

Area of Interest: Construction and Skilled Trades

## Electrical Engineering Technology (Co-op and Non Co-op Version)

Ontario College Advanced Diploma

Program Code: 0318X03FWO

3 Years

Ottawa Campus

### Our Program

**Advance your skillsets for a career in the electrical engineering technology field.**

In the Electrical Engineering Technology Ontario College Advanced Diploma program, you use state-of-the-art facilities to gain the knowledge and experience necessary to enter the electrical engineering field. This program is the continuation of the Electrical Engineering Technician program, and is open to students who already have an Algonquin College Electrical Engineering Technician Ontario College Diploma and meet the admission requirements.

Through a series of theory courses and extensive practical labs, you learn skills specific to becoming an Electrical Engineering Technologist. You expand your knowledge base of the following:

- electrical principles
- codes
- circuitry
- industrial control systems
- computer applications
- machinery
- AutoCAD
- telecommunications
- electronics
- instrumentation and robotics

Take on a complex project, either in partnership with an industry client or based on your own research interest, and use project management skills learned in the program to analyze and solve it. Complete your project by creating deliverables, monitoring and controlling project resources, and presenting results both orally and through written presentations.

Electives during this program help you specialize in either automation or utilities.

OACETT (Ontario Association of Certified Engineering Technicians and Technologists) recognizes this program as meeting the academic requirements for certification in the Certified Technician (C. Tech) category. While a student, you are encouraged to register as an Associate member of OACETT.

Students also have the option to gain real-world experience through a paid co-operative education (co-op) work term (see Additional Information for more details). Please note that places in the co-op work term are subject to availability and academic eligibility. Please note admission to the co-op program does not guarantee a co-op placement.

Upon graduation, you may find employment in many different areas of the Electrical Engineering Technology field. You may have titles such as:

- electrical designer
- electrical technologist
- electrical engineering technologist
- AutoCAD draftsperson
- project estimator
- control system designer
- instrumentation and controls (I&C) technologist
- building automation engineering technologist
- telecommunication quality assurance technologist

If you choose to pursue further studies, you may be eligible to take a summer-bridge program and transfer your diploma credits towards entering into the third-year of Lakehead University's Electrical Engineering Degree program.

- Enjoy applying physical and chemical laws and practising logic to find solutions to physical problems.
- Seek variety and opportunity in their career.
- Have strong observational and analytical skills.
- Enjoy working on multidisciplinary projects.

## **Employment**

Graduates may find employment in the following areas: design and testing, manufacturing, installation and/or supervision, diagnostics and analysis of electrical, communication, utilities, and fire protection equipment and systems.

## **Learning Outcomes**

The graduate has reliably demonstrated the ability to:

- Analyze, interpret, and produce electrical and electronics drawings, technical reports including other related documents and graphics.
- Analyze and solve complex technical problems related to electrical systems by applying mathematics and science principles.
- Design, use, verify, and maintain instrumentation equipment and systems.
- Design, assemble, test, modify, maintain and commission electrical equipment and systems to fulfill requirements and specifications under the supervision of a qualified person.
- Commission and troubleshoot static and rotating electrical machines and associated control systems under the supervision of a qualified person.
- Design, assemble, analyze, and troubleshoot electrical and electronic circuits, components, equipment and systems under the supervision of a qualified person.
- Design, install, analyze, assemble and troubleshoot control systems under the supervision of a qualified person.
- Use computer skills and tools to solve a range of electrical related problems.
- Create, conduct and recommend modifications to quality assurance-procedures under the supervision of a qualified person.

- Prepare reports and maintain records and documentation systems.
- Design, install, test, commission and troubleshoot telecommunication systems under the supervision of a qualified person.
- Apply and monitor health and safety standards and best practices to workplaces.
- Configure installation and apply electrical cabling requirements and system grounding and bonding requirements for a variety of applications under the supervision of a qualified person.
- Design, commission, test and troubleshoot electrical power systems under the supervision of a qualified person.
- Select and recommend electrical equipment, systems and components to fulfill the requirements and specifications under the supervision of a qualified person.
- Apply project management principles to contribute to the planning, implementation, and evaluation of projects.
- Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship.

