

ELECTRICAL ENGINEERING TECHNOLOGY

Program Outline

Major:	EETY
Length:	3 Years
Delivery:	6 Semesters, plus 3 work terms
Credential:	Ontario College Advanced Diploma, Co-op
Effective:	2013-2014
Location:	Barrie
Start:	Fall (Barrie), Winter (Barrie)

Description

The Electrical Engineering Technology Program curriculum incorporates theory, applications and practical experience from the manufacturing, robotics, computer communications and utilities industries, along with concepts from the sciences and humanities to ensure the graduate is provided with current technical knowledge, skills and practice.

Career Opportunities

There has never been a better time to enter the field of Engineering Technology to serve today's global market economy. The numbers of jobs in Electrical Technology have been growing steadily including opportunities in specialized robotics manufacturers, automotive support industries, equipment manufacturers, and utilities as well as product installation and service, design and testing, research, maintenance, industrial sales and marketing, estimating, contract and project administration as well as quality control.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- communicate effectively and use interpersonal skills;
- utilize computer aided drafting media to plan and organize graphical layouts;

- work effectively as an individual and team member in any setting with an awareness of leadership responsibilities;
- use computer and electronic systems literacy in a range of applications;
- analyze problems using critical thinking and create innovative problem solving solutions;
- apply generic and workplace skills for personal and professional growth;
- apply the benefits of general education to participate in society as an informed citizen and pursue an enriched personal and professional life;
- apply all skills and knowledge acquired in co-op work experiences;
- apply a wide variety of mathematical techniques with the degree of accuracy required to solve problems and make decisions;
- apply and specify instrumentation in electrical, electronic, pneumatic, and hydraulic control systems for manufacturing, process control and robotics operations;
- compare designs against engineering Standards;
- summarize the basic equipment needs of motion control systems;
- apply the basic principles of automatic control systems;
- perform calculations for power circuits;
- apply specific knowledge in the use and specification of automated test equipment;
- specify interfaces, communication protocols and automated systems integration solutions for computer based networked control systems;
- select and use software programs appropriate to the test equipment and task;
- assist in conducting quality control and quality assurance procedures in the distribution network in the power industry;
- prepare and maintain records and documentation systems;
- apply principles of networking, microprocessor systems, instrumentation, telecommunications, and other related technologies to reach completion of electrical engineering tasks in automation, power generation, distribution, and utilities industries;
- analyze grid systems using per unit, scalar and vector modeling encompassing paralleling effects of power generators and transformers;
- perform tasks in accordance with relevant law, policies, procedures, standards, regulations, environmental and ethical principles.

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 program 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 to proceed successfully to their first co-op work experience. 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.georgianc.on.ca/careers/for-students/

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

Sem 1	Sem 2	Work Term 1	Sem 3	Work Term 2	Sem 4
-----	-----	-----	-----	-----	-----
Fall 2013	Winter 2014	Summer 2014	Fall 2014	Winter 2015	Summer 2015
Work Term 3	Sem 5	Sem 6			
-----	-----	-----			
Fall 2015	Winter 2016	Summer 2016			

Winter Intake - Barrie

Sem 1	Sem 2	Work Term 1	Sem 3	Work Term 2	Sem 4
-----	-----	-----	-----	-----	-----
Winter 2014	Summer 2014	Fall 2014	Winter 2015	Summer 2015	Fall 2015
Work Term 3	Sem 5	Sem 6			
-----	-----	-----			
Winter 2016	Summer 2016	Fall 2016			

Admission Requirements:

You must meet ONE of the following requirements to be eligible for admission to these programs:

Secondary school applicants:

- OSS Curriculum: OSSD or equivalent with Grade 12 English (C) or (U) (ENG 4C, ENG 4U); plus any Grade 12 College Mathematics (MAP 4C or MCT 4C), or any Grade 12 U

University Mathematics. Also recommended: any Grade 11 (C) or (U/C) and/or any Grade 12 (C) or (U/C) Physics)

Non-Secondary school applicants (19 years or older):

- Any credit Communication course and most credit mathematics courses taken at Georgian College
- College preparatory programs including those taken at Georgian College: Technology Foundation and Technology Fundamentals*
- Equivalent courses in English and mathematics taken through secondary school or Independent Learning Centres (at the general, advanced, college or university level)
- Academic and Career Entrance Certificate (ACE) program with communications and business, apprentice or technical mathematics*
- Mature student testing in English and mathematics that meets the minimum standards for admission (available through most testing services)*
- Ontario High School Equivalency Certificate (GED)
- English, Literature or Communication credit courses and most mathematics credit courses from accredited colleges/universities

Home school applicants:

- Applicants can write the mature student testing in English and mathematics that meets the minimum standards for admission (available through testing services)*

* available from Georgian College. For a complete listing please contact the Office of the Registrar.

