

# Electrical Engineering Technician - Process Automation

Section B.62  
8/23/2017

**Ontario College Diploma (2 Years - 4 Semesters ) (4026)**

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## PROGRAM OVERVIEW

The Electrical Engineering Technician - Process Automation program provides you with the basic knowledge of electricity and electronics. As a student, you will learn to apply related subjects such as computer technology, industrial electronics, instrumentation, electrical machines, robotics, power electronics, and automated control systems. When you graduate, you will be geared towards a career in the industrial environment and will be able to install, test, modify, troubleshoot, and repair electrical systems. You will also be able to approach industrial electrical and electronic systems from the viewpoint of analysis, technical evaluation, design, and development.

If you are a Canadian citizen or permanent resident and currently unemployed, you may qualify for second career funding for this program! To learn more about your options and how to get started, contact us at [studentrecruitment@saultcollege.ca](mailto:studentrecruitment@saultcollege.ca).

## ADMISSIONS

### MINIMUM ACADEMIC REQUIREMENTS

Ontario Secondary School Diploma with Grade 12 English (C) ENG4C, Grade 12 Foundations for College Math (C) MAP4C, or mature student status. Completion of the two year Electrical Engineering Technician - Process Automation program and technology-level mathematics are required for entrance to the Technology program.

### ACADEMIC RECOMMENDATIONS

Grade 12 Mathematics for College Technology (C) MCT4C.

## CAREER PATHS

Graduates of the Electrical Engineering Technician Process Automation program may be employed by a public utilities commission, an industrial user, a manufacturer of electrical equipment, an electrical installer, or an electrical engineering consulting firm. Other potential areas of employment include the steel and papermaking industries and electrical power generation.

As an Electrical Engineering Technician, graduates may also be hired as an instrument repair technician, electrical maintenance technician, process control technician, or electrical repairer.

Technician and technology graduates who have had two years of acceptable work experience are eligible for certification by the Ontario Association of Certified Engineering Technicians and Technologists (OACETT) subject to fees and other requirements as established by OACETT. For more information please visit the OACETT website: <https://www.oacett.org/>.

## MANDATORY FEES

Candidates will be required to provide industrial safety apparel including approved safety boots, rubber insulated (hot) gloves with leather protectors, eye protection and adhere to all Health and Safety requirements of the college.

## OTHER INFORMATION

For more information contact Program Coordinator Ron Chartrand at 705.759.2554 ext 2523 or email [ron.chartrand@saultcollege.ca](mailto:ron.chartrand@saultcollege.ca).

## PROGRAM OF STUDY

### SEMESTER 1

CMM115-3 Communications I  
ELN100-5 Electronic Fundamentals I  
ELR100-5 Electrical Fundamentals DC  
ELR114-3 Measurement and Shop Practice  
MTH142-5 Mathematics  
GEN100-3 Global Citizenship

### SEMESTER 2

ELN109-5 Electronic Devices and Circuits  
ELN210-3 Computer Aided Design  
ELR109-5 A.C. Circuit Analysis & Machines  
MTH143-5 Mathematics

#### **Select one of the following:**

*GAS101: Rituals, Idols and Controversies in Sports*  
*GAS103: What in the World is Going On?*  
*GAS109: Music and Pop Culture*  
*GAS116: Your Two Cents*  
*GEN110: Student Selected General Education*  
*HDG122: Personal and Academic Success Strategies*  
*SSC102: Introduction to Aboriginal Peoples of Canada*

**Note:** \*Students must choose one of the identified Student Selected General Education Courses

### SEMESTER 3

ELN115-6 Digital Integrated Electronics  
ELN213-4 Electronic Devices and Circuits II  
ELN229-4 Instrumentation/Process Control  
ELR215-3 Electrical Power Systems  
ELR216-2 Introduction to Robotics  
ELR232-7 Electrical Machines

### SEMESTER 4

ELR223-6 Robotic and PLC Control Systems  
ELR236-7 Power Electronics  
ELR251-4 Telecommunication System I  
ELR214-4 Organizational Effectiveness

**Note:** Students must also take MTH551-4 Calculus I in Semester 4 should they elect to enter Program 4029 - Electrical Engineering Technology - Process Automation.

