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: 2015-2016
Location: Barrie, Owen Sound
Start: Fall (Barrie, Owen Sound), Winter (Owen Sound)

Description
Students will develop the skills required to install, service, and maintain the environmental systems for residential buildings. This includes working with a variety of gas appliances as well as an introduction to refrigeration and air conditioning. There will be an emphasis on energy efficient and environmentally friendly approaches. Students will also read, utilize, and produce Heating, Refrigeration, and Air Conditioning (HRAC) drawings using industry standard software. Practical skills with sheet metal will be developed. The program will prepare students to write their Technical Standards and Safety Authority (TSSA) Gas Fitter II exams in order to become a licensed gas technician.

Career Opportunities
The program primarily prepares students 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. Furthermore, this program introduces practical skills as well as industry relevant applied math and science in order to facilitate the transition into a variety of other trades within the HRAC industry (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;
- apply environmentally sound practices to work with heating, ventilation, air conditioning, and refrigeration.

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.

The Program Progression:

Fall Intake - Barrie, Owen Sound

Sem 1	Sem 2	Sem 3	TSSA G2 Exam	Work Term 1	Sem 4
Fall 2015	Winter 2016	Summer 2016	Summer 2016	Fall 2016	Winter 2017

Winter Intake - Owen Sound

Sem 1	Sem 2	Sem 3	TSSA G2 Exam	Work Term 1	Sem 4
Winter 2016	Summer 2016	Fall 2016	Fall 2016	Winter 2017	Summer 2017

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)

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:
Students must have successfully completed the TSSA G3 exam prior to going out on their co-op work term.

Graduation Requirements:
15 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
ENVR1000 Environmental Science and Sustainability
GAST1000 Introduction to Electricity
GAST1001 Professional Practices
GAST1002 Piping and Tubing Systems
GAST1003 Introduction to Gas Appliances
GAST1004 Pressure Regulator Controls
GAST1006 Gas Appliances
GAST1008 Forced Air and Space Heating
GAST1009 Venting
GAST1011 Water Heaters and Hydronic Heating
GAST1012 Forced Air Add-Ons and Air Conditioning
HRAC2000 Refrigeration and Air Conditioning 1
MATH1018 Introduction to Technical Mathematics
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 1

Course Descriptions:

DRFT2003 Drafting Techniques 42.0 Hours
This course covers the drafting skills (traditional as well as computer aided) required by HRAC technicians. Students will create field sketches and use CAD in the process of learning how to read, utilize, and produce drawings such as basic projections, perspectives, elevations, and details.

ENVR1000 Environmental Science and Sustainability 42.0 Hours
Students will be introduced to ecological principles, population dynamics and energy resources in order to assess their impact on the environment. The major types of pollution are examined and their effects on the various components of the ecosphere analyzed. Strategies for pollution control and the conservation of the Earth's resources are examined in the context of economic considerations and sustainable development.

GAST1000 Introduction to Electricity 42.0 Hours
Students study basic electrical theory as it applies to the work of a gas technician. The required practical skills with electricity, such as how to measure supply wiring are covered. This course also introduces students to electrical measuring and testing instruments.

GAST1001 Professional Practices 42.0 Hours
This course covers customer relations as well as a variety of professional skills that are important for gas technicians. The course content emphasizes workplace safety and the interpretation of installation 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.

GAST1002 Piping and Tubing Systems 42.0 Hours
Students apply the theoretical and practical skills that gas technicians require in order to install, service, and maintain piping and tubing. This includes hands-on work with piping/tubing systems greater that 2" and/or those that supply pressure greater than 0.5" psig.

GAST1003 Introduction to Gas Appliances 70.0 Hours
This course identifies the properties and characteristics of natural gas and propane with emphasis on the safe handling of natural gas. Students also apply basic concepts related to gas appliances as well as practical skills with the use of fasteners, hand tools, and power tools.

GAST1004 Pressure Regulator Controls 42.0 Hours

This course builds on the skills that students have developed with piping and tubing. This includes the important procedures used by Gas technicians in order to install, service and maintain pressure regulators and relief valves. In addition this course introduces important concepts related to mechanical and electronic controls.

GAST1006 Gas Appliances 126.0 Hours
This course identifies advanced concepts related to gas appliances. In addition students apply the practical and theoretical components related to the installation, servicing, and maintenance of non-vented gas appliances (including barbecues), domestic gas-fired refrigerators and conversion burners. This course also covers electrical work as it relates to gas appliances.
P- GAST1003 Introduction to Gas Appliances

GAST1008 Forced Air and Space Heating 84.0 Hours
The installation, service, and maintenance of forced warm air heating systems is the primary focus of this course. In addition students work with space-heating and decorative appliances. This course also covers the mechanical and electronic controls related to forced warm air heating systems and space heating appliances.

GAST1009 Venting 42.0 Hours
The theoretical and practical skills related to venting are covered in this course. Students are introduced to the practical procedures required to size, install, inspect, and repair venting systems.

GAST1011 Water Heaters and Hydronic Heating 98.0 Hours
Students are introduced to 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.

GAST1012 Forced Air Add-Ons and Air Conditioning 42.0 Hours
Students in this course assess duct design, size plenum connection, and tie into an existing duct system. In addition, this course covers the installation, service, and maintenance of forced air add-on devices including the selection.

HRAC2000 Refrigeration and Air Conditioning 1 70.0 Hours
This course introduces basic theoretical concepts related to the laws of matter, fluids and pressure enthalpy (PH). The course also covers the practical skills used in working with refrigeration controls, refrigerants, evaporators, condensers and metering devices.

MATH1018 Introduction to Technical Mathematics 42.0 Hours

Students will develop foundational skills in mathematical thinking and problem solving, and appropriately apply technology in the solution of engineering related problems using algebra, geometry, right angle trigonometry, trigonometric functions of any angle, systems of linear equations, and exponential and logarithmic functions. Additional time to strengthen and reinforce mathematical competencies will be made available to those students who require it.

SCIE2001 Heating and Air Conditioning Science 56.0 Hours
This course provides a background in chemistry and physics as they pertain to the fields of heating, and air conditioning, with an emphasis on environmental themes and energy conservation. This includes topics such as electrochemistry, corrosion, and organic chemistry as well as topics from physics related to thermal expansion, temperature, heat transfer, electricity, and magnetism. The course also includes an introduction to Hydronics, and a practical applications lab.

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.