Area of Interest: Engineering and Architecture

Manufacturing Engineering Technician

Ontario College Diploma
2 Years
Ottawa Campus

Academic Year: 2020/2021
Program Code: 1518X01FWO

Our Program

Prepare for a variety of dynamic technical positions within the manufacturing industry.

The two-year Manufacturing Engineering Technician Ontario College Diploma program prepares you for technical positions in the manufacturing industry. Gain a broad overview of manufacturing and industrial engineering principles, with a focus on product manufacturing, and learn from professionals with strong industrial backgrounds.

As a student in this program, you experience a combination of classroom, lab and machine shop environments and cultivate ideas from conception to production within various streams. These include, but are not limited to:

- solid modelling
- computer numerical control programming
- process engineering
- fabrication
- project management
- quality control

Learn how to use tools specific to the industry such as software and machinery, Computer-Aided Design and Computer-Aided Manufacturing, and CNC machinery. In your final term, undertake projects with external or internal industry partners where you analyze, plan and execute deliverables.

Graduates may work in a number of capacities within the industry, finding employment as a:

- CNC programmer
- CNC machinist
- quality control inspector
- production scheduler
- CAD drafter and designer
- process engineering in manufacturing firms and corporations

SUCCESS FACTORS

This program is well-suited for students who:

- Have knowledge of the career opportunities and study expectations of the program.
Manufacturing Engineering Technician

- Possess strong numeracy skills.
- Are interested in mechanical functions and manufacturing.
- Have solid conceptualization skills.
- Enjoy using problem-solving skills to find solutions.
- Are detailed-oriented and mechanically inclined.
- Have an aptitude for programming.
- Have an interest in working in machine shops and similar industrial environments.

Employment

Graduates may find employment in positions such as CNC operators and CNC programmers, production schedulers, machinists, quality control inspectors, CAD drafters and designers and process engineers, ranging from small manufacturing firms to large multi-national manufacturing corporations.

Learning Outcomes

The graduate has reliably demonstrated the ability to:

- Analyze and solve routine technical problems related to manufacturing environments through the application of engineering principles.
- Conduct routine analysis of components, processes, and systems through the application of engineering principles and practices.
- Interpret and prepare graphics and other technical documents to appropriate engineering standards.
- Use computer hardware and software to support the engineering environment.
- Apply knowledge of manufacturing materials, operations, and processes to support the production of components.
- Apply knowledge of machinery, tools and other equipment to manufacture and assemble components.
- Conduct quality control and quality assurance procedures as required.
- Recognize the environmental, economic, legal, safety, and ethical implications of manufacturing projects.
- Use and maintain documentation, inventory, and records systems.
- Contribute to the implementation of a manufacturing project.
- Develop strategies and plans to improve job performance and work relationships.
- 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

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<th>Level: 01</th>
<th>Courses</th>
<th>Hours</th>
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<td>CAD8300</td>
<td>Computer Aided Design/Drafting (CAD/D)</td>
<td>56.0</td>
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<td>ELN9104</td>
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<tr>
<td>ENL1813T</td>
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### Manufacturing Engineering Technician

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<td>GED0019</td>
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### Fees for the 2020/2021 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](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](https://www.algonquincollege.com/ro).

Fees are subject to change.

Additional program related expenses include:
Books and supplies cost approximately $950 and can be purchased at the campus store. Selected books are available for a reduced price through ebook initiatives at [http://www.coursesmart.com/](http://www.coursesmart.com/). (All students are responsible to supply their own CSA-approved safety eye wear and leather steel toe work boots. Any other types of footwear are not acceptable).

### Admission Requirements for the 2021/2022 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.

- Proficiency in Internet browsing and searching, and proficiency with an office software suite (word processing, spreadsheets, etc.) prior to the start of the program.

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

Admission Requirements for 2020/2021 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 (MAP4C with a grade of 60% or higher) or Grade 11 (MCF3M with a grade of 50% or higher) or equivalent.
- At least two science courses from Grade 11 and/or Grade 12.

International applicants must provide proof of the subject specific requirements noted above along with proof of either: (IELTS / TOEFL) 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.

- Applicants with international transcripts must provide proof of the subject specific requirements noted above and may be required to provide proof of language proficiency.
- Proficiency in Internet browsing and searching, and proficiency with an office software suite (word processing, spreadsheets, etc.) prior to the start of the program.

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

Application Information

MANUFACTURING ENGINEERING TECHNICIAN
Program Code 1518X01FWO
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
Email: AskUs@algonquincollege.com

Additional Information

Programs at Algonquin College are Bring Your Own Device (BYOD). To see the BYOD requirements for your program, please visit: https://www7.algonquincollege.com/byod/.

The first level of this program is common with two other programs, Mechanical Engineering Technology and Electromechanical Engineering Technician - Robotics. This provides students with the option of transitioning to either of these programs prior to the start of the second level.

Students wishing to transfer to Electromechanical Engineering Technician - Robotics may do so with permission from the program coordinator prior to the start of their second level. Students wishing to transition to Mechanical Engineering Technology need to maintain a good academic standing during the first semester and obtain a grade of at least C in the following courses: MAT8001M (Math) and MFG8518 (Manufacturing and Metrology). Students also need to speak to the coordinator of Mechanical Engineering Technology about additional math modules they may need.

