ELECTROMECHANICAL ENGINEERING TECHNOLOGY - MECHATRONICS

Program: METR
Credential: Ontario College Advanced Diploma, Co-op
Delivery: Full-time
Work Integrated Learning: 3 Co-op Work Terms
Length: 6 Semesters, plus 3 work terms
Duration: 3 Years
Effective: Fall 2023, Winter 2024
Location: Barrie

Description

As we enter the next industrial revolution, advanced technology demands interdisciplinary skills. Mechatronics is the interdisciplinary study of electrical, mechanical and computing systems. Students gain expertise in electrical, mechanical, and computer engineering, and explore how these disciplines are interconnected. Using the systems level approach, students develop both the applied skills and theoretical knowledge to build, troubleshoot and support next generation industrial systems. Students acquire an understanding of electronics, digital circuits, motor control, robotics, programmable logic controllers (PLCs), pneumatics, hydraulic systems, machining, dynamics, stress analysis, the internet of things, web and database systems, and interface programming. Through an official partnership with Siemens, students prepare for industry recognized certifications including the Siemens Mechatronics Systems Certification program (SMSCP) certification. Students gain experience in problem solving, and effective oral and written communications through examination of current industry trends and requirements. Co-op terms provide opportunities to experience real-life industry skills, networking, and potential career paths.

Career Opportunities

A mechatronics graduate will function as a highly skilled technician or technologist who can work with modules and components in complex mechatronics systems. Graduates may find work in a wide range of domestic and international industries such as aerospace, consumer products, transportation, mining, automotive, technical sales, packaging, distribution industries or in-service sites that use complex mechatronic systems. Tasks may include the design, building and fabrication of automated systems, troubleshooting, maintenance, repairs, programming, robotics, networking, smart manufacturing, and application support.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

1. fabricate and build electrical, electronic, and mechanical components and assemblies in accordance with operating standards, job requirements, and specifications;
2. 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;
3. select and use a variety of troubleshooting techniques and equipment to assess, modify, maintain, and repair electromechanical circuits, equipment, processes, systems, and subsystems;
4. modify, maintain, and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications and to optimize production;
5. design and analyze mechanical components, processes, and systems by applying engineering principles and practices;
6. 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;
7. install and troubleshoot computer hardware and programming to support the electromechanical engineering environment;
8. analyze, program, install, integrate, troubleshoot and diagnose automated systems including robotic systems;
9. establish and maintain inventory, records, and documentation systems to meet organizational and industry standards and requirements;
10. select and purchase electromechanical equipment, components, and systems that fulfill job requirements and functional specifications;
11. specify, coordinate, and apply quality-control and quality-assurance programs and procedures to meet organizational standards and requirements;
12. work in compliance with relevant industry standards, laws and regulations, codes, policies, and procedures;
13. 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;
14. contribute as an individual and a member of an electromechanical engineering team to the effective completion of tasks and projects;
15. design and analyze electromechanical systems by interpreting fluid mechanics and the attributes and dynamics of fluid flow used in hydraulic and fluid power systems;
16. contribute to project management through planning, implementation and evaluation of projects, and monitoring of resources, timelines, and expenditures as required;
17. design, simulate, install, and troubleshoot smart connected electromechanical systems, using networking and computer technologies;
18. apply cyber-physical technologies to a mechatronics system to create a smart manufacturing solution;
19. implement strategies to reduce the impact of mechatronics systems on the environment;
20. identify entrepreneurial opportunities related to mechatronics systems and supporting industries.

Practical Experience

All co-operative education programs at Georgian contain mandatory work term experiences aligned with program learning outcomes. Co-op work terms are designed to integrate academic learning with work experience, supporting the development of industry specific competencies and employability skills.

Georgian College holds membership with, and endeavours to follow, the co-operative education guidelines set out by the Co-operative Education

and Work Integrated Learning Canada (CEWIL) and Experiential and Work-Integrated Ontario (EWO) as supported by the Ministry of Colleges and Universities.

Co-op is facilitated as a supported, competitive job search process. Students are required to complete a Co-op and Career Preparation course scheduled prior to their first co-op work term. Students engage in an active co-op job search that includes applying to positions posted by Co-op Consultants, and personal networking. Co-op work terms are scheduled according to a formal sequence that alternates academic and co-op semesters as shown in the program progression below.

Programs may have additional requirements such as a valid driver's license, strong communication skills, industry specific certifications, and ability to travel. Under exceptional circumstances, a student may be unable to complete the program progression as shown below. Please refer to Georgian College Academic Regulations for details.

International co-op work terms are supported and encouraged, when aligned with program requirements.

Further information on co-op services can be found at www.GeorgianCollege.ca/co-op (https://www.georgiancollege.ca/co-op/)

Program Progression

The following reflects the planned progression for full-time offerings of the program.