## Course Descriptions

## Semester 1

### **Communications I (CMM115) (3 credits)**

The focus of this course is paragraph writing. Students will produce effective, college-level expository/response paragraphs by developing analytical skills to select and properly integrate electronic and other research materials. Writing components such as grammar, sentence structure, paragraph development, editing, and referencing are included.

### **Electronic Fundamentals I (ELN100) (5 credits)**

This is an introduction to the physical principles of semi-conductors and diodes with practical circuit applications. The study of LINEAR DC power supplies and transistor circuit analysis with related laboratory projects is also introduced.

### **Electrical Fundamentals DC (ELR100) (5 credits)**

This is an introduction to electrical quantities and units; Ohm's and Kirchoff's Laws; simple DC series, parallel, series-parallel, and voltage divider circuits; simple DC network analysis; magnetism and electromagnetism; inductance and capacitance; DC series RL circuit analysis.

### **Measurement and Shop Practice (ELR114) (3 credits)**

This course provides an understanding of the operating principles, characteristics, and application of electrical/electronic measuring instruments. Component testing and identification, soldering, wire-wrapping and hand tool exercises will be practiced in a lab setting.

### **Mathematics (MTH142) (5 credits)**

This first level mathematics course for engineering technology programs begins with a review of fundamental concepts, arithmetic operations, and units of measurement. This is followed by an in-depth study of basic algebra, trigonometric and other functions, and quadratic equations.

### **Global Citizenship (GEN100) (3 credits)**

The world we are living in is one in which local, national and international issues are interwoven, and the need for us to understand the impact these issues can have on our lives has never been greater! Using a socio-cultural, political and environmental lens, students will view how the world is changing and how to become active agents of change from the local to international level. Important issues such as social injustice, poverty, environmental protection, resource scarcity, sustainability, and health will be addressed. Global citizenship is an opportunity to `Be the Change`. This course meets the Civic Life and Social and Cultural Understanding General Education themes.

## Semester 2

### **Electronic Devices and Circuits (ELN109) (5 credits)**

This course is an in-depth analysis of amplifiers, using D.C. and A.C. equivalent circuits, employing BJT's, JFET's, MOSFET's, and linear IC's (OPAMPS). The lab work will include the design, analysis, testing and troubleshooting of amplifiers.

### **Computer Aided Design (ELN210) (3 credits)**

This course will teach the student the use of computer aided design tools (AUTOCAD) within the electrical industry. Software will be used to create and modify electrical/electronic schematics, wiring and layout diagrams.

### **A.C. Circuit Analysis & Machines (ELR109) (5 credits)**

This course is an analytical study of series, parallel and series-parallel A.C. impedance networks, network theorems and polyphase circuits. Concurrently an introduction to A.C. and D.C. motors and generators together with their control methods is studied using complex math.

### **Mathematics (MTH143) (5 credits)**

This course is a continuation of MTH142 (from Semester I) for engineering technology students. Topics of study include exponents and radicals, plane analytic geometry, solid mensuration, and functions including trigonometric, exponential and logarithmic functions. This course concludes with an introduction to statistics.

**Rituals, Idols and Controversies in Sports (GAS101) (3 credits)**

This course gives students the opportunity to examine the many rituals, idols, and controversies surrounding the world of sports. Students will debate, discuss, and present a variety of popular topics in sports such as athlete salaries, performance-enhancing drugs and athlete product endorsement. This course will explore the impact these issues have on social and cultural aspects of human behaviour.

**What in the World is Going On? (GAS103) (3 credits)**

This course will give you the opportunity to build a strong awareness of current global issues. You will explore various media such as radio, TV, Internet, newspaper, and magazines. Through discussions, debates, and presentations, students will focus on the main international headlines. Students will discover and develop a view of and understanding of the impact of events related to music, entertainment, fashion, sports, politics, economics, world issues, and human-interest stories.

**Music and Pop Culture (GAS109) (3 credits)**

This course will give students the opportunity to think creatively and critically about the influence of popular music. Students will explore different music genres (rock, metal, hip hop, and rap), their development and social significance. Students may explore music in film, commercials, war and protest, social and civil rights movements, and the contributions of specific artists to contemporary culture. The ways in which popular music has contributed to the current culture and, in turn, how culture has shaped popular music will be examined.