### Program of Study

Level: 01	Courses	Hours
DAT8942	Computer Applications - Electrical	42.0
ELE8909	Electrical Principles I	84.0
ELE8913	Codes and Regulations	42.0
ELE8919	Achieving Success in the 21st Century	42.0
ENL1813T	Communications I	42.0
MAT8100P	Essential Mathematics	70.0
Level: 02	Courses	Hours
DAT8921	Introduction to Programming	42.0
ELE8922A	Electrical Principles - II	84.0
ELE8923	Electrical Machinery	84.0
ELE8937	Electromagnetic Control	56.0
GEP1001	Cooperative Education and Job Readiness	18.0
PHY8201	Environmental Impact of Technology	42.0
Level: 03	Courses	Hours
ELE8932	Programmable Controllers	84.0
ELE8935	Digital Electronics	56.0
ELE8936	Analog and Power Electronics	56.0
ELE8944	Building Electrical Systems with AutoCAD	56.0
MAT8101	Differential Calculus	42.0

Choose one from equivalencies: Courses		Hours
GED0318	General Education Elective	45.0
Co-op: 01		Courses
WKT2101E	Co-Op Work Term Electrical	
Level: 04		Courses
ELE8931	Industrial Instrumentation	56.0
ELE8940	Industrial Telecommunications	70.0
ELE8941	Robotics and Controls	56.0
ELE8949	Project Management for Electrical Engineering Technicians	14.0
ENL2019T	Technical Communication for Engineering Technologies	42.0
MAT8102	Integral Calculus	42.0
Elective: choose 1		Courses
ELE8945	Distributed Power Systems	42.0
ELE8946	Fire Alarm Systems	42.0
Co-op: 02		Courses
WKT2102E	Co-Op Work Term II Electrical	
Level: 05		Courses
CAM8302E	Microcomputer Interfacing	56.0
ELE8956E	Electrical Equipment Design	42.0
ELE8960	Supervisory Control and Data Acquisition	56.0
ENG4001E	Project I	28.0
ENL4001	Technology Report Preparation	14.0
MAT8103	Ordinary Differential Equations	42.0
Elective: choose 1		Courses
ELE8958	Protection and Control	70.0
ELE8959	Mechanical-Electrical Systems Integration	70.0
Level: 06		Courses
DAT8934	Introduction to Revit	42.0
ELE8966	Advanced Building Electrical Systems	42.0
ENG4003E	Project II	28.0
ENG8344E	Control Systems	56.0
ENL4003	Technology Report	14.0

Elective: choose 1	Courses	Hours
ELE8967	Electrical Power Transmission Systems	70.0
ELE8968	Building Automation Systems	70.0

## Fees for the 2023/2024 Academic Year

Tuition and related ancillary fees for this program can be viewed by using the Tuition and Fees Estimator tool at <https://www.algonquincollege.com/fee-estimator>.

Further information on fees can be found by visiting the Registrar's Office website at <https://www.algonquincollege.com/ro>.

Fees are subject to change.

Additional program related expenses include:

- Books and supplies total approximately \$1,200 in the first year, \$650 in the second year, \$400 in the third year and can be purchased from the campus store. For more information visit <https://www.algonquincollege.com/coursematerials>.
- 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, protective eyewear, hearing protection, gloves, hard hat, as required in each lab environment.

## Admission Requirements for the 2024/2025 Academic Year

### Program Eligibility

- Successful completion of Algonquin's Electrical Engineering Technician program or equivalent with a cumulative GPA of 2.0 and no less than a C- in ENL2019T - Technical Communications and ELE8941 - Robotics and Controls. Plus the specified additional math course, MAT8102. Students not meeting these requirements require department permission to register in technology courses. Applicants from other colleges should contact the program coordinator prior to applying to determine required bridging courses.

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- Successful completion of Algonquin's Electrical Engineering Technician program or equivalent with a cumulative GPA of 2.0 and no less than a C- in ENL2019T - Technical Communications and ELE8941 - Robotics and Controls. Plus the specified additional math course, MAT8102. Students not meeting these requirements require department permission to register in technology courses. Applicants from other colleges should contact the program coordinator prior to applying to determine required bridging courses.

## Application Information

### **ELECTRICAL ENGINEERING TECHNOLOGY (CO-OP AND NON CO-OP VERSION)** **Program Code 0318X03FWO**

The two first years of the three-year Electrical Engineering Technology program is the Electrical Engineering Technician program. Students must initially apply to 0317X Electrical Engineering Technician. Upon completion of the Electrical Engineering Technician program, students who want to continue on to Levels 05 and 06 of the Electrical Engineering Technology program may apply directly with the Coordinator.

