2001 Heating and Air Conditioning Science

Communications Courses

To be selected at time of registration from the College list, as determined by testing.

General Education Courses

To be selected from College list

Co-op Work Term

COOP1029 HRAC Work Term

Course Descriptions:

COOP1029 HRAC Work Term 560.0 Hours

Co-operative Education will provide students with the skills to conduct a college supported and self-directed job search in their chosen field of study. Students will obtain a co-op work experience with an employer for a period of 14 weeks. All students are responsible to submit a work term record for approval prior to starting work, and a work term report indicating achievement of specific learning outcomes during their 1st co-op work term. Georgian College follows the Co-operative Education guidelines set out by the Canadian Association for Co-operative Education (CAFCE) and Education at Work Ontario (EWO) by supporting the learning outcomes designed for each program.

P- G3 TSSA G3 License

DRFT2003 Drafting Techniques 42.0 Hours

In this course, students examine and practice drafting skills (traditional as well as computer aided), that are required by HRAC (Heating, Refrigeration and Air Conditioning) technicians. Students create field sketches and use CAD (Computer Aided Design) in the process of learning how to read, utilize, and produce drawings such as basic projections, perspectives, elevations, and details.

ELEC1010 Introduction to Electricity 70.0 Hours

In this course, students identify electrical safety hazards, safe working techniques, procedures, and applicable codes. Students study basic electrical theory and concepts

and the components and operation of a simple electrical circuit. In addition, students examine principles of basic electromagnetism, the theory of direct and alternating current, and basic transformer theory and operation. The required practical electrical skills, such as measuring supply voltage, load resistance, and current flow are covered in the lab.

ELEC1011 Basic Electricity and Controls 56.0 Hours

In this course, students examine the function and features of electric power supply systems including safety measures and applied standards pertaining to the work of a gas technician. Students learn to read and interpret electrical drawings in order to apply the fundamental principles of electric control components. Students apply the practical skills of troubleshooting electrical circuits and controls in the lab.

P- ELEC1010 Introduction to Electricity

ELEC1012 Electrical Troubleshooting Applications 28.0 Hours

In this course, students troubleshoot problems as they apply to real life scenarios of installing, maintaining, and servicing natural gas and propane appliances. Students are introduced to techniques of following control signals, inspecting the functionality of operating controls and safety controls. In this course, students use their previous knowledge of interpreting electrical drawings and build on this knowledge to be able to do basic electrical troubleshooting with minimum or no supervision in the field.

P- ELEC1011 Basic Electricity and Controls

FITN1002 Fitness and Wellness 42.0 Hours

This course will provide students with the knowledge, skills and abilities necessary to integrate healthy living strategies in a variety of recreational settings. Students will conduct a nutrition, fitness and wellness inventory and analysis. A diversity of recreation and fitness initiatives will be explored through self-driven and planned activities. There will be gym sessions connected with this course.

GAST1003 Introduction to Gas Appliances 70.0 Hours

In this course, students identify the properties and characteristics of natural gas and propane with emphasis on the safe handling. Students compare different types of venting systems, the operation and application of various burners, pilots, ignition systems, and temperature sensing devices. Students differentiate and explain the difference between controls and safeties, non-vented and vented gas appliances. Students practice skills of safely reactivating natural gas and propane appliances.

GAST1013 Professional Practices 28.0 Hours

In this course, students examine customer relations as well as a variety of professional skills that are important for gas technicians. Students identify and examine workplace safety and the interpretation of applicable codes, acts and regulations. Students also study technical manuals, specifications, schematics, drawings and graphs in order to learn the relationship between mechanical and building systems.

GAST1014 Piping and Tubing Systems 28.0 Hours

Students apply the theoretical and practical skills that gas technicians require in order to select and use the different types of piping, tubing, valves, and connectors used to construct gas distribution systems. Students learn to correctly measure and size gas piping systems for a variety of applications and interpret applicable codes in order to properly test gas piping systems to ensure safe and efficient operation.

