

Area of Interest: Advanced Technology

Electromechanical Engineering Technician (Co-op and Non Co-op Version)

Ontario College Diploma

Program Code: 0550X03FWO

2 Years

Ottawa Campus

Our Program

Get the technical skills required to repair and modify automated equipment.

Discover all aspects of electromechanical engineering in the two-year Electromechanical Engineering Technician Ontario College Diploma program, delivered over four consecutive 14-week terms. This program prepares you with a complementary set of technical and theoretical skills that are readily transferable to working in any industry that incorporates automation into its daily activities. Learn to build and troubleshoot electrical systems, design electro-pneumatic circuits for process automation, develop your knowledge of motor controls, explore the workings and applications of programmable logic controllers and industrial robots, and also learn about the important aspects of mechatronics, quality control, group project work, leadership development, and entrepreneurship. Your acquired knowledge and skills can be focused on an area of electromechanical engineering/mechatronics that you are passionate about through a final project and optional co-op field placement in industry.

Over the course of this program, you experience both classroom and lab-based hands-on learning activities in which you develop communication, problem solving, and leadership and mentoring skills. You learn the fundamentals of mechatronics system design and construct functional automated systems as part of collaborative class projects.

As a student in this program, you learn about:

- electronic circuits
- pneumatics
- computer-aided design
- microcontrollers
- digital logic
- programmable logic controllers
- motor controls and machine tool operations
- industrial robots
- mechanical systems
- mechatronics
- quality control
- project management

Students also have the option to gain real-world experience through a paid co-operative education (co-op) work term (see Additional Information for more details). Please note that places in the co-op work term are subject to availability and academic eligibility. Please note admission to the co-op program does not guarantee a co-op placement.

In your last semester you complete an electromechanical project that solves an industrial automation problem. Your project incorporates the project management knowledge and methodology that you learn in the program and demonstrates your technical skill through a fully-functional automated task.

Upon completion of the program, you are eligible to write the Level 1: Siemens Certified Mechatronics Systems Assistant certification, which will certify you as a Siemens Mechatronics Level 1 technician.

Graduates may find a career in a number of areas such as the manufacturing sector, automated warehouses, and automated equipment servicing. Job opportunities are varied, as almost every automated industrial process requires electromechanical maintenance in some capacity.

This program has opportunities for graduates to pathway into further credentials including Algonquin College's Bachelor of Automation and Robotics (Honours); see the Careers and Pathways page for more information.

SUCCESS FACTORS

This program is well-suited for students who:

- Are self-motivated.
- Are well organized and methodical.
- Can manage their time effectively.
- Enjoy science and are eager to apply mathematics and physics to analyze problems.
- Have good oral and written communication skills.
- Enjoy working with the hands.
- Like systematic problem solving through troubleshooting.
- Enjoy collaborating on group projects.
- Are inquisitive and want to explore how things are made and function using automation.
- Are interested in a comprehensive and challenging career.

Prospective students are encouraged to research the career opportunities and study the expectations of the program.

Employment

Graduates may be employed as Electromechanical Engineering Technicians, Automation Technicians, Robotics Technicians, or may be found repairing, adapting and performing preventative maintenance in the manufacturing and service industry.

Learning Outcomes

The graduate has reliably demonstrated the ability to:

- Fabricate and build electrical, electronic, and mechanical components and assemblies in accordance with operating standards, job requirements, and specifications.
- Interpret and produce electrical, electronic, and mechanical drawings and other related technical documents and graphics for a variety of stakeholders in compliance with industry standards.
- Select and use a variety of troubleshooting techniques and equipment to assess, maintain, and repair electromechanical circuits, equipment, processes, systems, and subsystems.
- Maintain and repair electrical, electronic, and mechanical components, equipment, and systems to ensure that they function according to specifications and to optimize production.
- Support the design and production of mechanical components by assisting in the

- Support the design and production of mechanical components by assisting in the specification of manufacturing materials and processes.
- Apply, analyze, build, install, commission, and troubleshoot a variety of mechanical, electrical, and electronic control systems, logic and digital circuits, passive AC and DC circuits, and active circuits.
- Install and troubleshoot basic computer hardware and programming to support the electromechanical engineering environment.
- Maintain and troubleshoot automated equipment 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 fulfill job requirements and functional specifications.
- Assist in applying quality control and quality assurance program 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.
- Support project management activities such as planning, implementation and evaluation of projects, and monitoring of resources, timelines, and expenditures as required.
- Identify and apply discipline-specific practices that contribute to the local and global community through social responsibility, economic commitment and environmental stewardship.

