

Area of Interest: Advanced Technology

Mechanical Engineering Technology (Co-op and Non Co-op Version)

Ontario College Advanced Diploma
3 Years
Ottawa Campus

Program Code: 0010X03FWO

Our Program

Learn engineering design - Offer solutions as a mechanical engineering technologist.

The three-year Mechanical Engineering Technology Ontario College Advanced Diploma program teaches you to apply scientific and engineering principles to solve mechanical engineering problems in a variety of industries.

Through a series of classroom-based courses and extensive practical labs, you acquire skills specific to mechanical engineering technologists, including:

- modifying and improving engineering designs using conventional and computer-based methods
- performing engineering tests
- supporting product development
- using engineering software and systems to conduct engineering design and analysis
- designing specialized jigs and fixtures
- analyzing problems involving machine design, fluid dynamics, thermodynamics and heat transfer
- understanding and applying design standards (i.e. ASHRAE and ASM International)
- using design software such as SolidWorks, AutoCAD and MasterCAM

During your third year in the program, you complete a capstone design project under the guidance of your faculty members. You work with external stakeholders in the industry during the project to analyze, plan and execute your project.

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.**

Graduates may find work in the research, design and testing of mechanical systems, or with:

- manufacturing processes
- electro-mechanical control systems
- automation
- green-energy and building systems

Employment

Graduates may find employment as engineering technologists in the manufacturing, aerospace;

transportation, and system industries. Graduates may be involved in product design and product testing; electronics and computer manufacturing; automation and control systems/processes and other diverse jobs that involve the transmission of power and energy in mechanical systems.

Learning Outcomes

The graduate has reliably demonstrated the ability to:

- Monitor compliance with current legislation, standards, regulations and guidelines.
- Plan, co-ordinate, implement and evaluate quality control and quality assurance procedures to meet organizational standards and requirements.
- Monitor and encourage compliance with current health and safety legislation, as well as organizational practices and procedures.
- Develop and apply sustainability best practices in workplaces.
- Use current and emerging technologies to implement mechanical engineering projects.
- Analyze and solve complex mechanical problems by applying mathematics and fundamentals of mechanical engineering.
- Prepare, analyze, evaluate and modify mechanical engineering drawings and other related technical documents.
- Design and analyze mechanical components, processes and systems by applying fundamentals of mechanical engineering.
- Design, manufacture and maintain mechanical components according to required specifications.
- Establish and verify the specifications of materials, processes and operations for the design and production of mechanical components.
- Plan, implement and evaluate projects by applying project management principles.
- Develop strategies for ongoing personal and professional development to enhance work performance.
- Apply business principles to design and engineering practices.
- 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
ENG8307	Statics	56.0
ENL1813T	Communications I	42.0
GEN0351	Strategies for Learning	42.0
MAT8100	Essential Mathematics	42.0
MFG8528	Metrology	42.0
ROB8220	Industrial Pneumatics	56.0
Level: 02	Courses	Hours

CAD8305	Cad Applications and Gdt	42.0
ELN9104	Dc and Ac Electronics	84.0
ENG8308	Strength of Materials I	56.0
GED0019	Becoming an Entrepreneur: Is It for Me?	42.0
GEP1001	Cooperative Education and Job Readiness	21.0
MAT8101	Differential Calculus	42.0
MFG8519	Machine Shop I	70.0
WEL9107	Introduction to Fuel Gas and Electrical Welding	42.0
Level: 03	Courses	Hours
CAM8515	Computer Aided Manufacturing I	28.0
DSN0037	Tool Design	28.0
ELN8299	Industrial Electricity	42.0
ENG8309	Strength of Materials II	70.0
ENG8310	Dynamics	56.0
ENG8320	Fluid Mechanics	56.0
ENG8335	Materials Science	28.0
GEP2001	Co-Op Job Search 1	21.0
MAT8102	Integral Calculus	42.0
Co-op: 01	Courses	Hours
WKT0010A	Met - Coop Placement I	0.0
Level: 04	Courses	Hours
CAM8313	Introduction to C Language	42.0
DRA8362	Computer Aided Engineering	42.0
ELN8298	Industrial Electronics	42.0
ENG8311	Dynamics of Machinery I	42.0
ENG8321	Thermodynamics	56.0
ENG8336	Metallurgy & Heat Treatment Lab	28.0
ENG8337	Metallurgy and Polymers	42.0
ENL2019T	Technical Communication for Engineering Technologies	42.0
GEP2002	Co-Op Job Search 2	21.0
Co-op: 02	Courses	Hours
WKT0010B	Met - Coop Placement II	0.0