GAST1015 Gas Appliances 70.0 Hours

In this course, students identify advanced concepts related to gas appliances. In addition, students identify theoretical fundamentals related to the installation, servicing, and maintenance of non-vented gas appliances (including barbecues), domestic gas-fired refrigerators and conversion burners.

P- GAST1003 Introduction to Gas Appliances

GAST1016 Piping, Forced Air and Space Heating 84.0 Hours

In this course, students examine the installation, service, and maintenance of forced warm air heating systems. In addition, students work with space-heating and decorative appliances in the lab. The student identifies and describes installation requirements for forced-air furnaces and space heating appliances; mechanical and electrical components on forced-air furnaces and space heating appliances; and the procedures for servicing said components.

P- GAST1015 Gas Appliances

GAST1017 Venting 28.0 Hours

In this course, students study the theoretical concepts of removing combustion products from appliances; principles of selecting proper venting material and size; alternative ways of configuring venting systems; and factors that effect the capacity of a venting system. Students identify and explain appliance categories based on the concepts of flue loss and vent pressure. Students are also introduced to principles of inspecting existing venting systems and calculating combustion air requirements in different types of buildings.

P- GAST1015 Gas Appliances

GAST1018 Water Heaters and Hydronic Heating 84.0 Hours

In this course, students examine the skills and knowledge required to install, service, and, maintain water heaters, combo units and portable water heaters. In addition this course covers the installation, service, and maintenance of gas fired hydronic heating appliances as well as those accessories that form an integral part of these appliances. Mechanical and electronic controls related to water heaters and hydronic heating devices are also examined.

GAST1019 Gas Code Applications 14.0 Hours

In this course, the student judges the result of applying, assesses risks of not applying, and argues for and against the pertinence of specific laws of the Natural Gas and Propane Installation Code and Propane Storage and Handling Code as they apply to prescribed study cases.

P- GAST1015 Gas Appliances

GAST1020 Buildings and Air Handling 28.0 Hours

In this course, students examine the components of the building as a system; the principles of heat, air, and moisture flow; methods for calculating heat loss and testing for negative building; and indoor air quality. In addition, the student identifies the principles of selecting, installing, and maintaining appropriate air filters, air cleaners, humidifiers, and add-on cooling coils. The student identifies and discusses the theoretical principles of air handling.

GNED1000 Environmental Concerns 42.0 Hours

This course provides an understanding of how human actions impact various plant and animal ecologies. Past and present environmental issues are examined and future environmental concerns predicted through the lens of human value systems, priorities, lifestyles, and worldviews. Issues of sustainability are investigated in light of specific environmental challenges.

HRAC2000 Refrigeration and Air Conditioning 1 70.0 Hours

In this course, students examine the practical application of basic theoretical concepts related to the laws of matter, fluids, pressure and, enthalpy – as they relate to air conditioning and refrigeration processes. Students are trained to acquire the technical skills required for working with schematic drawings, refrigerants, evaporators, condensers, metering devices and, a host of tools and other specialized equipment used by HRAC technicians in the field.

MATH1007 Mathematics Techniques 42.0 Hours

This is a consolidation and review of the principles and techniques of mathematics, which are required for the technical trades. Students develop and promote the use of mental arithmetic, estimation skills, problem solving, and reasoning skills.

SCIE2001 Heating and Air Conditioning Science 56.0 Hours

In this course, students examine chemistry and physics with an emphasis on heat transfer, sensible and latent heat, thermal expansion, temperature, pressure, refrigeration cycle, psychometrics, pressure/enthalpy charts, and combustion. Students are introduced to Integrated Combo Systems, and oil heat. Students complete a major project that pertains to sizing, sourcing and costing heating and cooling products to be installed in a residential house.

Course Description Legend

P = Prerequisite; C = Concurrent prerequisite; CO= Corequisite

Information contained in College documents respecting programs is correct at the time of publication. Academic content of programs and courses is revised on an ongoing basis to ensure relevance to changing educational objectives and employment market needs. The college reserves the right to add or delete programs, options, courses, timetables or campus locations subject to sufficient enrolment, and the availability of courses.