Program of Study

Level: 01	Courses	Hours
CAD8300	Computer Aided Design/Drafting (CAD/D)	56.0
ELN8613	Basic Electronic Assembly	28.0
ELN9104	DC and AC Electronics	84.0
ENL1813T	Communications I	42.0
GEN0351	Strategies for Learning	42.0
MAT8001M	Math for Engineering Technicians	56.0
MFG8528	Metrology	42.0
Level: 02	Courses	Hours
ELN9192	Circuit Applications	98.0
ELN9211	DC and AC Motor Controls	42.0
ENG8317	Statics and Mechanics of Materials	56.0

GEP1001	Cooperative Education and Job Readiness	18.0
MFG8519	Machine Shop I	70.0
ROB8220	Industrial Pneumatics	56.0
Level: 03	Courses	Hours
ELN8305	Digital Logic Analysis	84.0
ELN9206	Mechanisms	28.0
ELN9216	Programmable Logic Controllers 1	42.0
ELN9217	C Programming with Microcontrollers	42.0
ENL8720	Technical Communication for Technicians	42.0
ROB8306	Project Planning	14.0
Choose one from equivalencies:	Courses	Hours
GED0550	General Education Elective	42.0
Co-op: 01	Courses	Hours
WKT0027	EMET - Co-Op Placement	
Level: 04	Courses	Hours
CAM8515	Computer Aided Manufacturing I	28.0
ELN9204	Microcontroller Interfacing	70.0
ELN9218	Programmable Logic Controllers 2	28.0
ENG0005	Introduction to Quality Assurance	28.0
GED0019	Becoming an Entrepreneur: Is It for Me?	42.0
MGT8215	Final Project	28.0
ROB9205	Industrial Robots	56.0

Fees for the 2023/2024 Academic Year

Tuition and related ancillary fees for this program can be viewed by using the Tuition and Fees Estimator tool at <https://www.algonquincollege.com/fee-estimator> .

Further information on fees can be found by visiting the Registrar's Office website at <https://www.algonquincollege.com/ro> .

Fees are subject to change.

Additional program related expenses include:

- Books, etextbooks and supplies including safety glasses, safety boots, cost approximately \$1,000. (All students are responsible to supply their own CSA-approved leather steel toe work boots. Any other types of footwear are not acceptable).

Admission Requirements for the 2024/2025 Academic Year

College Eligibility

- Ontario Secondary School Diploma (OSSD) or equivalent. Applicants with an OSSD showing senior English and/or Mathematics courses at the Basic Level, or with Workplace or Open courses, will be tested to determine their eligibility for admission; OR
- Academic and Career Entrance (ACE) certificate; OR
- General Educational Development (GED) certificate; OR
- Mature Student status (19 years of age or older and without a high school diploma at the start of the program). Eligibility may be determined by academic achievement testing for which a fee of \$50 (subject to change) will be charged.

Program Eligibility

- English, Grade 12 (ENG4C or equivalent).
- Mathematics, Grade 12 (MCT4C or equivalent).
- At least two science courses from Grade 11 and/or Grade 12.
- Applicants with international transcripts must provide proof of the subject-specific requirements noted above and may be required to provide proof of language proficiency. Domestic applicants with international transcripts must be evaluated through the International Credential Assessment Service of Canada (ICAS) or World Education Services (WES).
- IELTS-International English Language Testing Service (Academic) Overall band of 6.0 with a minimum of 5.5 in each band; OR TOEFL-Internet-based (iBT) Overall 80, with a minimum of 20 in each component: Reading 20; Listening 20; Speaking 20; Writing 20; OR Duolingo English Test (DET) Overall 110, minimum of 110 in Literacy and no score below 95.

Not sure if you meet all of the requirements? Academic Upgrading may be able to help with that: <https://www.algonquincollege.com/access/> .