Level: 05	Courses	Hours
CAM8302M	Microcomputer Interfacing	42.0
ENG4001	Project 1	28.0
ENG8312	Dynamics of Machinery II	42.0
ENG8315	Machine Design and Analysis I	56.0
ENG8323	Heat Transfer	42.0
ENL4001	Technology Report Preparation	14.0
MAT8103	Ordinary Differential Equations	42.0
Choose one from equivalencies: Courses		Hours
GED0010	General Education Elective	42.0
Level: 06	Courses	Hours
ENG4003	Project 2	28.0
ENG8316	Machine Design and Analysis II	56.0
ENG8322	Thermofluids	42.0
ENG8339	Applied Machine Learning	42.0
ENG8344M	Control Systems	42.0
ENL4003	Technology Report	14.0
ROB8305M	Pneumatics/Hydraulics/Automation	56.0

Fees for the 2025/2026 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/ro/pay/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 and supplies cost approximately \$1,350 per year and can be purchased from the campus store. For more information visit <https://www.algonquincollege.com/coursematerials/>

Students are required to procure safety boots and glasses for use in some labs at a cost of approximately \$200. 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 2026/2027 Academic Year

College Eligibility

- Ontario Secondary School Diploma (OSSD) or equivalent;
- Mature Student status (19 years of age or older and without a high sch diploma at the start of

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Program Eligibility

- English, Grade 12 (ENG4C or equivalent).
- Mathematics, (Grade 12 MCT4C) or (Grade 11 MCR3U) 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.

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.

Admission Requirements for 2025/2026 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 will be charged.

Program Eligibility

- English, Grade 12 (ENG4C or equivalent).
- Mathematics, (Grade 12 MCT4C) or (Grade 11 MCR3U) 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).
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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.

Application Information

MECHANICAL ENGINEERING TECHNOLOGY
Program Code 0010X03FWO

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

<https://www.ontariocolleges.ca/en>

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 <https://www.ontariocolleges.ca/en>

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.my.site.com/myac360/s/self-registration-page>

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 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-career-centre/>

The program shares courses with Manufacturing Engineering Technician and Electro-Mechanical Engineering Technician programs, allowing students the option of continuing their studies in either of these programs.

Contact Information

Program Coordinator(s)

- Brian Gray, <mailto:grayb@algonquincollege.com> , 613-727-4723, ext. 5786
- Bruno Rocha, <mailto:rochab@algonquincollege.com> , 613-727-4723, ext. 2547

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

Corerequisite(s):none

CAD8305 Cad Applications and Gdt

Students use a commercial CAD/D system (SolidWorks) to parametrically model mechanical parts, assemblies and systems. Rudimentary statistics and probabilities are introduced to analyze error and tolerance in a design. Established design fits and their associated engineering tolerances are used to define functional mates between assembled parts. Tolerance accumulation and stack-up analysis are performed on assemblies. Students learn how to annotate working drawings in compliance with the ANSI/ASME Y14.5 and Y14.41 Geometric Dimensioning and Tolerancing (GD&T) standards. The creation of specialized types of CAD models is also taught; these applications include programmed parts, sheet metal developments, welded structures and rudimentary FEA.

