Seneca POLYTECHNIC

2024-2025

ELECTROMECHANICAL ENGINEERING TECHNOLOGY – AUTOMATION (EMA)

About the Program

In this three-year advanced diploma program, you will learn how to interpret schematic drawings, and use electrical and mechanical diagnostic tools. With an emphasis on automation and robotics, this program is a blend of electronics and mechanical engineering and focuses on training engineering technologists. You will acquire industry specific skills such as operating hydraulic and pneumatic machineries, using programmable logic controllers (PLC), and understanding machine elements and industrial automation. Classes and labs will be delivered in Seneca's Centre for Innovation, Technology and Entrepreneurship (CITE).

Common First Semester

Four programs within the School of Electronics & Mechanical Engineering Technology (https://www.senecapolytechnic.ca/school/electronics-and-mechanical-engineering-technology.html) have a common first semester, which allows you to transfer easily between programs before your second semester. The other programs are: Computer Engineering Technology (https://www.senecapolytechnic.ca/programs/fulltime/ECT.html), Electronics Engineering Technician (https://www.senecapolytechnic.ca/programs/fulltime/EEN.html), Electronics Engineering Technology (https://www.senecapolytechnic.ca/programs/fulltime/EET.html).

Computer Requirements

- operating system: Windows 10 or 11, 64 bit
- processor: 3.3 GHz (or faster)
- memory: 16 GB (or larger)
- solid-state drive: 128 GB (or larger)
- second display screen (recommended)

Credential Awarded

Ontario College Advanced Diploma

Duration

6 Semesters (3 Years)

Starts

January, May, September

Program and Course Delivery

This program is offered in Seneca's hybrid delivery format with some courses available in Seneca's flexible delivery format. Some coursework is online and some must be completed in person. Students will need to come on campus to complete in-person learning requirements. For courses offered in the flexible delivery format, professors use innovative learning spaces and technology to teach students in a classroom or lab and broadcast in real time to students attending remotely. In flexible courses, students have the choice of coming on campus or learning online.

Skills

Throughout this program you will develop the following skills:

- Design techniques
- Diagnostic techniques
- Troubleshooting of electronics, electrical and mechanical systems
- Programming of controls systems
- Programming of robotics systems
- Reading and creating engineering electrical and mechanical drawings

Optional Co-op

This program offers the option to complete a co-op work term, providing valuable hands-on experience in your field of study.

Students who select the co-op stream will have the opportunity to participate in a co-op term(s) if eligibility requirements are maintained. Students will have the flexibility to transfer to the non co-op stream at any time. The co-op term(s) is typically a full-time paid position completed between two academic semesters. The co-op search is student-driven and participation in the co-op stream does not guarantee that a work position will be secured. However, students will receive guidance and support through in-class career workshops and one-on-one coaching to help prepare for the co-op term.

Review eligibility requirements for work-integrated learning (https://www.senecapolytechnic.ca/employers/seneca-works/work-integrated-learning/eligibility.html)

Your Career

As a graduate of this program, you may pursue future career options, such as:

- Automation technologist
- Control systems technologist
- Electromechanical engineering technologist
- PLC programmer
- Pneumatic/hydraulic technologist
- Process control technologist
- Robotics programmer and technologist
- Startup and service technologist
- Technical sales consultant

Affiliations/Associations

- KUKA Robotics
- Siemens
- EPLAN/Rital
- Microsoft
- Institute of Electrical and Electronics Engineers (IEEE)
- Ontario Association of Certified Engineering Technicians and Technologists (OACETT)

Industry and Professional Certifications

While passing specific courses, students are directly granted numerous global industry certificates or an opportunity to pass comprehensive industry certifications such as:

- **Siemens**
  - Basics of PLC Automation
  - Totally Integrated Automation
  - IIoT – Industrial Internet of Things
  - Mechatronics Level I and Level II (comprehensive exams)
- **Kuka Robotics**
  - Robot Programming I
  - Robot Applications
- **Microsoft**
  - Azure – Cloud basics
- **EPLAN**
  - Eplan CAD fundamentals (comprehensive exam)

Program of Study

Course Code	Course Name	Weekly Hours
COM101	Communicating Across Contexts	3
or COM111	Communicating Across Contexts (Enriched)	
ETY155	Electricity	5
ICO155	Introduction to Computers	2
LIN155	Electronic Lab Instrumentation and Techniques	3
MTH147	Mathematics with Foundations	6
PRG155	Programming Fundamentals Using "C	4
Semester 2		
CAD255	Mechanical Designs and Drawing	4
DGS266	Digital Electronics and Introduction to PLC	4
ELM253	AC Circuits for Electrical Systems	4
IPS255	Interpersonal Skills in the Engineering Workplace	3
MTH255	Mathematics	4
THY200	Machining Theory - Automation	3
Semester 3		
CAD355	Electrical Designs and Drawings	4
CSF453	Control Systems Fundamentals	4
ECP455	Engineering Codes and Practices	4
MEC355	Mechatronics: Pneumatics and Hydraulic	4
MME355	Mechanics and Machine Elements	4
WTP100	Work Term Preparation *	1
plus: General Education Course (1)		3
Work-Integrated Learning Term 1		
EMA331	Electromechanical Engineering Technology - Automation, Co-op *	30
Semester 4		
ELM453	Motors and Transformers	4
MEC455	Mechatronics Concepts	4
MMF455	Material and Machining Fundamentals	5
PCS455	Process Control	4
TEC400	Technical Communications	3
TIA555	Totally Integrated Automation	4
Work-Integrated Learning Term 2		
EMA332	Electomechanical Engineering Technology - Automation, Co-op II *	30
Semester 5		
AUT555	Advanced Automation	4
CAD555	Electrical and Mechanical Design and Simulation	4
CNC555	CNC Technology	4
IOT555	Industrial Internet of Things	4
MOM555	Manufacturing Operations Management	4
ROB555	Robotics Basics	4
Semester 6		
CMA655	Cloud and Manufacturing Data Analytics	4
ROB655	Robotic Applications	4
SIM655	Simulation for Design and Manufacturing	4
TPJ653	Capstone Project	4
plus: Professional Options (1)		
plus: General Education Course (1)		3