Should the number of qualified applicants exceed the number of available places, applicants will be selected on the basis of their proficiency in English and mathematics.

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Application Information

ELECTROMECHANICAL ENGINEERING TECHNICIAN (CO-OP AND NON CO-OP VERSION) **Program Code 0550X03FWO**

Applications to full-time day programs must be submitted with official transcripts showing completion of the academic admission requirements through:

ontariocolleges.ca
60 Corporate Court
Guelph, Ontario N1G 5J3
1-888-892-2228

Students currently enrolled in an Ontario secondary school should notify their Guidance Office prior to their online application at <http://www.ontariocolleges.ca/> .

Applications for Fall Term and Winter Term admission received by February 1 will be given equal consideration. Applications received after February 1 will be processed on a first-come, first-served basis as long as places are available.

International applicants please visit this link for application process information: <https://algonquincollege.force.com/myACint/> .

For further information on the admissions process, contact:

Registrar's Office
Algonquin College
1385 Woodroffe Ave
Ottawa, ON K2G 1V8
Telephone: 613-727-0002
Toll-free: 1-800-565-4723
TTY: 613-727-7766
Fax: 613-727-7632
Contact: <https://www.algonquincollege.com/ro>

Additional Information

CO-OP INFORMATION:

All applicants apply directly to the co-op version of this program through <http://ontariocolleges.ca/> or our International Application Portal. Applicants not wishing to pursue the co-op version will have the opportunity to opt-out after being admitted to the program but prior to the first co-op work term.

Co-operative education (Co-op) allows students to integrate their classroom learning with a real-world experience through paid work terms. Two academic terms prior to the cooperative education work term, students are required to actively participate in and successfully complete the self-directed co-op course, readiness activities and workshops.

Students must actively conduct a guided, self-directed job search and are responsible for securing approved program-related paid co-op employment. Students compete for co-op positions alongside students from Algonquin College and other Canadian and international colleges and universities. Algonquin College's Co-op Department provides assistance in developing co-op job opportunities and guides the overall process, but does not guarantee that a student will obtain employment in a co-op work term. Co-op students may be required to relocate to take part in the co-op employment opportunities available in their industry and must cover all associated expenses; e.g., travel, work permits, visa applications, accommodation and all other incurred expenses.

Co-op work terms are typically 14 weeks in duration and are completed during a term when students are not taking courses. For more information on your program's co-op level(s), visit the courses tab on your program's webpage.

International students enrolled in a co-op program are required by Immigration, Refugees and Citizenship Canada (IRCC) to have a valid Co-op/Internship Work Permit prior to commencing their work term. Without this document International students are not legally eligible to engage in work in Canada that is part of an academic program. The Co-op/Internship Work Permit does not authorize international students to work outside the requirements of their academic program.

For more information on co-op programs, the co-op work/study schedule, as well as general and program-specific co-op eligibility criteria, please visit <https://www.algonquincollege.com/coop>.

The Electromechanical Engineering Technician program starts at three different times during the year; in September, January and May and runs for four consecutive semesters, without a break between semesters.

The first level of this program is common with Manufacturing Engineering Technician. This provides students with the option of transitioning to this program prior to the start of the second level. Students wishing to transition to Manufacturing Engineering Technician may do so with permission from the program coordinator prior to the start of the second level.

Contact Information

Program Coordinator(s)

- Irene Casey, <mailto:caseyi@algonquincollege.com>, 613-727-4723, ext. 6581
- Karim Khelfi, <mailto:khelfik@algonquincollege.com>, 613-727-4723

Course Descriptions

CAD8300 Computer Aided Design/Drafting (CAD/D)

Drawings and blueprints are the language of design for engineered parts and structures, therefore creating, interpreting, and understanding drawings is critical to working in the engineering field. Students are introduced to (CAD/D) Computer-Aided Design/Drafting. Students use a commercial 3D CAD/D system (SolidWorks) to parametrically model mechanical parts and assemblies. Area and mass property information is determined and verified by students. Motion inter-dependencies and physical dynamics within the model are established to create realistic virtual models. Commercial-off-the-shelf third party components are sourced, imported and utilized as required. Students create drawing layouts which typically include the orthographic, section, auxiliary and detailed views necessary to thoroughly describe a part/assembly. Students learn how to annotate their drawings in strict accordance with the ANSI/ASME Y14.5 drafting standard.