Prerequisite(s): CAD8300

Corerequisite(s):none

CAM8302M Microcomputer Interfacing

Through theoretical and several lab sessions, microcomputers (e.g. Raspberry Pi) and microcontrollers architecture and particularly interfacing operation are introduced. Practical knowledge is gained on interfacing electric and electronic circuits with a microcontroller/microcomputer, both from/with digital and analog inputs and outputs, such as from switches, sensors, or to LEDs (indicators) and to control mechanical actuators (DC and servo motors). Students are introduced to mechatronic systems operation and control (ex. for manufacturing), PLCs, ladder logic and LabView. Simple computer programs are developed to perform simple open-loop I/O control of external devices.

Prerequisite(s): CAM8313 and ELN8298

Corerequisite(s):none

CAM8313 Introduction to C Language

Computer hardware, operating systems and C programming are introduced. Students are also introduced to the essentials of a microcomputer system. Topics include: algorithms, pre-processor directives, variables, data I/O, relational operators, arrays, matrices and file I/O. Students use these concepts to create structured C programs to solve engineering problems. Hardware, including a

microcontroller board, and simple input (switches) and output (LED indicators) components are also explored.

Prerequisite(s): none

Corerequisite(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

Corerequisite(s):none

DRA8362 Computer Aided Engineering

Students use commercial finite element analysis (FEA) software (SolidWorks Simulation) to analyze mechanical parts and assemblies. Topics include rudimentary theory, mesh design, convergence testing, optimization and verification of FEA problems. Students also use FEA methods to solve problems involving stress analysis, beam deflection, buckling of columns, contact frictions, free vibration and rudimentary computational fluid dynamics (CFD). Each FE or CFD analysis is compared with a theoretical solution and/or an empirical prediction.

Prerequisite(s): CAD8300 and ENG8309 and ENG8320

Corerequisite(s):none

DSN0037 Tool Design

Students are exposed to a significant amount of drafting. Topics include design of cutting tools, gauges and gauge design, principles of locating and clamping, work-holder standards and special purpose, design analysis procedures, manufacturing process as related to tool design, tooling materials and their applications, design of sheet metal, shearing, bending and forming and drawing dies.

Prerequisite(s): CAD8305

Corerequisite(s):none

ELN8298 Industrial Electronics

Theory and laboratory work are used to build upon previously acquired knowledge on the use of power supply, signal generation and signal output and power measurement equipment, such as oscilloscopes and voltmeters and ammeters. As well, the design and assembly of electronic circuits for different engineering applications are performed through the application of fundamental electronic devices, such as resistors, capacitors, diodes, transistors, operational amplifiers and other integrated circuits. Some of the applications involve building rectifiers, logic circuits and amplifiers circuits, filters, summing amplifiers, integrators, comparators and differentiators. Students are introduced to mechatronic systems operation and control (ex. for manufacturing), PLCs, ladder logic.

Prerequisite(s): ELN8299

Corerequisite(s):none

ELN8299 Industrial Electricity

Theory and applications of industrial electrical components are expanded. Topics covered expand on previous knowledge of relays, transformers, DC/AC generators and single phase circuits to develop a deeper understanding on DC/AC motors, single-phase motors and three phase AC circuits, and their application to mechatronic systems operation.

Prerequisite(s): ELN9104

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

ENG4001 Project 1

Experience with practical projects provides students with learning opportunities to gain insight and experience, thereby making connections to industry. Through collaborative participation in applied research projects or self-directed in-class projects, student groups undertake problems of significant technical complexity and work towards solutions using project management methodologies. Student groups initiate projects, working closely with stakeholders in real-world workplace environments. Note: Project 1 and Project 2 courses must be successfully completed in two consecutive terms.

Prerequisite(s): CST8152 and CST8216 and CST8219 and CST8221 and CST8233 or CAM8313 and CAM8515 and DRA8362 and DSN0037 and ELN8298 and ENG8311 and ENG8321 and ENG8336 and ENG8337 and ENL2019T and ROB8220 and WEL9107

Corerequisite(s):ENL4001

ENG4003 Project 2

The ability to identify and satisfy stakeholder expectations is essential for successful project development and completion. Following up on topics selected in Project 1, student groups continue to execute projects of significant technical complexity in an applied research context. Student groups work in consultation with faculty and/or external stakeholders to create deliverables by monitoring and controlling the project resources. The solutions developed are defended in formal oral and written presentations. Note: Project 1 and Project 2 courses must be successfully completed in two consecutive terms.