**Your Two Cents (GAS116) (3 credits)**

No matter one's lifestyle, income, or background, each person has experienced and developed practices to how we relate to money. This course explores our relationship and personal understanding with money, and its place and value in our culture and individual lives.

**Student Selected General Education (GEN110) (3 credits)**

For Transfer Credit Purposes only.

**Personal and Academic Success Strategies (HDG122) (3 credits)**

This course will prepare you for the rigors of academic life and enable you to develop a personal profile for college and career success. The main focus of this course will include accepting personal responsibility, discovering self-motivation, mastering self-management, employing interdependence, gaining self-awareness, adopting lifelong learning, and developing emotional intelligence. In addition, you will develop and produce a `Personal Profile` that will identify your personal learning style, communication style, and personality style to enable you to achieve success in learning about, understanding, and choosing the courses and careers that will lead to personal and professional satisfaction.

**Introduction to Aboriginal Peoples of Canada (SSC102) (3 credits)**

This course will provide participants with an introduction to the history and cultural survival of Canada's Aboriginal people. Aboriginal worldview will be identified and discussed in both historical and modern perspectives. Students will review colonization, government policies and legislation, which provide a foundation for understanding modern Aboriginal life in Canada.

**Semester 3**

**Digital Integrated Electronics (ELN115) (6 credits)**

This course is the study of digital logic circuits and pulse circuits. The student will study pulse fundamentals, basic digital gates, flip flops counters and registers, A/D and D/A conversion. Practical

exercises include circuit analysis, testing, troubleshooting and applications.

#### **Electronic Devices and Circuits II (ELN213) (4 credits)**

This course is a detailed study of control devices and circuits together with their industrial applications. Topics include relays, timing circuits, operational amplifiers, optoelectronics, trigger devices (BJT, UJT, 555 timer), THYRISTOR control devices (SCR, TRIACS). Related practical exercises will consist of circuit design, analysis, testing and trouble-shooting.

#### **Instrumentation/Process Control (ELN229) (4 credits)**

This course introduces the student to the principles of Instrumentation and Process Control. The measurement and control of process variables such as temperature, pressure, level and flow will be studied in detail and applied in the practical component of the course.

#### **Electrical Power Systems (ELR215) (3 credits)**

This course is a study of the production and delivery of electrical power from the generating station to the consumer. Transmission and distribution equipment, system configurations, protection and control and electrical load fundamentals will be discussed and analyzed.

#### **Introduction to Robotics (ELR216) (2 credits)**

This is an introductory course in industrial robotics. Topics covered will include types of robots and their applications, cell design, safety and utilization of simulation/programming software. Students will develop and demonstrate basic programs for control of 6 axis robots.

#### **Electrical Machines (ELR232) (7 credits)**

This course is an analytical study of the characteristics, performance and control of D.C. generators and motors, single and polyphase induction motors, polyphase synchronous machines and transformers, supported by an integrated laboratory program.

### **Semester 4**

#### **Robotic and PLC Control Systems (ELR223) (6 credits)**

This course will introduce the student with classical control fundamentals and reinforce them through robotic and programmable logic controller applications.

#### **Power Electronics (ELR236) (7 credits)**

This course is an introductory analytical study of A.C. and D.C. motor control utilizing solid-state techniques. The topics include D.C. motor speed control utilizing phase-controlled and chopper converters; and polyphase A.C. motor speed control utilizing six-step and pulse-width modulated inverters and phase-controlled cycloconverters. This course is supported by a well equipped laboratory program.

#### **Telecommunication System I (ELR251) (4 credits)**

The student will study the technology and protocols that comprise data and voice telecommunication networks of today. The OSI 7 Layer Model will form the basis of the course with focus on the bottom 3 layers. The theory will be strengthened with hands-on labs in cable making, protocol analysis (RS232, TCP/IP) as well as building a simple client/server network. Wireless networks and security issues will also be investigated.

#### **Organizational Effectiveness (ELR214) (4 credits)**

Knowledge of the patterns and precedents of the past provide the means for a person to gain awareness of his/her place in contemporary culture. Every organization, as a culture, requires critical elements to be effective. Appreciating the roles and contributions of those elements inform one's understanding of the organizational culture. Some key elements include Quality Assurance, the organization's relevance to consumer well-being and the operation of inter-disciplinary teams. This course will provide insight into

historical and current organizational cultures and the need for motivation in them.