Prerequisite(s): none

Corequisite(s):none

CAM8515 Computer Aided Manufacturing I

The use of Computer Numerical Control (CNC) machinery has become a standard in the manufacturing industry. Through instruction and discussion of concepts, applications and coding systems of CNC machines, students examine CNC manufacturing methods and develop the technical understanding required to operate such machinery. Students also write and edit part programs, generate G-codes in software such as Mastercam and Fusion 360, verify the correct tool operations, and check the simulated CNC operations ready to execute on a CNC machine.

Prerequisite(s): CAD8300 and MFG8528

Corequisite(s):none

ELN8305 Digital Logic Analysis

Digital logic is critical to understanding modern digital circuits and the foundations of microcontroller applications and programmable logic devices and controllers. Students master the theory of digital logic, including BCD combinational logic circuits like decoders and multiplexers,

and sequential logic circuits like shift registers and counters. Topics of study include introduction to PLDs, latches and flip-flops, and both combinational and sequential logic circuits. Logic gates and Boolean algebra are reviewed. Lab experiments allow students to apply and implement their digital circuit knowledge.

Prerequisite(s): ELN9192

Corerequisite(s):none

ELN8613 Basic Electronic Assembly

Electronic circuits are the heart of modern electromechanical and automation control circuits, and soldering is crucial to the assembling of those circuits and their electrical connections to the equipment they control. Soldering and electronic assembly skills, including the assembly, repair, and troubleshooting of soldered electronic components, are skills in demand across all branches of the automation and electromechanical engineering world. Students apply a variety of soldering techniques. Brief lecture sessions provide the theoretical background followed by practical skills demonstration. Students perform labs to develop various soldering skills for specific electronic applications such as traditional Through-Hole and Surface Mount Technology.

Prerequisite(s): none

Corerequisite(s):none

ELN9104 DC and AC Electronics

An understanding of entry-level electronics is essential to all engineering fields. Students explore basic electrical components and how they are used in electrical circuits. Discovering and using resistors, capacitors and inductors to build circuits from schematic diagrams, students perform tests and measurements to promote their understanding of fundamental electronics. Through following the flow of energy in complete circuits, students apply troubleshooting strategies to identify, localize and correct malfunctions. Students use digital multimeters, oscilloscopes and signal generators to create and measure circuit characteristics. Students evaluate circuits using Ohm's Law, Kirchhoff's laws, superposition and other theorems. RL, RC and RLC circuits are examined. Good lab safety practices are stressed. Students provide written reports on their findings.

Prerequisite(s): none

Corerequisite(s):none

ELN9192 Circuit Applications

Semiconductor and integrated circuit components are widely used in the electronics field. They also have many applications for automation and control systems as well. Hence, a deeper understanding of the application of semiconductor based circuits and their operation requires both a theoretical overview of the various electrical components and circuits. Students enhance their understanding of the properties and uses of semiconductor, and solid state devices including diodes, transistors and integrated circuits. In lab experiments students construct practical circuits to explore the proper use of semi-conductor components. Students build amplifier, operational amplifier, oscillator, and filter circuits using DC and AC power supplies, and complement the lab activities with a strong theoretical formulation.

Prerequisite(s): ELN9104

Corerequisite(s):none

ELN9204 Microcontroller Interfacing

Microcontrollers have become entrenched in numerous control and monitoring systems, medical diagnostic and dispensing equipment, and automated and industrial robotics, to name a few. This course helps students appreciate the complexity and ease of use of the Arduino Mega microcontroller and its many applications in automated processes. Students interface the Arduino Mega to an assortment of output devices and electronic components to demonstrate many of the ways these devices are used in industry. Students develop practical knowledge to integrate Arduino based circuits to control motors, industrial robots, and automated systems.