Prerequisite(s): ENG4001 or ENG4002

Corerequisite(s):ENL4003

ENG8307 Statics

Statics is the study of bodies at rest, or of forces in equilibrium. Students explore concepts of free body diagram, force, moment, couple, force components, force resultants, concentrated and distributed loads. The basics of static equilibrium of machines and structures, friction, and centroids are covered.

Prerequisite(s): none

Corerequisite(s):none

ENG8308 Strength of Materials I

Students are introduced to applied stress analysis including normal and shear stress, deformation and various material properties. Hooke's Law is presented to show the relationship between stress and strain. Other topics include stresses in bolted connections, torsional shear stress and angle of twist in shafts, normal and shear stress in beams and the concept of factor of safety.

Prerequisite(s): ENG8307 and MAT8100
Corerequisite(s):none

ENG8309 Strength of Materials II

Students are introduced to combined loadings, pressure vessels, the state of stress and the use of Mohr's circle to determine principle stresses. Beam deflection is calculated using a variety of techniques. Critical load for column buckling is determined for columns with various types of supports. Labs are designed to complement new theory, as well as reinforce concepts. Students experimentally determine material properties, such as Young's Modulus, Shear Modulus and yield strength.

Prerequisite(s): ENG8308 and MAT8101
Corerequisite(s):none

ENG8310 Dynamics

Students explore the dynamics of particles and rigid bodies. Topics include position, velocity, acceleration analysis, Newton's second law, power, energy and momentum. Students use analytical and graphical methods to solve velocities and accelerations of machine parts.

Prerequisite(s): ENG8307 and MAT8101
Corerequisite(s):none

ENG8311 Dynamics of Machinery I

The Grashof criteria and Gruebler's equation are used to identify and evaluate linkages. Students design common linkages using graphical methods. Position, velocity and acceleration are calculated using both graphical and analytical techniques. Students demonstrate competence by completing a final project and verify their design through the use of simulation or models.

Prerequisite(s): ENG8310
Corerequisite(s):none

ENG8312 Dynamics of Machinery II

A variety of machine components are introduced with their kinematics and kinetics approaches. Included are: forces acting on links; gear trains; fundamental law of gearing; gear types and terminology; simple and compound gear trains; mass moment; center of gravity, mass moment of inertia; D'Alembert principle; dynamic force analysis of linkages; bolted connection design. Students learn how to visualize and analyze motions in machines, and how to design mechanisms to achieve desired motion specifications. A combination of graphical and analytical techniques is used. Students write computer scripts and use CAD design software, such as Solidworks to create their designs.

Prerequisite(s): ENG8311
Corerequisite(s):none

ENG8315 Machine Design and Analysis I

An understanding of failure mechanisms is essential to design parts that are safe. Following a review of applied and principal stresses for static loading, students learn static failure theories for ductile and brittle materials. Students also learn fatigue failure theories and demonstrate competence by analyzing parts with stress concentrations, fabricated of ductile and brittle materials, using Modified-Goodman.

Prerequisite(s): DRA8362 and ENG8309
Corerequisite(s):none

ENG8316 Machine Design and Analysis II

A competent mechanical designer designs and analyzes a variety of machine elements by drawing upon appropriate fatigue and other failure theories. Applying these theories, the student specifies, designs and analyzes a variety of parts, such as, shafts, keys, springs, screws and fasteners, solid-disk flywheels and determines interference fits.