Fall Intake

- **Sem 1**: Fall 2023
- **Sem 2**: Winter 2024
- **Work Term 1**: Summer 2024
- **Sem 3**: Fall 2024
- **Sem 4**: Winter 2025
- **Sem 5**: Summer 2025
- **Work Term 2**: Fall 2025
- **Work Term 3**: Winter 2026
- **Sem 6**: Summer 2026

Winter Intake

- **Sem 1**: Winter 2024
- **Sem 2**: Summer 2024
- **Work Term 1**: Fall 2024
- **Sem 3**: Winter 2025
- **Sem 4**: Summer 2025
- **Sem 5**: Fall 2025
- **Work Term 2**: Winter 2026
- **Work Term 3**: Summer 2026
- **Sem 6**: Fall 2026

Admission Requirements

OSSD or equivalent with

- Grade 12 English (C or U)
- Grade 12 Mathematics (C or U)

Mature students, non-secondary school applicants (19 years or older), and home school applicants may also be considered for admission. Eligibility may be met by applicants who have taken equivalent courses, upgrading, completed their GED, and equivalency testing. For complete details refer to: www.georgiancollege.ca/admissions/academic-regulations/ (https://www.georgiancollege.ca/admissions/academic-regulations/)

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may also be considered for admission; refer to the Credit for Prior Learning website for details: www.georgiancollege.ca/admissions/credit-transfer/ (https://www.georgiancollege.ca/admissions/credit-transfer/)

Graduation Requirements

- 33 Program Courses
- 1 Capstone Project (Technical Project)
- 2 Communications Courses
- 3 General Education Courses
- 3 Co-op Work Terms

Graduation Eligibility

To graduate from this program, the passing weighted average for promotion through each semester, from year to year, and to graduate is 60%. Additionally, a student must attain a minimum of 50% or a letter grade of P (Pass) or S (Satisfactory) in each course in each semester unless otherwise stated on the course outline.

Program Tracking

The following reflects the planned course sequence for full-time offerings of the Fall intake of the program. Where more than one intake is offered contact the program co-ordinator for the program tracking.

Semester 1		**Hours**
Program Courses		
COMP 1084	Computer Aided Design 1 For Mechanical Engineering Technology	56
COMP 1107	Principles of Programming	42
MATH 1018	Introduction to Technical Mathematics	42
METR 1000	Electrical Components	56
METR 1001	Introduction to Mechatronics Systems and Reliability	56
Communications Course		
Select 1 course from the communications list during registration.		42
	Hours	**294**
Semester 2		
Program Courses		
COMP 1108	CAD Mechatronics Electrical	42
MATH 1019	Technical Mathematics	42
MENG 1021	Machine Shop Theory and Practices	42
METR 1002	Fluid Power Control Systems	56
METR 1003	Digital Fundamentals and Programmable Logic Controllers	56
METR 1004	Fundamentals of Electronic Systems in Mechatronics	42
Communications Course		
Select 1 course from the communications list during registration.		42
	Hours	**322**
Semester 3		
Program Courses		
COMP 2135	Computer Aided Design 2 for Mechanical Engineering	56
COMP 3031	Networking	42

MATH 3000	Calculus	42
METR 2000	Industrial Control System	56
METR 3000	Motor Control	56
ROBT 2000	Introduction to Robotics	42
	Hours	**294**
Semester 4		
Program Courses		
COMP 2123	Introduction to Microprocessors and Computing	42
COMP 2136	Web Interfaces	42
ELEC 3010	Advanced Programmable Logic Controllers	56
MENG 2020	Statics and Mechanics of Materials	56
METR 2003	Automation Systems	56
STAT 3002	Applied Statistics	42
General Education Course		
Select 1 course from the communications list during registration.		42
	Hours	**336**
Semester 5		
Program Courses		
COMP 3034	Database Systems for Mechatronics	42
MENG 3025	Kinematics and Dynamics of Machines	56
METR 2001	Introduction to Totally Integrated Automation	56
METR 2002	Factory Simulation and Manufacturing Processes	56
METR 3001	Health and Safety Codes and Standards	28
MGMT 2002	Project Management	42
ROBT 3003	Advanced Robotics	42
	Hours	**322**
Semester 6		
Program Courses		
COMP 2121	Computer Aided Engineering (CAE)	42
COMP 3035	Smart Manufacturing	42
METR 3002	Machine Elements in Mechatronics Design	56
Capstone Project		
METR 3003	Mechatronics Capstone Project	42
General Education Course		
Select 1 course from the general education list during registration.		42
General Education Course		
Select 1 course from the general education list during registration.		42
	Hours	**266**
	Total Hours	**1834**

Co-op Work Term		**Hours**
COOP 1056	Mechatronics Work Term 1	560
COOP 2042	Mechatronics Work Term 2	560
COOP 3020	Mechatronics Work Term 3	560
	Hours	**1680**
	Total Hours	**1680**

Graduation Window

Students unable to adhere to the program duration of three years (as stated above) may take a maximum of six years to complete their credential. After this time, students must be re-admitted into the program, and follow the curriculum in place at the time of re-admission.

Disclaimer: *The information in this document is correct at the time of publication. Academic content of programs and courses is revised on an ongoing basis to ensure relevance to changing educational objectives and employment market needs.*

Program outlines may be subject to change in response to emerging situations, in order to facilitate student achievement of the learning outcomes required for graduation. Components such as courses, progression, coop work terms, placements, internships and other requirements may be delivered differently than published.