Prerequisite(s): ELN8305 and ELN9217

Corerequisite(s):none

ELN9206 Mechanisms

Mechanized systems are pervasive and can be found in many diverse industrial and non-industrial applications. A good foundational knowledge of the inter-play between design parameters, material properties, forces, and power transmission are important for any student of engineering. Students learn about the mechanical and fluid components used to transmit power in functional mechanical systems. Students also develop an understanding of how to select bearings, seals, shafts, couplings, brakes, clutches, and pulleys to assemble drive systems. Students also consider the implications of power losses on mechanical systems and how to limit these through friction reduction and lubrication methodologies. Other important topics include a review of kinematics, dynamics, linkages, mobility, joints, degrees of freedom, spatial mechanisms, and positional analysis.

Prerequisite(s): ENG8317

Corerequisite(s):none

ELN9211 DC and AC Motor Controls

Electromechanical and automation systems in industry and commercial settings use 120 and 240 volt motors to power manufacturing and production equipment. Electromechanical and automation technicians must know how to safely install, service and operate such 120V and 240V motors. In this course, students gain a thorough knowledge of how large DC and AC motors are operated and controlled. Students gain practical experience wiring and troubleshooting single and three phase AC circuits to Canadian Electrical Code standards. By the end, students will be able to safely install and troubleshoot motor control circuits using industrial forward/reverse motors starters, and will be able to implement logic control, multiple motor control circuits using motor starters, relays, and timers.

Prerequisite(s): ELN9104

Corerequisite(s):none

ELN9216 Programmable Logic Controllers 1

Programmable Logic Controllers play a prominent role in automating the production processes in many diverse manufacturing industries ranging from automotive to aerospace. Students learn the fundamentals of PLC operations, PLC hardware and its configuration and connection of input/output modules and Industrial ladder programming techniques. Students develop programs to solve typical industrial applications using logic instructions, counters, timers, and mathematical instructions. The student will write, enter, and execute application programs using the programmable controllers and Human Machine Interface (HMI).

Prerequisite(s): ELN9104 and ROB8220

Corerequisite(s):none

ELN9217 C Programming with Microcontrollers

Control systems are an integral part of the modern world. With the current trend of ever increasing automation, fundamental knowledge and skill in the development and implementation of systemic control are a basic requirement. Students learn C Language programming and then use C to program an Arduino Mega in basic electronic control circuits. Lab exercises reinforce programming skills and introduce basic interfacing techniques for the Arduino. Analytical and troubleshooting skills are further developed through breadboard experiments.

Prerequisite(s): ELN9192

Corerequisite(s):none

ELN9218 Programmable Logic Controllers 2

Programmable Logic Controllers (PLCs) are important in industrial, commercial and building automation control systems. Students further develop their ability to program and use PLCs. Students reinforce their knowledge of PLC programming, creating longer and more flexible

software programs. Students expand their knowledge gained of different PLCs and different industrial, commercial and building automation applications of PLCs. Students gain advanced experience programming PLCs, and doing more complex interfacing of PLCs to electromechanical inputs and outputs, such as advanced sensors and robots.

Prerequisite(s): ELN9216 or ELN8305

Corerequisite(s):none

ENG0005 Introduction to Quality Assurance

Organizations require formal control processes and systems to ensure quality of products and services. Students gain an understanding of numerous quality control strategies, such as Lean Manufacturing and basic ISO standards and practices. In our data-driven society, statistics are everywhere, guiding personal and professional decisions. Students are introduced to the basics of statistics as well as how and when to use them. Topics covered include, mean, standard deviation, margin of error, normal distributions, Pareto charts and an overview of Statistical Process Control. Through the discussion of case studies, students gain an appreciation of the costs of quality.

Prerequisite(s): none

Corerequisite(s):none

ENG8317 Statics and Mechanics of Materials

As technicians are called upon to solve problems, it's important that they understand how changes to applied forces, to mass or other physical characteristics will impact the tools and equipment they are using. Students are introduced to the concepts of force and stress and learn to apply these concepts to a variety of engineering problems. This course will also provide a foundation for future studies of Mechanisms. Statics topics include free body diagrams, force, moment, couples, static equilibrium, centroids and distributed loads. Mechanics of materials topics include normal stress, shear stress, strain and Hooke's Law. Students will solve complex problems by creating free body diagrams and applying Newton's Laws to determine the effects of loads on structures such as beams, frames and machines.