Non-secondary school applicants who are 19 years of age or over by the first day of classes, and who lack the academic entrance qualifications, may be considered for entrance to an appropriate post-secondary diploma or certificate program as mature applicants. Mature applicants must meet all program specific prerequisites including all selection criteria; equivalencies are stated above. Applicants who are unsure whether they meet admission requirements should contact the Office of the Registrar. In addition, those applying as mature students and having no documentation of Grade 12 education must supply, if required, proof of age, such as a copy of an official birth certificate or driver's licence. Refer to Section 2.5 and 2.6 of the Academic Calendar for further details.

Credit transfer and course exemptions:

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may be eligible for credit transfer/course exemptions. Courses/experience must match at least 80% of the learning outcomes of a Georgian College course with a minimum grade of 60% or C achieved in previous coursework; some program exceptions apply (see program outline). For further information please visit the Credit Transfer Centre website: georgiancollege.ca/admissions/credit-transfer/

Graduation Requirements:

- 29 Mandatory Courses
- 2 Communications Courses
- 5 General Education Courses
- 3 Co-op Work Terms

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.

Mandatory Courses

- DRFT1003 Introduction to Technical Drafting
- ELEC1000 CAD Electrical Circuits
- ELEC1001 AC Circuit Fundamentals
- ELEC1002 Electrical System and Control 1
- ELEC2005 Electrical Machines
- ELEC2006 Power Transmission and Distribution
- ELEC2007 CAD Electrical Layouts
- ELEC2008 Programmable Logic Controller 1
- ELEC2010 Progressive Electrical Maintenance
- ELEC2011 Power Transmission and Distribution 2
- ELEC2014 Hydro Codes and Standards
- ELEC2018 Electronic Devices
- ELEC3002 Instrumentation
- ELEC3004 Systems Integration
- ELEC3006 Power Quality and Distribution
- ELEC3007 Electrical Protection and Control
- ELEC3008 Advanced PLCs and Industrial Networking
- ELEN1000 DC Circuit Fundamentals
- ELEN3001 Electronic Motor Controls
- ENVR1003 Environmental Health and Safety
- GEOG2000 Geographic Information Systems
- MATH1006 Mathematics for Technology
- MATH3000 Calculus
- MGMT2002 Project Management
- PHYS1001 Physical Sciences

ROBT2000 Robotics
ROBT3003 Advanced Robotics
STAT3002 Applied Statistics
TECR3008 Technical Report

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 Terms

COOP1022 Electrical Work Term 1
COOP2017 Electrical Work Term 2
COOP3009 Electrical Work Term 3

Course Descriptions:

COOP1022 Electrical Work Term 1 640.0 Hours

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 electrical oriented work experience related to their program 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.

COOP2017 Electrical Work Term 2 560.0 Hours

Building on previous Co-op experience, students will continue to gain valuable experience and develop knowledge and skills through the second 4 month co-op terms that are relevant to the Electrical sector. Students will gain experience with a variety of electrical functions in various workplaces. Upon completion of the Co-op work term students will be required to attend a debriefing session to review the requirements for completion of the Co-op work term.

P- COOP1022 Electrical Work Term 1

COOP3009 Electrical Work Term 3 560.0 Hours

Building on previous Co-op experience, students will continue to gain valuable experience and develop knowledge and skills through the third 4 month co-op terms that are relevant to the Electrical Technology sector. Students will gain experience with

a variety of electrical job functions in various workplaces. Upon completion of the Co-op work term students will be required to attend a debriefing session to review the requirements for completion of the Co-op work term.

P- COOP2017 Electrical Work Term 2

DRFT1003 Introduction to Technical Drafting 42.0 Hours

This course will introduce the student to reading and understanding engineering drawings and the use of the computer as a drafting tool. Emphasis will be on creating accurate, clear drawings. Standards and conventions will be presented and their applications will be shown using CAD.

ELEC1000 CAD Electrical Circuits 42.0 Hours

This course stresses the development of a reasonable skill in preparing and interpreting basic electrical engineering drawings. The student will produce neat and accurate drawings of single line, schematic, connection and inter-connection diagrams. Emphasis will be on industrial power and control applications. Computer Aided Drafting methods will be used to prepare the drawings.

P- DRFT1003 Introduction to Technical Drafting

ELEC1001 AC Circuit Fundamentals 56.0 Hours

A study of single and three phase power systems with various resistive and reactive loads; the relationship between real, apparent and reactive power - including the use of power, phasor and impedance diagrams; methods of measuring power; calculations power factor.