For further information on the admissions process, contact:

Registrar's Office  
Algonquin College  
1385 Woodroffe Ave  
Ottawa, ON K2G 1V8  
Telephone: 613-727-0002  
Toll-free: 1-800-565-4723  
TTY: 613-727-7766  
Fax: 613-727-7632  
Contact: <https://www.algonquincollege.com/ro>

## Additional Information

### CO-OP INFORMATION:

All applicants apply directly to the co-op version of this program through OntarioColleges.ca or our International Application Portal. Applicants not wishing to pursue the co-op version will have the opportunity to opt-out after being admitted to the program but prior to the first co-op work term.

Students must actively conduct a guided, self-directed job search and are responsible for securing approved program-related paid co-op employment. Students compete for co-op positions alongside students from Algonquin College and other Canadian and international colleges and universities. Algonquin College's Co-op Department provides assistance in developing co-op job opportunities and guides the overall process, but does not guarantee that a student will obtain employment in a co-op work term. Co-op students may be required to relocate to take part in the co-op employment opportunities available in their industry and must cover all associated expenses; e.g., travel, work permits, visa applications, accommodation and all other incurred expenses.

Co-op work terms are typically 14 weeks in duration and are completed during a term when students are not taking courses. For more information on your program's co-op level(s), visit the courses tab on your program's webpage.

International students enrolled in a co-op program are required by Immigration, Refugees and Citizenship Canada (IRCC) to have a valid Co-op/Internship Work Permit prior to commencing their work term. Without this document International students are not legally eligible to engage in work in Canada that is part of an academic program. The Co-op/Internship Work Permit does not authorize international students to work outside the requirements of their academic program.

For more information on co-op programs, the co-op work/study schedule, as well as general and program-specific co-op eligibility criteria, please visit <https://www.algonquincollege.com/coop>.

With department approval, students who maintain a college-prescribed academic standing may take part in two cooperative placements. Co-op work term 1 is at the end of Level 03.

Students are trained on a Windows-based platform which is the industry standard in the field of engineering. Mac platforms are not acceptable because they are not compatible with the hardware and software used in this program.

OACETT (Ontario Association of Certified Engineering Technicians and Technologists) recognizes this program as meeting the academic requirements for certification in the Certified Technician (C. Tech) category. Students are encouraged to register as Associate members of OACETT. Additional requirements to become fully certified (work experience, the OACETT Professional Practice Examination, peer references, etc.) are the jurisdiction of OACETT.

Levels 05 and 06 include a technology project. Important elements of planning, project selection and team assignment occur at the end of Level 04, usually in April. Students registering for the program after this time may have a limited opportunity for industrial partnerships and inter-professional learning.

## Contact Information

### Program Coordinator(s)

- Kathryn Reilander, <mailto:reilank@algonquincollege.com>, 613-727-4723, ext. 3431

## Course Descriptions

### CAM8302E Microcomputer Interfacing

Students develop practical knowledge to integrate microcomputer and electronic circuits to control mechanical and electronic devices. Students interface systems using USB, I2C, serial and Ethernet communications. The concept of automation is reinforced by experimenting with industry standard software (LabVIEW) and National Instruments hardware. Closed loop I/O control via a computer is implemented using "C-Language" programs with external devices, such DC motors, stepper motors and solid state devices. Students use data acquisition systems to acquire data from various sensors.

Prerequisite(s): ELE8941

Corerequisite(s):none

### **DAT8921 Introduction to Programming**

Programming provides opportunities to solve problems and innovate solutions in the engineering field. Students are introduced to structured programs in a high-level language and develop the ability to write appropriate user functions, code control structures and supported data-types. They explore problem-solving strategies, program design, debugging methods and program documentation. Students are also introduced to available standard (std) library resources for a particular programming language. Through lab exercises, students apply programming language skills to solve engineering problems.