Prerequisite(s): none

Corerequisite(s):none

ENL1813T Communications I

Communication remains an essential skill sought by employers, regardless of discipline or field of study. Using a practical, vocation-oriented approach, students focus on meeting the requirements of effective communication. Through a combination of lectures, exercises, and independent learning, students practise writing, speaking, reading, listening, locating and documenting information and using technology to communicate professionally. Students develop and strengthen communication skills that contribute to success in both educational and workplace environments.

Prerequisite(s): none

Corerequisite(s):none

ENL8720 Technical Communication for Technicians

Clear, concise and detailed communication is essential for technical workplaces. Students plan and execute a variety of formal and informal visual, oral and written communication tasks. Exercises and activities foster confidence and competence in workplace communication.

Prerequisite(s): ENL1813T

Corerequisite(s):none

GED0019 Becoming an Entrepreneur: Is It for Me?

The ever-changing global economy presents many challenges for job seekers, but it also provides opportunities for entrepreneurs. The process of turning an idea into an opportunity forms the nucleus of entrepreneurship, with the aim of enhancing the socio-economic experience of the public. Students are exposed to the various aspects of entrepreneurship and the effects they have

on themselves and the global community. Through classroom discussions, presentations and online activities, students develop their understanding of the pros and cons of entrepreneurship. Students evaluate their career ambitions through introspective reflection to determine if they have the drive and desire to pursue a career as an entrepreneur.

Prerequisite(s): none
Corerequisite(s):none

GED0550 General Education Elective

Students have the opportunity to choose one from a group of general education electives. Options include courses which cover the following broad topic areas: Arts in Society, Civic Life, Social and Cultural Understanding, and Personal Understanding.

Prerequisite(s): none
Corerequisite(s):none

GEN0351 Strategies for Learning

Self-Regulated Learning is important not only for academic success but also in the development of lifelong learning skills, and can be defined as an active constructive process whereby learners monitor, regulate, and control their cognition, motivation, and behaviour. Through a variety of assignments and in class activities, students learn how to transform their mental abilities into academic skills by investigating notetaking, time management, goal setting and feedback. Case studies allow students to consider how to employ SRL in their own learning. Students explore effective learning techniques and move toward implementing these techniques to improve their study habits.

Prerequisite(s): none
Corerequisite(s):none

GEP1001 Cooperative Education and Job Readiness

Students are guided through a series of activities that prepare them to conduct a professional job search and succeed in the workplace. Through a detailed orientation students learn the cooperative education program policies and procedures related to searching and securing a work term opportunity. Students identify their strengths and transferable skills and participate in workshop-style sessions that focus on cover letter and resume development, interview techniques and job search strategies. Students learn how to navigate a web-based resource centre, which is used to post employment and cooperative education job opportunities. Students reflect on workplace success, ethics and responsibilities.

Prerequisite(s): none
Corerequisite(s):none

MAT8001M Math for Engineering Technicians

Students learn foundational mathematics required in many College technical programs. Students solve measurement problems involving a variety of units and ratio and proportion problems. They manipulate algebraic expressions and solve linear, quadratic, exponential and logarithmic equations. Students study the trigonometry of right triangles and vectors. Students acquire the knowledge to work with numerical systems and internal machine representations, binary/hex/octal/decimal math, Boolean logic and truth tables. Students learn to use and manipulate complex numbers in rectangular, polar and exponential forms. Delivered in a modular format, this course is equivalent to the completion of all of the following math modules MAT8100 - a, b, c, e, f, h, i, k, and l.

Prerequisite(s): none
Corerequisite(s):none

MFG8519 Machine Shop I

Manufacturing is complex and dynamic, and professionals must continuously demonstrate skill,

adaptability, creativity, and collaboration. By examining how components and products are created, students will discover numerous manufacturing processes using many different types of materials. Machine shop fundamentals are covered. Students focus on metal removal operations and the selection of machine tools for specific operations, including the use of drill presses, lathes, milling machines, grinders and various hand tools encompassing speed and feed calculations. To effectively function safely in a manufacturing environment, it is necessary to develop the knowledge and skills in maintaining machinery, performing manufacturing, and developing components and products. While practicing shop safety, students' machine basic level projects providing practical experience in a manufacturing environment. Students operate standard machine tools and apply hands-precision measurement and layout tools. The importance of machine safety and personal safety are a key part of manufacturing; the use of PPE, WHMIS regulations and safe operation of equipment will be emphasized.