Professional Options

Course Code	Course Name	Weekly Hours
ACC106	Accounting I	3
BAM101	Introduction to Business Administration	3
PHY354	Physics for Electronics	4
PPE655	Engineering Ethics and Professional Practice	5
THY201	Machining Theory	3
TLD201	Tool Design	2

* Work-Integrated Learning option only

Program Learning Outcomes

This Seneca program has been validated by the Credential Validation Service as an Ontario College Credential as required by the Ministry of Colleges and Universities.

As a graduate, you will be prepared to reliably demonstrate the ability to:

- Fabricate and build electrical, electronic, and mechanical components and assemblies in accordance with operating standards, job requirements, and specifications.
- Analyze, interpret, and produce electrical, electronic, and mechanical drawings and other related technical documents and graphics necessary for electromechanical design in compliance with industry standards.

- Select and use a variety of troubleshooting techniques and equipment to assess, modify, maintain, and repair electromechanical circuits, equipment, processes, systems, and subsystems.
- Modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications and to optimize production.
- Design and analyse mechanical components, processes, and systems by applying engineering principles and practices.
- Design, analyze, build, select, commission, integrate, and troubleshoot a variety of industrial motor controls and data acquisition devices and systems, digital circuits, passive AC and DC circuits, active circuits and microprocessor-based systems.
- Install and troubleshoot computer hardware and programming to support the electromechanical engineering environment.
- Analyse, program, install, integrate, troubleshoot and diagnose automated systems including robotic systems.
- Establish and maintain inventory, records, and documentation systems to meet organizational and industry standards and requirements.
- Select and purchase electromechanical equipment, components, and systems that fulfil job requirements and functional specifications.
- Specify, coordinate, and apply quality-control and quality-assurance programs and procedures to meet organizational standards and requirements.
- Work in compliance with relevant industry standards, laws and regulations, codes, policies, and procedures.
- Develop strategies for ongoing personal and professional development to enhance work performance and to remain current in the field and responsive to emergent technologies and national and international standards.
- Contribute as an individual and a member of an electromechanical engineering team to the effective completion of tasks and projects.
- Design and analyze electromechanical systems by interpreting fluid mechanics and the attributes and dynamics of fluid flow used in hydraulic and fluid power systems.
- Contribute to project management through planning, implementation and evaluation of projects, and monitoring of resources, timelines, and expenditures as required.
- Design, modify, and maintain automated electromechanical equipment, components, systems and subsystems to maintain applications including mechanical, electrical, and instrumentation.
- Design electromechanical processes for electromechanical devices and components by applying automation/control systems concepts.

Admission Requirements

- Ontario Secondary School Diploma (OSSD), or equivalent, or a mature applicant (https://www.senecapolytechnic.ca/registrar/canadian-applicants/admission-requirements/mature-applicants.html)
- English: Grade 12 C or U, or equivalent course
- Mathematics: Grade 12 C or U, or equivalent course

Canadian citizens and permanent residents may satisfy the English and/or mathematics requirements for this program through successful Seneca pre-admission testing. (https://www.senecapolytechnic.ca/registrar/canadian-applicants/admission-requirements/mature-applicants.html)

Recommended upgrading for applicants who do not meet academic subject requirements (https://www.senecapolytechnic.ca/registrar/canadian-applicants/admission-requirements/upgrading-options.html).

International Student Information

International admissions requirements vary by program and in addition to English requirements (https://www.senecapolytechnic.ca/international/apply/how-to-apply/admission-requirements/english-requirements.html), programs may require credits in mathematics, biology, and chemistry at a level equivalent to Ontario's curriculum, or a postsecondary degree or diploma, equivalent to an Ontario university or college. Program-specific pre-requisite courses and credentials are listed with the admission requirements on each program page. To review the academic requirements please visit: Academic Requirements - Seneca, Toronto, Canada (senecapolytechnic.ca) (https://www.senecapolytechnic.ca/international/apply/how-to-apply/admission-requirements/academic-requirements.html).

Pathways

As a leader in academic pathways, we offer a range of options that will allow you to take your credential further in another Seneca program or a program at a partner institution.

To learn more about your eligibility, visit the Academic Pathways (https://www.senecapolytechnic.ca/pathways.html) web page.

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