MECHANICAL TECHNICIAN - PRECISION SKILLS

Program Outline

Major: MTPS
Length: 2 Years
Delivery: 4 Semesters, plus 1 work term
Credential: Ontario College Diploma, Co-op
Effective: 2016-2017
Location: Barrie
Start: Fall (Barrie)

Description
Students safely set-up and operate standard machine tools and complex machining equipment, such as CNC lathes and mills. Knowledge and skills learned are used to repair or manufacture components, assist with design of jigs, fixtures, tools, moulds and dies and perform troubleshooting to enact repairs on production tooling. Students use accurate testing methods to ensure accuracy of manufactured components.

Career Opportunities
This program prepares the graduate for the Aerospace, Energy, Mining, and Automotive industries, to name a few. Career paths include careers such as CNC Programmers, CNC Set-Up Technicians, Tool and Die Makers, Mould Makers, Millwrights and General Machinists as well as many other precision manufacturing opportunities. As employees, responsibilities may include design, custom production, maintenance and troubleshooting of complex tooling, moulds, dies and/or related tooling. Demand in Canada for individuals with excellent precision skills is typically high.

Program Learning Outcomes
The graduate has reliably demonstrated the ability to:

- complete all work in compliance with current legislation, standards, regulations and guidelines;
- apply quality control and quality assurance procedures to meet organizational standards and requirements;
- comply with current health and safety legislation, as well as organizational practices and procedures;
- apply sustainability best practices in workplaces;
- use current and emerging technologies to support the implementation of mechanical and manufacturing projects;
- analyze and solve mechanical problems by applying mathematics and fundamentals of mechanics;
- interpret, prepare and modify mechanical drawings and other related technical documents;
- perform technical measurements accurately using appropriate instruments and equipment;
- manufacture, assemble, maintain and repair mechanical components according to required specifications;
- contribute to the planning, implementation and evaluation of project;
- employ environmentally sustainable practices within the profession;
- apply basic entrepreneurial strategies to identify and respond to new opportunities.

Practical Experience:
Co-operative Education is a mandatory component of all Co-op programs at Georgian College; it has been designed as a process by which students integrate their academic education with work experience related to their programs of study. This integration affects much more than simply earning a salary, including the adjustment to the work environment and the development of professionalism. It also reinforces skills and theory learned during academic semesters, develops professional contacts, job knowledge and career path, improves human relations and communication skills, and promotes personal maturity and financial independence.

Students are requested to register, attend and participate in their scheduled co-operative education classes. These classes are scheduled for all first year students and are expected to be completed in order for students to proceed successfully to their first co-op work experiences. To ensure students are eligible to proceed onto any co-op work experience, students should refer to Promotional Status and Eligibility for Co-op as outlined in the College Calendar. Co-op policies and procedures can be located on our website: www.georgiancollege.ca/student-services/co-op-and-career-services/students-tab/

Georgian College follows the Co-operative Education guidelines set out by the Canadian Association for Co-operative Education (CAFCE) and Education at Work Ontario (EWO) by supporting the learning outcomes designed for the program specific graduate profile and curriculum as set out by the Ministry of Training, Colleges and Universities.

The Program Progression:

```
Fall Intake - Barrie

Sem 1 | Sem 2  | Work Term | Sem 3 | Sem 4
-------------------------------------------
Fall  | Winter | Summer    | Fall  | Winter
2016  | 2017   | 2017      | 2017  | 2018
```

Articulation:

A number of articulation agreements have been negotiated with universities and other institutions across Canada, North America and internationally. These agreements are assessed, revised and updated on a regular basis. Please contact the program co-ordinator for specific details if you are interested in pursuing such an option. Additional information can be found on our website at http://www.georgiancollege.ca/admissions/credit-transfer/

Admission Requirements:

OSSD or equivalent with
- Grade 12 English (C or U)
- any Grade 11* or 12 Mathematics (C, M, or U)
*Minimum of 60% in Grade 11 College or University level Mathematics (MBF3C or MCF3M)

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

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

Graduation Requirements:

16 Mandatory Courses
2 Communications Courses
3 General Education Courses
1 Co-op Work Term

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

Mandatory Courses
CNCT1005   CNC Process and Fixture Technology
CNCT1012   CAD CAM Design 1
CNCT1013   CNC Applications 1
CNCT1014   CNC Applications 2
CNCT2009   CAD Cam Design 2
CNCT2010   CNC Manufacturing (Design and Applications)
MATH1018   Introduction to Technical Mathematics
TDIE1001   Basic Machine Tool Application
TDIE1013   Basic Machine Tool Theory
TDIE1014   Advanced Machine Tool Applications
TDIE1015   Interpreting Engineering Drawings
TDIE1016   Advanced Machine Tool Theory
TDIE2003   Integration of Manufacturing Processes
TDIE2008   Advanced Tool Making Theory
TDIE2010   Basic Tool Making Theory
TDIE2011   Basic Tool Making Applications

Communications Courses
To be selected at time of registration from the College list, as determined by testing.

General Education Courses
To be selected from College list

Co-op Work Term
COOP1021   Mechanical Technician Work Term 1

Course Descriptions:

CNCT1005 CNC Process and Fixture Technology   28.0 Hours
Students are introduced to machine part planning and associated manufacturing technology. Using graphic software students create and design the machining processes to enable a production cycle to take place. Topics will include: CAD, machine part process, holding technology and machine tool life management.
P- CNCT1012 CAD CAM Design 1

CNCT1012 CAD CAM Design 1   42.0 Hours
Students are provided training in three dimensional design and geometrical dimensioning and tolerancing using a CAD/CAM software application. This course introduces the student to the management and creation of design elements to develop the structure for a Computer Numerical Control (CNC) program. Topics to be covered include: design application structure, editing and modification of existing design.
P- TDIE1015 Interpreting Engineering Drawings

CNCT1013 CNC Applications 1   56.0 Hours
Students are provided with basic training in CNC programming, safe setup and operation of a CNC Lathe and CNC Mill. This is a fundamental course designed to introduce students to CNC Machine Operation and Programming.