Prerequisite(s): none

Corerequisite(s):none

### **DAT8934 Introduction to Revit**

Students are introduced to Revit and learn the fundamental skills required to produce construction drawings. Building Information Modeling (BIM) is introduced, and students learn how Revit as a drafting tool ties into the greater application of BIM in construction, design and building maintenance. Students learn about the interface basics, project setup, linking models, adding electrical content, drawing setup, annotation and view controls. During the course, students complete several in-class assignments and have two in-class exams to test their skills.

Prerequisite(s): none

Corerequisite(s):none

### **DAT8942 Computer Applications - Electrical**

Students are introduced to the College computer network, spreadsheet applications, word processing software and electrical design software, including Multisim electronic workbench and AutoCAD. Focus is on AutoCAD, in particular electrical applications.

Prerequisite(s): none

Corerequisite(s):none

### **ELE8909 Electrical Principles I**

To understand how electrical circuits, systems and equipment work, knowledge of electrical principles is essential. Students study safe practices for working with electrical systems. Students explore electrical measurement standards and develop the ability to design, construct, test and document circuits. Through applied activities and labs, students apply the skills required to analyze, test and troubleshoot electrical systems.

Prerequisite(s): none

Corerequisite(s):none

### **ELE8913 Codes and Regulations**

Codes and Regulations serve to ensure electrical systems are consistent, reliable, safe and effective. Students locate and interpret the Canadian Electrical Code rules that ensure that electrical systems and equipment do not create hazardous conditions to human life or property. This forms the basis for building electrical system design. Through case studies and in-class activities, students practice applying various regulatory codes to ensure safe practices.

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

### **ELE8919 Achieving Success in the 21st Century**

Rapid changes in technology have created new employment and business opportunities that challenge each of us to find our place as citizens in the emerging society. Life in the 21st century presents significant opportunities, creates potential hazards, and demands that we face new responsibilities in ethical ways. Students explore the possibilities ahead, assess their own aptitudes and strengths, and apply critical thinking and decision-making tools to help resolve some of the important issues present in our complex society with its competing interests.

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

### **ELE8922A Electrical Principles - II**

Understanding the fundamental of electrical principles is essential for design, analysis and troubleshooting of electric circuits and systems. Resistive, inductive and capacitive circuits in both DC and AC (including power factor correction) are covered. Operation of basic electronic components, such as diodes, zener diodes, SCRs, voltage regulators, single phase and three phase rectifiers and power supplies are also studied. Students learn to design, construct, analyze and test electronic circuitry at the "breadboard" level. Via hands-on activities, students apply their skills to design, construct, analyze and test various electric circuits.

Prerequisite(s): ELE8909  
Corerequisite(s):none

### **ELE8923 Electrical Machinery**

The energy conversion between the electrical and mechanical power is performed by electric machines. Therefore, understanding electric machine principles is crucial to the modern technology in developing more energy efficient systems. Beginning with electromagnetism and induction, single phase and three phase transformers are studied. Schematic representation using single line diagrams is introduced. Students learn the construction, selection and operational characteristics of the most common single phase and three phase motors and generators, including high efficiency designs. The operation of primary and secondary batteries and related technologies are covered. The time-current characteristics of fuses and breakers are studied. Via lab activities, students reinforce their applied skills by exploring, testing and troubleshooting various electric machines.

Prerequisite(s): ELE8909  
Corerequisite(s):none

### **ELE8931 Industrial Instrumentation**

Instrumentation, process monitoring and control are crucial for the automation of industrial and manufacturing processes, resulting to an improved operational efficiency. The procedures for the selection, connection and calibration of instruments are covered. Instruments are used to measure quantities, such as temperature, pressure, fluid flow and level. Students explore standard testing and calibration procedures of instrumentation and sensing devices. Students also connect and program PLCs to measure and control temperature, pressure, flow and level. In addition, students are introduced to process control systems and to the design of instrumentation systems. Via hands-on activities, students acquire skills and techniques to measure, calibrate, test, setup and analyze a variety of sensing devices and instrumentation systems.

Prerequisite(s): ELE8932  
Corerequisite(s):none

### **ELE8932 Programmable Controllers**

Programmable Logic Controllers (PLC) are specialized computers adapted for control and monitoring of complex manufacturing and industrial applications. This PLC course extends the



principles learned in the first year and applies them to programmable logic controllers. Emphasis is placed on programming and installing current generation PLC technology. Industrial ladder diagrams, structured text and sequential function chart software are covered. Students develop programs to solve typical industrial applications using relay logic, counters, timers, sequencers, mathematical functions and move commands. Through hands-on activities, students acquire skills to configure and connect digital and analog input/output modules and to develop programs for various industrial applications.