Prerequisite(s): CAD8300 and MFG8528
Corerequisite(s):none

MFG8528 Metrology

Metrology is an important part of science, technology and engineering fields. In general, It involves measurements that the industrial sectors rely on for safety and quality control. Students are introduced to the science of measurement. Through theory and lab exercises the student will learn the importance of quality and accuracy of manufactured components using many different types of measuring equipment. Fundamental topics include systems of measurement, units, linear measurement, and angular measurement. Labs are used to provide students with the opportunity to gain a practical and theoretical understanding of a variety of measuring instruments. Students are familiarized with the basic concepts of data analysis, using graphing, linear regression, and statistics to demonstrate lab results and form conclusions.

Prerequisite(s): none
Corerequisite(s):none

MGT8215 Final Project

Projects provide students with ample learning opportunities related to team dynamics, project milestones and deliverables, time management, communication plan, mentoring/leadership, and technical skills. Students work, in consultation with faculty, to create deliverables and work towards solutions using project management methodologies. Students undertake projects generated by industry, the department faculty, or the students themselves that solve an industrial manufacturing or automation problem. The finished project must demonstrate a functional, design, manufacturing and electro-mechanical solution (mechatronics). Students in small groups research their project design problem, develop specifications for the design solution and produce a report to document their project work. Students are expected to meet with faculty advisors, document their work, deliver an oral presentation and demonstrate a functional automation project.

Prerequisite(s): ROB8306
Corerequisite(s):none

ROB8220 Industrial Pneumatics

The current trend towards ever-increasing automation requires a workforce trained in all aspects of automated systems, including pneumatics and electro-pneumatics. Pneumatics is the use of air to do work. Students build pneumatic and electro-pneumatic circuits that mimic real life industrial situations. Simulation software complements the hands-on lab experience. Pneumatic and electro-pneumatic valves such as timers, directional and flow control valves controlled by solenoids and relays are used extensively throughout the course. Students make use of ladder logic diagrams to develop the logistical requirements of various industrial applications, including meeting safety standards. Students work in teams to apply their skills by designing an industrial application for a culminating project.

Prerequisite(s): none
Corerequisite(s):none

ROB8306 Project Planning

Effective, productive, successful project teams form an integral part of a modern labour force. The ability to successfully lead and manage groups and individuals through project planning, initiation, development and conclusion phases is highly sought after in industry. Students develop basic project management skills, including leadership, team management, scheduling, top-down (back-end) versus bottom-up (front-end) planning, budgeting, ethics, risk assessment, conflict resolution, and organizational skills required to manage projects. Students also develop an appreciation for individual character traits such as learning styles and personality types, and how these can influence team dynamics. In preparation for the final project course MGT8215, students research, review and discuss possible projects ideas and define project goals. Learning activities include group presentations, assignments, and in class discussions.

Prerequisite(s): none

Corerequisite(s):none

ROB9205 Industrial Robots

The development and use of robotics and electromechanical automation has grown at an unprecedented pace over the last 20 years. Industrial robots provide efficiency, quality and safety which continues to make them attractive to manufacturing companies around the world. New designs and applications ranging from transportation and aerospace, to medical procedures, provide a strong impetus for continued investment in this sector for years to come. Students explore industrial robotic applications and the various elements of robotic systems. They develop coding skills for a varied range of robotic motions. A selection of industrial robots, and their various parts consisting of drives, controllers, arms, sensors, and end effectors are investigated. Students complete a final project that simulates an industrial process.

Prerequisite(s): ROB8220 or ELN8305 and ELN9217

Corerequisite(s):none

WKT0027 EMET - Co-Op Placement

Cooperative Education is an experiential learning program that ties classroom learning to its applications in the world of work, normally off-campus, by formally integrating work experience into the student's program of study. Students gain valuable learning opportunities through paid, full-time, on-the-job work experience. Co-op students must complete and submit assignments during the work-term, including a final work term report, by the established due date.

Prerequisite(s): none

Corerequisite(s):none