ELEC1002 Electrical System and Control 1 56.0 Hours

The principles of motor control and protection in both AC and DC circuits are developed for forward, reverse and speed regulating applications using electromechanical devices. Control of special motors such as synchronous and wound rotor are analyzed. Standard motor control circuit diagrams and symbols receive detailed attention.

ELEC2005 Electrical Machines 56.0 Hours

This course examines the basic theory, characteristics, construction operation and application of rotating electrical machines. It includes the study of direct current motors, direct current generators, alternators, synchronous motors, polyphase induction motors and single phase motors.

ELEC2006 Power Transmission and Distribution 42.0 Hours

This course is an introduction to power systems. The basic engineering principles of how electrical power is generated, transmitted, distributed and controlled are developed through examination of transformer design, power transmission equipment, and the electrical code.

ELEC2007 CAD Electrical Layouts 42.0 Hours

This course stresses continued development in the skills of preparing and interpreting electrical drawings with emphasis placed on electrical layout and installation drawings such as electrical panel and equipment layouts, cable schedules and conduit installation drawings. Drawings will be prepared on CAD. Specific customization of CAD as it relates to electrical drawings will also be covered.

P- ELEC1000 CAD Electrical Circuits

ELEC2008 Programmable Logic Controller 1 42.0 Hours

This course develops the functional design, hardware configuration, programming and application of Programmable Logic Controllers (PLC). The design and programming of control circuits using examples from industrial applications will be emphasized. The application of PLC's in process automation will be examined. An overview of functional hardware design will be included. The equipment used will be small and medium sized PLC's with both digital and analog capabilities.

ELEC2010 Progressive Electrical Maintenance 42.0 Hours

To be able to manage the maintenance function - to identify safe working habits - interpret all necessary information from various manuals electrical plans - Set up maintenance schemes, lubrication - training - tooling - testing. Repairing. Costing - on various types of plant equipment.

ELEC2011 Power Transmission and Distribution 2 42.0 Hours

This is an advanced Power Distribution course that performs per unit calculations for grid system analysis. Scalar and vector modeling are used to describe the paralleling effects of generator and transformers. Power factor correction and energy management techniques are studied within the course. In the lab component, students gain the practical experience needed to work in an industrial environment and/or power utilities (generation, transmission, distribution).

ELEC2014 Hydro Codes and Standards 56.0 Hours

This course is designed to introduce the student to the structure and content of the Ontario Electrical Code. Students use design practice and principles applied to distribution and transmission standards as used by utilities in Ontario. Job analysis and design, planning, equipment selection, and government and legal challenges are covered as applied to new upgraded electrical infrastructure.

ELEC2018 Electronic Devices 56.0 Hours

This course explores the theory and principles of electronic devices and digital circuits. Special attention is devoted to topics related to logic gates, flip-flops, encoders, decoders, advanced digital systems, A/D and D/A conversion, power switching and control. Laboratory experiments reinforce lecture theory and provide the student with experience in the use of test instruments and procedures.

ELEC3002 Instrumentation 42.0 Hours

This course will introduce industrial instrumentation as used for troubleshooting, process measurements and process control. Specifically, the course will discuss measurement terminology, differentiating between analog and digital, describe the instrumentation used for electronic testing and develop the principles of operation of transducers used for industrial process measurement and control.

ELEC3004 Systems Integration 42.0 Hours

This course brings together the content of many preceding courses and applies that content to the requirements of systems integration. The problems associated with interconnection and interworking of different components will be explored, and typical solutions will be illustrated using conveyors, manufacturing tools, and robotic devices. The course is largely a hands-on experience in an automated manufacturing environment.

ELEC3006 Power Quality and Distribution 42.0 Hours

The focus of this course will be on power quality infrastructure, primarily focusing on an AC powerline environment. A review of AC power basics will lead the student into a study of power quality including the causes and effects of transient voltage surges. Surge Protective Devices (SPD's) will be studied in defending against disruptive and damaging effects of surges. Upon completion, the student should be able to properly implement efficient, cost effective SPD installations in a broad range of application environments.

ELEC3007 Electrical Protection and Control 42.0 Hours

Following a review of power system equipment, Students will define common protection terms and use common IEEE device designations while performing acceptance tests on protective relay schemes and elements. Combined with logic statements and a breaker control scheme, Students will develop a coordinated over-current protection scheme as found in large manufacturing or utility environments. The culmination of the course will have the students analyze protection event reports to determine correct protection system function.