Prerequisite(s): ELE8921

Corerequisite(s):none

### **ELE8935 Digital Electronics**

Digital electronics are considered the building blocks and backbone of modern electronics, computer systems, smart systems and devices. Therefore, it is essential to understand the basics of digital electronics principles and applications. In this course, students are introduced to the theoretical and practical principles of digital electronics. Students develop the methods and skills required to use and perform Boolean algebra, analysis, design and implementation of combinational and sequential circuits. Students explore the functionality of various digital circuit components, and through lab activities, focus on circuit building, troubleshooting and design. Students also verify and test their circuits via lab equipment and simulation tools. Students are introduced to Finite State Machines (FSM), Hardware Description Language (HDL) and Field-Programmable Gate Array (FPGA) design. Through in-class and lab activities, students gain the theoretical and applied knowledge of digital electronics.

Prerequisite(s): ELE8922A

Corerequisite(s):none

### **ELE8936 Analog and Power Electronics**

The digital world relies heavily on analog and power electronics to condition, amplify and switch signals to function efficiently. Therefore, understanding the basic principles of analog and power electronics are of vital importance in the engineering field. Students are introduced to analog and power electronics by studying the principles of semiconductor devices and circuits. Students explore analog to digital interfaces, signal conditioning and amplification and apply their skills by building and testing various circuits. Students also explore power electronics applications for safety, reliable control and efficient management of electrical energy. Students also examine the functionality of various analog components and circuits. Through in-class and lab activities, students gain the theoretical and applied knowledge of analog and power electronics and safe work practice.

Prerequisite(s): ELE8922A

Corerequisite(s):none

### **ELE8937 Electromagnetic Control**

Electromagnetism is widely used in modern technology and industry; it is the foundation of electric power engineering. Students cover the design, installation and troubleshooting of relay logic, electronic logic, electromagnetic controls and AC motor control methods using full voltage starters and selection and installation of variable frequency drivers (VFD's). Students also study the design of motor power circuits, using the Canadian Electrical Code. Students strengthen their knowledge and skill through hands-on lab activities, troubleshooting of motor control circuits, and programming for motor control applications.

Prerequisite(s): ELE8909

Corerequisite(s):none

### **ELE8940 Industrial Telecommunications**

Industrial telecommunication plays an important role in modern technology and the future of electronics. Therefore, fundamental knowledge and skill in various aspects of telecommunications, including various communication protocols, devices, systems and networks is essential. Students are introduced to the basic concepts and theories utilized in modern electronic communications. This includes basic signal and information theory, analog and digital modulation, and data

communications technologies. In the lab, students gain hands on experience using industry standard communications test equipment. Students conduct experiments in frequency response measurement, signal power measurement, time domain reflectometry, and data communications at both the protocol and physical level. Through hands-on lab activities, measurement, testing and troubleshooting, students develop the required technical skills for the industrial telecommunications domain.

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

### **ELE8941 Robotics and Controls**

Robotics and controls are at the core of many engineering system designs, and require technicians to use their acquired skills to plan, interface and integrate a functional robotics unit. In this capstone course, robotics is approached as a special case within the larger area of interactive, software-driven devices. Students are introduced to the basics of robotics and feedback control, setting up and programming a microcontroller, designing and programming actuation and sensing devices associated with a robot, analogue and digital control and DC motor control using Pulse Width Modulation (PWM). Via hands-on lab activities, students explore and gain the skills required to integrate and develop a mobile robot for practical applications.

Prerequisite(s): DAT8921  
Corerequisite(s):none

### **ELE8944 Building Electrical Systems with AutoCAD**

Proficiency in the use of CAD tools is important for the design of electrical systems, and engineering design in general. AutoCAD software is an essential tool for creating electrical drawings, schematics, wiring diagrams, etc. and is widely used for the electrical system design of residential and commercial buildings. Students develop their AutoCAD skills including the use of layers, blocks, PaperSpace, ModelSpace, block attributes, dynamic blocks, templates (DWT), drawing standards and DWF (Drawing Web Format). The application of standards, particularly the Canadian Electrical Code, specifications, and manufacturers' data to the design of both residential and commercial building electrical systems are included. Through in-class activities and projects, students develop AutoCAD skills to design electrical systems for residential and commercial buildings in compliance with the Canadian Electrical Code.