Prerequisite(s): ENG8315

Corerequisite(s):none

ENG8320 Fluid Mechanics

Students explore fluid properties; manometry laws; fluid statics; buoyancy and stability of submerged objects and continuity equations. Bernoulli's principle and modifications for pumps and turbines; viscosity; Reynold's number; Darcy's equation; Moody's diagram; hydraulic systems, and pressure and flow measuring techniques are also covered.

Prerequisite(s): ENG8307 and MAT8101

Corerequisite(s):none

ENG8321 Thermodynamics

Energy transformation and utilization of various working substances in some thermal and refrigeration systems are studied along with their efficiency and performance definitions. Fundamental concepts based on zeroth, first and second laws of thermodynamics are also introduced. Students study Closed and Open systems along with different types of processes (e.g. isothermal, isentropic). Properties and processes for ideal gases and solid-liquid-vapor phases of pure substances are studied with their applications to power and refrigeration cycle. Students define entropy and its change for some processes. Students solve problems using T-s or P-h diagrams graphically, or using thermodynamic property tables.

Prerequisite(s): ENG8320 and MAT8102

Corerequisite(s):none

ENG8322 Thermofluids

The theory and practice of power and refrigeration cycles are covered. Upon completion the student is able to apply 1st and 2nd laws of thermodynamics to a variety of thermal-mechanical systems, design and troubleshoot heating and ventilation systems used in residential and commercial buildings, evaluate the performance of air conditioning and refrigeration systems, understand how a steam plant works, and determine its efficiency and perform engineering calculations in both metric and English units.

Prerequisite(s): ENG8321

Corerequisite(s):none

ENG8323 Heat Transfer

Conduction, convection and radiation heat transfer concepts are covered. The application of Fourier's equation for conduction through plane walls, cylindrical and spherical shapes; Newton's law of cooling, convection heat transfer rates using experimental correlations, non-dimensional numbers, overall heat transfer coefficients; and basic relations in radiation heat transfer are also covered.

Prerequisite(s): ENG8321 and MAT8103

Corerequisite(s):none

ENG8335 Materials Science

As rapid advances in materials continue, from polymers used in composite components on aircraft, to high strength aluminum used in EV's to make vehicles lighter, a thorough understanding of how to determine a materials suitability for an application is crucial. Students interpret mechanical properties of materials and their microscopic structural behaviours. Crystal structures, atomic bonding, dislocation theory, heat treatments, phase and TTT diagrams for some alloys are explained. Ferrous and non-ferrous alloys naming convention and their applications are discussed,

and the students are familiarized with select national and international standard institutes. Students learn concepts such as failure and strengthening mechanisms. Ceramics, polymers and composite materials and their properties and applications are discussed.

Prerequisite(s): none

Corerequisite(s):none

ENG8336 Metallurgy & Heat Treatment Lab

Heat treating can change metal product properties. Some alloy properties can be improved by heat treatment processes. Students experiment with heat treatment processes in a lab. Ferrous and non-ferrous materials properties are tested and reported and students compare the results with published data. Students are familiarized with techniques used in industry to obtain better mechanical properties for metals. Students use destructive and non-destructive tests to observe and report materials properties.

Prerequisite(s): ENG8335

Corerequisite(s):none

ENG8337 Metallurgy and Polymers

Advances in materials science continue at a rapid pace. Whether powder metallurgy of aircraft components or the latest flexible touchscreen phone, an understanding of metallurgy and polymers is critical in engineering applications. Topics covered include steels, aluminum, alloys and their industrial applications, powder metallurgy, surface treatments, ceramics, and corrosion control and prevention, failure mechanisms, fatigue and creep, fundamentals of polymer and composite structures, thermoset, thermoplastic, and elastomeric polymerization reactions, and physic.

Prerequisite(s): ENG8335

Corerequisite(s):none

ENG8339 Applied Machine Learning

Machine learning is becoming more widely used with each passing day. In this course students will apply the principles of artificial intelligence to real world problems through Machine Learning. Students will create datasets, clean-up data, acquire time domain signals from a variety of sources, and analyze with Machine Learning algorithms to make real world observations.