CNCT1014 CNC Applications 2   56.0 Hours
Students are provided practical and theoretical training in the Computer Numerical Control (CNC) programming and operational field. Students write CNC programs using the machine code at the 2-3 axis level, and apply it to the machine operations. Aspects covered include: safety, review of base machine code and CNC concepts, circular interpolation, offsets, cutter compensation, subroutines and tooling.
P- CNCT1013 CNC Applications 1

CNCT2009 CAD Cam Design 2   42.0 Hours
Students are provided applied training using a CAD/CAM software application. Students develop machine tool paths for CNC lathes and machining centers as used in today's industrial machines. Topics to be covered include: Safety Procedures, Geometry Building, Machining Methodology, Tool Management, Tool Path Creation and Editing and Postprocessor Management, in creating CNC machine code for 2-3 Axis generation.
P- CNCT1012 CAD CAM Design 1 and P- CNCT1014 CNC Applications 2

CNCT2010 CNC Manufacturing (Design and Applications)   168.0 Hours
Successful students design and manufacture projects and components using current CNC and conventional machine tools, to tight dimensional tolerances. Students produce a working tool or prototype project complete with drawings and must show proper assembly techniques. The project must be completed and tested as a mandatory requirement of the course. Students will gain the understanding of different tool steels and their alloys as it pertains to their machining capabilities and time required to machine.

P- TDIE2011 Basic Tool Making Applications

MATH1018 Introduction to Technical Mathematics   42.0 Hours
Students are provided a foundation in mathematics in engineering technology and related programs. Students will develop skill in mathematical thinking and problem solving, and appropriately apply technology in the solution of engineering related problems using algebra, geometry, right angle trigonometry, trigonometric functions of any angle, systems of linear equations, and exponential and logarithmic functions. Additional time to strengthen and reinforce mathematical competencies will be made available to those students who require it.

TDIE1001 Basic Machine Tool Application   112.0 Hours
This course is a practical application of knowledge pertaining to the safe set-up and operation of standard metal cutting machine tools, the correct and safe selection of cutting tools, R.P.M., feedrates and machining processes.
C- TDIE1013 Basic Machine Tool Theory

TDIE1013 Basic Machine Tool Theory   42.0 Hours
This course is a study of the theoretical application and operation of standard metal cutting machine tools in conjunction with basic techniques required for manufacturing and assembly of machined components.. The process of steel and iron manufacturing is discussed along with their metallurgical qualities and their environmental impact.
C- TDIE1001 Basic Machine Tool Application

TDIE1014 Advanced Machine Tool Applications   126.0 Hours
This course is a practical application of knowledge pertaining to the safe set-up and operation of standard metal cutting machine tools, the correct and safe selection of cutting tools, R.P.M., feed rates and machining process. Students will demonstrate an action plan for each class. Planning prior to class and monitoring progress upon completion. Estimating time and machines used will support the entrepreneurial spirit.
P- TDIE1001 Basic Machine Tool Application and C- TDIE1016 Advanced Machine Tool Theory

TDIE1015 Interpreting Engineering Drawings   28.0 Hours
Students read, interpret and sketch mechanical engineering components and assembly prints. Students will demonstrate a comprehension of orthographic, isometric, oblique and auxiliary projections used on mechanical drawings.

TDIE1016 Advanced Machine Tool Theory   42.0 Hours
In this course, students study the theoretical application and operation of standard metal cutting machine tools in conjunction with basic tool making techniques required for manufacturing and assembly of presswork tools, moulds, inserts and general machining practices. A focus is put on environmental sustainability in manufacturing.

P- TDIE1013 Basic Machine Tool Theory and C- TDIE1014 Advanced Machine Tool Applications

TDIE2003 Integration of Manufacturing Processes   28.0 Hours
This course looks at all manufacturing processes as taught throughout the program. Students will have an opportunity to work as an entrepreneur in the design and development of a final project. Students will consider the best manufacturing processes along with project estimation related to time and project costing.

TDIE2008 Advanced Tool Making Theory   42.0 Hours
Students are provided advanced training in the design and manufacture of precision metal cutting and forming tools and moulds. Topics covered include plastic shrinkage, venting as well as bend allowance during forming, stock material utilization and strip layout.
P- TDIE2010 Basic Tool Making Theory

TDIE2010 Basic Tool Making Theory   42.0 Hours
Students are provided theory in the design and manufacture of metal cutting and forming tools, moulds, die casting and related hydraulics and pneumatics. A focus on optimizing cutting tool technology, coatings and geometry will support current manufacturing goals.

TDIE2011 Basic Tool Making Applications   154.0 Hours
Students are introduced to the tooling often required in industry such as jigs and fixtures. Students interpret a product drawing and precision machine components to tolerance, in the manufacture of practical projects. Students will learn the proper set up techniques to manufacture their advanced projects using common work holding devices.
P- TDIE1014 Advanced Machine Tool Applications

Course Description Legend
P = Prerequisite; C = Concurrent prerequisite; CO= Corequisite

Information contained in College documents respecting programs is correct at the time of publication. Academic content of programs and courses is revised on an ongoing basis to ensure relevance to changing educational objectives and employment market needs. The college reserves the right to add or delete programs, options, courses, timetables or campus locations subject to sufficient enrolment, and the availability of courses.