Prerequisite(s): DAT8942  
Corerequisite(s):none

### **ELE8945 Distributed Power Systems**

Students examine power generation, transmission and distribution with particular emphasis on the province of Ontario. This includes an understanding of standard voltage levels, energy sources, cost of electricity, environmental impact, major system components, reactive loads, power quality, arc flash safety, effects of weather on the delivery of electricity and organizational structures that control electricity in Ontario.

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

### **ELE8946 Fire Alarm Systems**

Fire alarm systems are an essential element ensuring protection and life safety of people, homes and buildings. The knowledge and skill in the fire alarm industry regulations and design is of vital importance in the overall engineering design of our living spaces. Students are introduced to the fire alarm industry, the applicable codes and standards, the nature of fire and extinguishment processes, different types of systems, verification and inspections. An overview of fire alarm systems emphasizes requirements for initiating devices, signal appliances, and control panels together with the different types of field wiring and microprocessor-based systems. Through in-class activities and group discussions, students acquire the knowledge and skills to interpret, investigate and determine various important elements in the design of fire alarm systems, according to the rules and regulations as set in the Canadian Electrical Code, National Building Code and the National Fire Code of Canada, and the respective dedicated standards for the Fire

Alarm Systems.

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

### **ELE8949 Project Management for Electrical Engineering Technicians**

Students develop the planning, scheduling, budgeting and organizing skills required to manage projects. Relevant industrial examples are used.

Prerequisite(s): ENL1813T  
Corerequisite(s):none

### **ELE8956E Electrical Equipment Design**

Students analyze the design of electrical equipment and systems including solar and wind energy generation, and transformers. Measurement and quality concepts are covered. Thermodynamics, as it relates to energy losses, equipment cooling and the operation of refrigeration and heat pumps, is included. Students apply mathematics and science principles to find solutions technical problems.

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

### **ELE8958 Protection and Control**

Students examine the types of protection relays and fault protection used in power distribution and transmission. Students study current transformers, fuses, circuit breakers, tap changers, time current curves (TCC curves), single line representations of power systems, typical drawing symbols and terminology, zones of protection, selective coordination, symmetrical components, substation design and equipment ratings. Protection and control relays for transformers, motors, and feeders are programmed, tested and used in simulation.

Prerequisite(s): ELE8945  
Corerequisite(s):none

### **ELE8959 Mechanical-Electrical Systems Integration**

Students are introduced to the essential mechanical devices and systems they deal with in design, construction and troubleshooting. Students also examine the use of basic machines, gears, pulleys, pneumatics, hydraulics and pumps. The lab portion includes using programmable logic controllers in conjunction with pneumatic devices and applications of block programming.

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

### **ELE8960 Supervisory Control and Data Acquisition**

Whether it's manufacturing, water treatment, or energy production, Supervisory Control and Data Acquisition (SCADA) systems are at the heart of any automated control system. Students explore the hardware and software components of a SCADA system including industrial network protocols, alarm monitoring, and data collection. Students also examine standards, control philosophy, security, and best practices. In the lab, students build, configure and test a SCADA system.

Prerequisite(s): ELE8940  
Corerequisite(s):none

### **ELE8966 Advanced Building Electrical Systems**

Electrical systems within buildings are analyzed and designed based on CE and Building Code requirements. Students determine feeder sizing, cable selection, raceway options and distribution configurations. Students examine the principal components of electrical installations, including

grounding and bonding. The requirements for lighting levels for various space usage are examined and calculated. Economic factors are reviewed with respect to providing efficient lighting solutions. Electrical design issues within buildings are studied, including maximum fault current calculations within the building's power distribution network. Economic issues relating to power distribution and methods to correct power quality problems, such as voltage sags, transients, waveform distortion, harmonics, and noise are discussed.

Prerequisite(s): none

Corerequisite(s):none

### **ELE8967 Electrical Power Transmission Systems**

Students explore the construction and operation of AC and DC transmission systems, modelling transmission lines, control of power flow, performance of a transmission line, maximum power transfer, and common design methods of distributed networks. Students use lab equipment to simulate electrical transmission and distribution faults, while using Switzer Engineering Laboratories (SEL) relay protection and control schemes to indicate fault conditions.