P- ELEC2011 Power Transmission and Distribution 2

ELEC3008 Advanced PLCs and Industrial Networking 56.0 Hours

This course covers advanced programming and hardware concepts of PLC's and their electrical, electronic, mechanical and software integration. It also covers networking fundamentals and interfacing of electrical equipment for the purpose of data acquisition and process control. Topics include data management, program control, analog and scaling, programming languages, data communication standards, network adapter configurations and networking hardware. A system overview of industrial SCADA systems is also introduced.

ELEN1000 DC Circuit Fundamentals 56.0 Hours

This course introduces the student to the fundamental concepts of direct current electricity using power related applications where possible. Topics include: series and parallel DC circuits, magnetism, inductance, capacitance, DC metering applications and an introduction to network analysis.

ELEN3001 Electronic Motor Controls 42.0 Hours

Electronic motor control is rapidly changing the way we use motors. An adjustable speed drive can give closer control of your process, reduce your energy bill and reduce stress on mechanical loads. These benefits are only possible if the ASD is correctly selected, applied and maintained. This course will cover these requirements and will include the usage of modern troubleshooting and diagnostic test instruments.

ENVR1003 Environmental Health and Safety 42.0 Hours

This course provides an overview of the requirements of current legislation and standards pertaining to environmental health and safety in the workplace. Health and safety management systems, hazardous materials management, WHMIS, biological, physical and chemical hazards, environmental monitoring devices, confined space entry, personal protective equipment, and emergency response will be examined.

GEOG2000 Geographic Information Systems 42.0 Hours

This course will provide an introduction to the topic of Geographic Information Systems (GIS). It will familiarize the student with the basics of the technology and provide an appreciation for the use of GIS in both business and government. Projects will familiarize the student with the use of digital maps, various forms of data input, analysis and the presentation of finished products.

MATH1006 Mathematics for Technology 42.0 Hours

This course provides a foundation in mathematics for students in engineering technology or engineering related programs. Mathematical techniques are applied to a range of technical and financial problems.

MATH3000 Calculus 42.0 Hours

This course in calculus is intended to develop practical skills in differential and integral calculus. As well, it is intended to illustrate various applications of calculus to technical problems. The rules of differentiation will be introduced, and methods of differentiating various algebraic and transcendental functions will be developed. Applications of differential calculus to finding roots of equations by Newton's method, to finding maxima and minima, and to developing power series representation for functions will be studied. Methods of algebraic integration will be introduced, with both definite and indefinite integrals being determined for a variety of functions. The use of tables of integrals for finding solutions for difficult integrals will be introduced. Numerical integration using Simpson's rule will also be developed. Various applications of integration will be studied including Fourier series. First and second order differential

equations will be introduced and methods of solving will be developed. These methods will include laplace transforms.

MGMT2002 Project Management 42.0 Hours

This course introduces the fundamental principles necessary for successful management of projects. Project planning, management and control techniques will be discussed and the application of computers in project management will be studied.

PHYS1001 Physical Sciences 42.0 Hours

This is a course designed to introduce students to the basic concepts of Physics. It deals with topics which include basic mechanics, simple harmonic motion natural frequencies and sound; heat, thermal expansion, temperature and heat transfer; electromagnetic waves, light optics electricity and magnetism. These concepts are developed by considering practical related examples. Laboratory experiments may be used to illustrate and investigate the principles involved.

ROBT2000 Robotics 42.0 Hours

This is an introductory course in industrial robots. There are two main classes of industrial robots - continuous path robots and pick- and-place robots. Students in this course will learn to operate, program, and service modern continuous path industrial robots. They will also learn to design, construct, and program pneumatic pick-and-place robots using current industrial standards and materials. Proper robot safety procedures will be emphasized throughout the course.

ROBT3003 Advanced Robotics 42.0 Hours

This course covers advanced programming and hardware concepts associated with industrial robots. In this course, several robots are programmed to work together and with other common automation systems to increase the efficiency and throughput of industrial automation processes. Robot safety procedures and standards will be emphasized throughout the course.

STAT3002 Applied Statistics 42.0 Hours

Elementary statistical methods and applications to engineering problems, samples and populations, frequency distributions, probability theory, basic distributions, random sampling, point and interval estimation, hypothesis testing and linear regression and correlation are studied.

TECR3008 Technical Report 42.0 Hours

The student will demonstrate communication skills by completing and presenting, both written and orally, a major technical report of at least 3000 words in the narrative portion of the report. The course is largely self-directed. The content of the report will be developed around a technical topic that is relevant to the student's program area in Engineering Technology. The content of the report may be based on original research

and/or based on a current review of the literature in a specific technical field and/or based on data obtained or processes worked on during the student's co-op experiences.

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.