Prerequisite(s): CAM8302M

Corerequisite(s):none

ENG8344M Control Systems

Various industrial control systems and their components are introduced. Open and closed loop control systems are explained, through an understanding and development of block diagrams, transfer functions, Laplace transforms, sensors and actuators applications, analog signal processing and conversion (analog to digital and vice-versa), motion control principles; component selection, integration and circuit design; discrete control, continuous control and use of digital and analog controllers, including microcontrollers and microcomputers. During lab work, data acquisition and processing are performed, with data retrieved from digital and analog inputs, such as from sensors, using Analog to Digital Converters (ADC). As well, outputs from industrial controllers are used for motion control (DC motors and servos), using Pulse-Width Modulation (PWM). Students apply their learning to mechatronic systems operation and control (ex. for manufacturing), using PLCs, ladder logic and LabView.

Prerequisite(s): CAM8302M and MAT8103

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

ENL2019T Technical Communication for Engineering Technologies

The ability to communicate effectively in a technically-oriented interdisciplinary workplace is a foundational skill in an innovation-driven economy. Students are exposed to exercises and assignments designed to foster independent and collaborative critical thinking, research, writing, visual communication and presentation skills related to technical topics.

Prerequisite(s): ENL1813T
Corerequisite(s):none

ENL4001 Technology Report Preparation

Students define and describe a problem of significant technical complexity and present a suitable technological solution. Drawing upon skills previously acquired, students plan, conduct research for and begin the creation of a written report that is based upon the guidelines established by the Ontario Association of Certified Engineering Technicians and Technologists (OACETT).

Prerequisite(s): ENL2019T
Corerequisite(s):ENG4001E or ENG4002 or ENG4001 or ENG4001A

ENL4003 Technology Report

Students complete the report defined in ENL4001. The completed report forms the basis of an oral presentation to faculty, peers and interested industry personnel in the final weeks of the term. ENL4001 and ENL4003 must be taken in the same academic year unless an exception is approved.

Prerequisite(s): ENL4001
Corerequisite(s):ENG4003E or ENG4003A or ENG4003

GED0010 General Education Elective

Students choose one course, from a group of general education electives, which meets one of the following five theme requirements: Arts in Society, Civic Life, Social and Cultural Understanding, Personal Understanding, and Science & Technology.

Prerequisite(s): none
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

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

GEP2001 Co-Op Job Search 1

Students are guided through a self-directed co-op job search using Algonquin's web-based resource centre, HireAC, as well as independent resources. Students will access information on key job search processes, including Co-op and Career Centre job search procedures and how to declare a self-developed job that meets co-op guidelines. Students will apply and further develop their knowledge on networking, interview techniques and job search strategies to improve their chances of success in securing co-op employment through a competitive job search process. Additional support is provided through individual coaching and group sessions, including job application reviews, mock interviews and assistance for students experiencing unique employment challenges.

Prerequisite(s): none

Corerequisite(s):none

GEP2002 Co-Op Job Search 2

Students are guided through a second self-directed co-op job search using Algonquin's web-based resource centre, HireAC, as well as independent resources. Students will access information on key job search processes, including Co-op and Career Centre job search procedures and how to declare a self-developed job that meets co-op guidelines. Students will apply and further develop their knowledge on networking, interview techniques and job search strategies to improve their chances of success in securing co-op employment through a competitive job search process. Additional support is provided through individual coaching and group sessions, including job application reviews, mock interviews and assistance for students experiencing unique employment challenges.

Prerequisite(s): none

Corerequisite(s):none

MAT8100 Essential Mathematics

Students review the manipulation of algebraic expressions as a foundation for advanced mathematical concepts. Students solve 2x2 and 3x3 systems of linear equations, and factor algebraic expressions using common factors and techniques for factoring trinomials. They simplify, add, subtract, multiply and divide rational expressions and solve equations involving algebraic fractions. Students study the properties of right triangles and trigonometric functions of obtuse angles. Students graph polynomial and sinusoidal functions using tables of values and stretches, shifts and shrinks. They also add and subtract vectors and convert between 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 modules in MAT8100 - A,B,C,D,E,F,G and I.