Prerequisite(s): ELE8958

Corerequisite(s):none

### **ELE8968 Building Automation Systems**

Various topics related to Building Automation Systems (BAS) are covered. Students are introduced to the main components of the BAS. Many technical aspects of automation including smart thermostats, (Heating Ventilation and Air Conditioning), lighting, access and security, measuring, sensing, actuation and digital controls are covered. Important aspects of building automation are introduced, including the Internet of Things (IoT), Ambient Intelligence (Aml) concepts, real-world applications of Wireless Sensor Networks (WSN) and Data Acquisition Systems (DAQ). In the lab, students design, build, test and troubleshoot various building automation components and subsystems.

Prerequisite(s): CAM8302E

Corerequisite(s):none

### **ENG4001E Project I**

Experience with practical projects provides students with learning opportunities to gain insight and experience, thereby making the connection to industry. Through collaborative participation in applied research projects, students in groups undertake problems of significant technical complexity and work towards solutions using project management methodologies. Student groups initiate projects working closely with stakeholders in real-world workplace environments. There is an option to take the project course ENG4002 as an equivalence to this course. Note: the project courses (ENG4001 and ENG4003) and the supporting communication courses (ENL4001 and ENL4003) have to be done in two consecutive terms.

Prerequisite(s): none

Corerequisite(s):ENL4001

### **ENG4003E Project II**

The ability to identify and satisfy all stakeholder expectations is essential in successful product development. Following up on topics selected in the Project 1 course or the ENgineering Project for Entrepreneurs course (ENG4001 or ENG4002) student groups continue to execute projects of significant technical complexity in an applied research context. Student groups work in consultation with faculty and external stakeholders to create deliverables by monitoring and controlling the project resources. The solutions developed are defended in formal oral and written presentations. Students that started with ENG4002 must continue with the project course ENG4003. Note: the project courses (ENG4001 and ENG4003) and the supporting communication courses (ENL4001 and ENL4003) have to be done in two consecutive terms.

Prerequisite(s): ENG4001E

Corerequisite(s):ENL4003

**ENG8344E Control Systems**

Students are introduced to industrial control systems. They develop an understanding of various control systems and their components. Topics covered include open and closed loop control systems, block diagrams, transfer functions, Laplace transforms, sensors and actuators applications, processing analog signals, motion control principles, component selection/integration and system design, discrete control, continuous control and digital and analog controllers. Lab work focuses on the use of sensors, data acquisition and processing, use of DACs and ADCs and industrial controllers.

Prerequisite(s): CAM8302E  
Corerequisite(s):none

**ENL1813T Communications I**

Communication remains an essential skill sought by employers, regardless of discipline or field of study. Using a practical, vocation-oriented approach, students focus on meeting the requirements of effective communication. Through a combination of lectures, exercises, and independent learning, students practise writing, speaking, reading, listening, locating and documenting information and using technology to communicate professionally. Students develop and strengthen communication skills that contribute to success in both educational and workplace environments.

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

**ENL2019T Technical Communication for Engineering Technologies**

The ability to communicate effectively in a technically-oriented interdisciplinary workplace is a foundational skill in an innovation-driven economy. Students are exposed to exercises and assignments designed to foster independent and collaborative critical thinking, research, writing, visual communication and presentation skills related to technical topics.

Prerequisite(s): ENL1813T  
Corerequisite(s):none

**ENL4001 Technology Report Preparation**

Students define and describe a problem of significant technical complexity and present a suitable technological solution. Drawing upon skills previously acquired, students plan, conduct research for and begin the creation of a written report that is based upon the guidelines established by the Ontario Association of Certified Engineering Technicians and Technologists (OACETT).

Prerequisite(s): ENL1819T or ENL2019T  
Corerequisite(s):ENG4001

**ENL4003 Technology Report**

Students complete the report defined in ENL4001. The completed report forms the basis of an oral presentation to faculty, peers and interested industry personnel in the final weeks of the term. ENL4001 and ENL4003 must be taken in the same academic year unless an exception is approved.

Prerequisite(s): ENL4001  
Corerequisite(s):ENG4003

**GED0318 General Education Elective**

Students choose one course, from a group of general education electives, which meets one of the following five theme requirements: Arts in Society, Civic Life, Social and Cultural Understanding, Personal Understanding, and Science and Technology.

