PROGRAM OVERVIEW

This program is not a direct intake. This does not preclude current Sault College Electrical Engineering program students from working towards gaining this additional diploma.

If you are enrolled in any of the following Sault College Electrical Engineering Programs listed below, you may be eligible in your second or third year to take courses that will allow you to gain this additional diploma:

- 4026 - Electrical Engineering Technician - Process Automation
- 4127 - Electrical Engineering Technician - Process Automation & Trades
- 4029 - Electrical Engineering Technology - Process Automation

Please contact the Registrar’s Office for further information.

The Instrumentation and Control Engineering Technician program will prepare you to install, calibrate, configure, maintain, service, test, troubleshoot, analyze and upgrade measuring and control devices and systems, which equip process industries.

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.

Must be currently enrolled in one of the Sault College Electrical Engineering Programs listed below:

- 4026 - Electrical Engineering Technician - Process Automation
- 4127 - Electrical Engineering Technician - Process Automation & Trades
- 4029 - Electrical Engineering Technology - Process Automation

ACADEMIC RECOMMENDATIONS

Grade 12 Mathematics for College Technology (C) MCT4C.

CAREER PATHS

Graduates may be employed by pulp and paper, power generation, mining, petrochemical, natural gas, steel, refining, and water and wastewater treatment industries.
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
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
ELR211-5 Fluids and Combustion

SEMESTER 4
ELR212-5 Process Control
ELR223-6 Robotic and PLC Control Systems
RAA205-4 Industrial Automation Networking I
ELR214-4 Organizational Effectiveness

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 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.

**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.

**Fluids and Combustion** (ELR211) (5 credits)
This course includes the study of viscosity, pressure, temperature, gas laws, pressure at a depth, manometry, continuity equation, Bernoulli’s equation, pitot tubes, orifice and venturi meters, laminar and turbulent flow, combustion and properties of steam.

**Semester 4**

**Process Control** (ELR212) (5 credits)
This course is a study of process control systems including: single loop, multi-loop, cascade, ratio, feed forward and boiler control. The student will calibrate, adjust, tune, test and maintain these types of control systems.

**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.

**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.