Electrical Engineering Technician - Process Automation and Trades

Ontario College Diploma (2 Years - 4 Semesters) (4127)
705.759.6700 : 1.800.461.2260 : www.saultcollege.ca : Sault Ste. Marie, ON, Canada

PROGRAM OVERVIEW

Sault College’s Electrical Engineering Technician - Process Automation and Trades program is designed to provide you with the knowledge and skills required to pursue a career as an Electrical Engineering Technician and/or as an Industrial or Construction Electrician. Classroom instruction (semesters one through four) at Sault College will provide you with the basics of electricity and electronics as well as related subjects such as computer technology, industrial electronics, instrumentation, electrical machines, power electronics, and automated control systems. These skills will prepare you for a career in industrial environments with the electrical trades. Graduates will have a wide variety of skills including those required to install, test, modify, troubleshoot, and repair electrical systems.

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.

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.

ACADEMIC RECOMMENDATIONS

Grade 12 Mathematics for College Technology (C) MCT4C.

CAREER PATHS

The work-ready graduates of the Electrical Engineering Technician - Process Automation and Trades program have numerous opportunities and will be attractive to prospective employers given their Electrical Engineering Technician program diploma. As an Electrical Engineering Technician, graduates may also be hired as an instrument repair technician, electrical maintenance technician, process control technician, or electrical repairer.

Graduates of this program may also pursue further education or apprenticeships in the Construction or Industrial Electrician trades. Students wishing to pursue an apprenticeship should contact the local office of the Ministry of Training, Colleges & Universities, Apprenticeship Branch – 705.945.6815 in Sault Ste. Marie.

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

<table>
<thead>
<tr>
<th></th>
<th>Domestic</th>
<th>International</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuition</td>
<td>$2,716.50</td>
<td>$15,180.80</td>
</tr>
<tr>
<td>Ancillary</td>
<td>$1,117.00</td>
<td>$1,577.00</td>
</tr>
</tbody>
</table>

These fees are for the 2020-2021 academic year (year 1 of study) and are subject to change. Please visit your Student Portal to view your Schedule of Fees.

OTHER INFORMATION

For more information contact Bob Allen at 705.759.2554 ext 2522 or email Bob.Allen@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
ELR113-2 Installation Methods I
MTH143-5 Mathematics

Select one of the following:
GEN110: Student Selected General Education

Note: *This student-selected general education course code indicates a general-education course is taken in this semester. Students will choose from a selection of courses (details) prior to the semester in which the student-selected general education course is to be taken.

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
ELR233-5 Installation Methods III
ELR236-7 Power Electronics
RAA205-4 Industrial Automation Networking I
ELR214-4 Organizational Effectiveness  
**Note:** Students must also take MTH551-4 Calculus in Semester 4 should they elect to enter Program 4029 - Electrical Engineering Technology - Process Automation.

**Course Descriptions**

**Semester 1**

**Communications I (CMM115) (3 credits)**  
This course is designed to help students develop the skills necessary to communicate effectively in their programs and at the college level. Students will think critically to capture the meaning messages and respond appropriately; produce coherent, clear paragraphs; and purposively research and responsibly integrate credible sources into their own writing. Emphasis is placed on the writing process, from planning to revising, while providing opportunities to explore various modes of communication.

**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 electromagnetic; 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-wraping 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.

**Installation Methods I** (ELR113) (2 credits)
This course introduces the student to residential wiring practices and the Canadian Electrical Code.

**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.

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

For Transfer Credit Purposes only.

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.

Installation Methods III (ELR233) (5 credits)
This course is a continuation of installation Methods I and II. Residential wiring methods are completed and commercial wiring methods are introduced.

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.

Industrial Automation Networking I (RAA205) (4 credits)
The student will study the technology and protocols used in industrial networks for process automation? The TCP/IP 4 layer model will form the basis of the course with a comparison to the OSI 7 layer model.? The theory will be strengthened with hands-on labs in cable making, protocol analysis (RS232, RS485, TCP/IP) as well as building simple client/server networks.? Industrial networks topics such as Ethernet/IP and CAN BUS will also be studied.

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.