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

**GEP1001 Cooperative Education and Job Readiness**

Students are guided through a series of activities that prepare them to conduct a professional job search and succeed in the workplace. Through a detailed orientation students learn the cooperative education program policies and procedures related to searching and securing a work term opportunity. Students identify their strengths and transferable skills and participate in workshop-style sessions that focus on cover letter and resume development, interview techniques and job search strategies. Students learn how to navigate a web-based resource centre, which is used to post employment and cooperative education job opportunities. Students reflect on workplace success, ethics and responsibilities.

Prerequisite(s): none

Corerequisite(s):none

**MAT8100P Essential Mathematics**

The study of algebraic and transcendental functions is an essential prerequisite to Calculus. Students manipulate algebraic expressions, solve algebraic equations and linear systems, and learn the properties of algebraic and transcendental functions. Students graph a variety of functions and solve problems involving complex numbers, trigonometry and vectors. Delivered in a modular format, this course is equivalent to the completion of all of the following math modules MAT8100 - A, B, C, D, E, F, G, H, and I.

Prerequisite(s): none

Corerequisite(s):none

**MAT8101 Differential Calculus**

Differential Calculus is the mathematical study of rates of change. Students study derivative, its definition and interpretation and its applications. Stud limits and use first principles to find simple derivatives. The product, quotient and chain rules are used to find derivatives of algebraic functions. Students use differentiation rules to find derivatives of transcendental functions. A variety of applications of derivatives, such as curve sketching, finding the tangent to a curve and finding an approximate solution to an equation using Newton's method, are also studied.

Prerequisite(s): MAT8100 or MAT8100P or MAT8050 and MAT8051 or MAT8050P and MAT8051

Corerequisite(s):none

**MAT8102 Integral Calculus**

Integral calculus is the study of the definitions, properties and applications of two related concepts, the indefinite integral and the definite integral. Students find the area under a curve and the area between two curves. Students calculate both indefinite and definite integrals, and use the Trapezoidal Rule and Simpson's Rule to perform numerical integrations. Students integrate polynomial, exponential, logarithmic and trigonometric functions by substitution. Integration by parts and partial fractions are employed to perform complex integrations.

Prerequisite(s): MAT8101

Corerequisite(s):none

**MAT8103 Ordinary Differential Equations**

Physical situations such as beam deflection, harmonic motion, circuit theory or Newton's Laws require solving first or second order ordinary differential equations. Students study first order differential equations and solve these equations using separation of variables, integrating factors for linear equations and Laplace Transforms. Both homogeneous and non-homogenous second and higher order differential equations with constant coefficients are solved using the method of undetermined coefficients and using Laplace Transforms. Students also use both methods to solve practical applications of second order ordinary differential equations related to students' program of study. A review of sequences and series is completed in order to prepare students for power series expansions. Students apply Maclaurin series to expand functions as a power series and use the results to approximate values of transcendental functions. Students also study periodic functions and determine their Fourier series expansions.

Prerequisite(s): MAT8102  
Corerequisite(s):none

**PHY8201 Environmental Impact of Technology**

Every day newspaper headlines, movies, and television have warnings of the dire consequences of some environmental issues, such as global warming, acid rain, climate change and a host of other problems. Students are provided some of the science behind the headlines so they can make informed decisions as citizens, consumers and professionals.

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

**WKT2101E Co-Op Work Term Electrical**

This course includes a work placement, a weekly recording of the activities done in a journal and a final summary report of the overall experience to be submitted before returning to school. The placement has to be in an electrical related industry, preferably to electrical engineering. The timing of the placement depends on the progression pattern of the program and cannot be done before completion of the second level of the Electrical Engineering Technician program. The placement is monitored by the College. Feedback from the employer is considered in the final evaluation of the course. All assignments (journal entries and final report) must be provided to pass the course. The College Coop office assist in finding a placement. However, it is the student responsibility to find, apply and get the work term as if they were applying for a job.

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

**WKT2102E Co-Op Work Term II Electrical**

With departmental approval, students complete an optional paid full-time work term. The placement is monitored by the College and assignments, including a final report must be completed for a pass/fail mark. College provides assistance in finding a placement.

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