Prerequisite(s): none

Corerequisite(s):none

MAT8101 Differential Calculus

Differential Calculus is the mathematical study of rates of change. Students study derivative, its definition and interpretation and its applications. Stud limits and use first principles to find simple derivatives. The product, quotient and chain rules are used to find derivatives of algebraic functions. Students use differentiation rules to find derivatives of transcendental functions. A variety of applications of derivatives, such as curve sketching, finding the tangent to a curve and finding an approximate solution to an equation using Newton's method, are also studied.

Prerequisite(s): MAT8100 or MAT8100P or MAT8050 and MAT8051 or MAT8050P and MAT8051

Corerequisite(s):none

MAT8102 Integral Calculus

Integral calculus is the study of the definitions, properties and applications of two related concepts, the indefinite integral and the definite integral. Students find the area under a curve and the area between two curves. Students calculate both indefinite and definite integrals, and use the Trapezoidal Rule and Simpson's Rule to perform numerical integrations. Students integrate polynomial, exponential, logarithmic and trigonometric functions by substitution. Integration by parts and partial fractions are employed to perform complex integrations.

Prerequisite(s): MAT8101

Corerequisite(s):none

MAT8103 Ordinary Differential Equations

Physical situations such as beam deflection, harmonic motion, circuit theory or Newton's Laws require solving first or second order ordinary differential equations. Students study first order differential equations and solve these equations using separation of variables, integrating factors for linear equations and Laplace Transforms. Both homogeneous and non-homogenous second and higher order differential equations with constant coefficients are solved using the method of undetermined coefficients and using Laplace Transforms. Students also use both methods to solve practical applications of second order ordinary differential equations related to students' program of study. A review of sequences and series is completed in order to prepare students for power series expansions. Students apply Maclaurin series to expand functions as a power series and use the results to approximate values of transcendental functions. Students also study periodic functions and determine their Fourier series expansions.

Prerequisite(s): MAT8102

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

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

ROB8305M Pneumatics/Hydraulics/Automation

Focus is on the design and logic of power circuits operated by hydraulic or pneumatic devices and equipment. Developing on previous theoretical knowledge on Fluid Mechanics, the course content includes the following: pneumatic/hydraulic directional control valves, logic gates, series and parallel circuits, compressors and pumps, motors and pneumatic/hydraulic cylinders, sequencing, intensifiers and amplifiers, and directional, volume and pressure (flow) control valves. Application of pneumatic/hydraulic circuits and components on mechatronic systems operation and control (ex. for manufacturing) is explored, including the use of Programmable Logic Controllers (PLCs), ladder logic, and the use of computer software to simulate power circuits.

Prerequisite(s): none

Corerequisite(s):none

WEL9107 Introduction to Fuel Gas and Electrical Welding

Welding is a skill essential to a variety of professions. Students develop competent welding skills at a basic level using oxyacetylene equipment, Shielded Metal Arc Welding (SMAW), Gas Metal Arc Welding, (GMAW) and Gas Tungsten Arc Welding (GTAW). Students are provided with instructions on the safety, proper setup and operation of equipment. Students learn basic principles of flame types and temperatures, metal preparation, gas selection and electrode classification.

Prerequisite(s): none

Corerequisite(s):none

WKT0010A Met - Coop Placement I

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 studies. Students gain valuable learning opportunities through paid, full-time, on-the-job work experiences. All Co-op students must complete and submit assignments

while on work-term, including a Final work term report by the established due date for each scheduled work term.

Prerequisite(s): none

Corerequisite(s):none

WKT0010B Met - Coop Placement II

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 studies. Students gain valuable learning opportunities through paid, full-time, on-the-job work experiences. All Co-op students must complete and submit assignments while on work-term, including a Final work term report by the established due date for each scheduled work term

Prerequisite(s): none

Corerequisite(s):none