Note: Proficiency in Internet browsing and searching, and proficiency with an office software suite (word processing, spreadsheets, etc.) prior to the start of the program is recommended. The Student Learning Centre offers training in these skills if needed. While programming experience is not a requirement to enter the program, aptitude for programming is necessary and includes strong language, problem solving and logic skills.

This program has an annual intake in the Fall. For more information, please contact Hooman Abdi, Program Coordinator at 613-727-4723 ext. 3473 by email at hoomana@algonquincollege.com.

Course Descriptions

**CAD8300 Computer Aided Design/Drafting (CAD/D)**

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

**CAM8505 CNC Machining I**

Through instruction and assistance, students operate computer numerical control machines, load and edit part programs, follow instruction sheets, set up the tooling and fixtures required to manufacture component parts and practise CNC related mathematics.

Prerequisite(s): none
Corerequisite(s): CAM8501

**CAM8506 CNC Machining II**

The manufacturing industry relies heavily on computer-aided technologies. Students develop a technical understanding required for their program, practise advanced operation techniques of computer numerical machining centres and setup of tooling and fixtures. Students design part drawings and generated toolpaths on CAD/CAM systems, simulate CNC files using the software and also practise CNC related mathematics.

Prerequisite(s): CAM8505 and CAM8515
Corerequisite(s): CAM8507

**CAM8507 Computer Aided Manufacturing II**

Students develop the technical understanding required for building competence in Computer Aided Manufacturing. Through instruction and assistance, students write and refine part programs using advanced programming techniques, such as computer-aided design and computer-aided manufacturing systems (CAD/CAM).

Prerequisite(s): CAM8505 and CAM8515
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 concept, 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 and operate IBM compatible computers using editing, printing and back-plotting software.

Prerequisite(s): CAD8300 and MFG8518
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

DSN8501 Additive Manufacture and 3D Printing

Additive Manufacturing (AM) is the newest emerging technology within manufacturing. AM is the creation of an object by adding layer-upon-layer of material to build the desired component. While many technologies exist to produce these components they all revolve around designing within solid modeling by 3D CAD. Students build upon the skills already gained in CAD modeling and manufacturing techniques to learn how to design for this exciting method of manufacture.

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

ELN8613 Basic Electronic Assembly

Students are exposed to soldering techniques. Brief lecture sessions provide the theoretical background followed by practical skills demonstration. Students perform labs to develop various skills, such as Printed Circuit Board component soldering (and de-soldering) for both traditional Through-Hole and Surface Mount Technology. They build their own set of meter leads and a functional project, (such as a Logic Probe) for use in other electronic courses.

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, Kirchoff’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):MAT8001M or MAT8100

ELN9212 Programmable Logic Controllers I

Students learn to program and use the Programmable Logic Controller (PLC), an important industrial, commercial and building automation control system. Students reinforce their knowledge of programming by adapting it to the specific programming requirements of the PLC. Students learn how the PLC has replaced mechanical controls with a faster, more flexible, software alternative. Students are exposed to industrial, commercial and building automation applications of the PLC. Students gain practical experience programming the PLC, and doing basic interfacing of the PLC to electromechanical inputs and outputs such as light sensors and motors.

Prerequisite(s): ELN9104 and ROB8220  
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

**ENG8306 Materials Science**

Understanding the properties of materials is an important component in working with such materials. Topics covered include crystal structures, atomic bonding, dislocation theory, equilibrium diagrams, heat treatments, hardening ability, IT diagrams and ferrous alloys.

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

**ENG8317 Statics and Mechanics of Materials**

Students are introduced to the concepts of force and stress and learn to apply these concepts to a variety of engineering problems. 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. The concept of Factor of Safety is used in the design of pinned connections, cables and axially loaded members.

Prerequisite(s): MAT8001M
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

GED1518 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 and Technology.

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

GEN0351 Strategies for Learning

Students learn techniques to help them become expert learners by examining their assumptions and attitudes towards learning. Students are introduced to concepts such as self-efficacy, goal setting and valid self-assessment. Students learn to identify how and when to ask for help. Students complete a learning plan to document and manage their own learning objectives.

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

MAC8519 Machine Shop I

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 practising 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.

Prerequisite(s): CAD8300 and ENG8313
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

MFG0003 Manufacturing Application Theory

In-depth knowledge of principles and safety relating to manufacturing machines is essential in setup and use of machinery. Students explore strategies and methodologies of component manufacturing including various assembly and secondary processes. In relation to manufacturing of components and products, students examine topics, such as material removal, tooling uses, advanced manufacturing techniques, project planning and layout procedures for application in lab.

Prerequisite(s): MFG8518
Corerequisite(s): none
**MFG8514 Machine Shop II**

Correct inspection and operation of machinery are dependent on strong knowledge of safety, setup, speeds, feeds and form-tools. Students apply assembly practices and procedures to manufacture advanced components on a variety of equipment from a variety of materials. Through application, students use build-to-print principles with engineering drawings for assembly of manufactured components to develop knowledge and skills in the manufacturing field.

Prerequisite(s): MFG8512
Corerequisite(s): none

**MFG8518 Manufacturing and Metrology**

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. What is also key to manufacturing is the ability to measure those manufactured goods. 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. The importance of machine safety and personal safety are a key part in all types of manufacturing; the use of PPE, WHMIS regulations and safe operation of equipment will be emphasized.

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

**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