

MECHANICAL ENGINEERING TECHNOLOGY - AUTOMOTIVE PRODUCTS DESIGN

Program Outline

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| Major: | MTAP |
| Length: | 3 Years |
| Delivery: | 6 Semesters, plus 3 work terms |
| Credential: | Ontario College Advanced Diploma, Co-op |
| Effective: | 2014-2015 |
| Location: | Barrie |
| Start: | Fall (Barrie) |

Description

This program has a core emphasis on automotive products (parts) design, supported by learning about quality optimization, up-to-date automotive parts production and assembly methods. The aesthetic considerations of parts design, and the artistic abilities to develop and document marketable designs, are key components of this program. Technical project management, planning and supervisory techniques further compliment students' educational experiences. Technical and non-technical courses provide a solid foundation in communications, computer assisted drafting (CAD), and product design. The standards of the automotive industry are emphasized, recognizing the global nature of the industry and the internationalization of standards and practices in the North American manufacturers as well as the benchmark practices of international competitors.

Career Opportunities

Graduates may find a range of occupations in automotive products design and manufacturing. They may participate in an engineer-technologist-technician team in mechanical consulting, manufacturing or design. Careers are possible in design, production, quality assurance, management and technical sales. Automotive parts and assembly, metal fabricating and plastic moulding industries are among graduate

employers. The skills learned in this program are applicable to other design and manufacturing activities, including the aerospace and consumer products industries.

Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- analyze and solve complex technical problems related to mechanical environments through the application of engineering principles;
- design and analyze mechanical components, processes, and systems through the application of engineering principles and practices;
- analyze 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 processes to the design of components;
- apply knowledge of materials and engineering principles to manufacturing operations and processes;
- apply knowledge of machinery, tools, and other equipment used in manufacturing processes;
- specify, coordinate, and conduct quality control and quality assurance procedures;
- recognize the environmental, economic, legal, safety, and ethical implications of mechanical engineering projects;
- use and maintain documentation, inventory, and records systems;
- participate in the management of an engineering project;
- develop strategies and plans to improve job performance and work relationships.

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 program 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 to proceed successfully to their first co-op work experience. 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.georgianc.on.ca/careers/for-students/

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

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|-------------|--------|-------------|-------|-------------|--------|
| Sem 1 | Sem 2 | Work Term 1 | Sem 3 | Work Term 2 | Sem 4 |
| ----- | ----- | ----- | ----- | ----- | ----- |
| Fall | Winter | Summer | Fall | Winter | Summer |
| 2014 | 2015 | 2015 | 2015 | 2016 | 2016 |
| | | | | | |
| Work Term 3 | Sem 5 | Sem 6 | | | |
| ----- | ----- | ----- | | | |
| Fall | Winter | Summer | | | |
| 2016 | 2017 | 2017 | | | |

Admission Requirements:

You must meet ONE of the following requirements to be eligible for admission to these programs:

Secondary school applicants:

- OSS Curriculum: OSSD or equivalent with Grade 12 English (C) or (U) (ENG 4C, ENG 4U); plus any Grade 12 College Mathematics (MAP 4C or MCT 4C), or any Grade 12 University Mathematics. Also recommended: Grade 12 College or Grade 11 or 12 University Physics (SPH4C, SPH4U, SPH3U) or Grade 12 College or Grade 11 or 12 University Chemistry (SCH4C, SCH4U, SCH3U); Grade 11 or 12 College or University Technological Design (TDJ3M, TDJ4M); Grade 11 or 12 College Manufacturing Engineering Technology (TMJ3C, TMJ4C)

Non-Secondary school applicants (19 years or older):

- Any credit Communication course and most credit mathematics courses taken at Georgian College
- College preparatory programs including those taken at Georgian College: Technology Foundation and Technology Fundamentals*
- Equivalent courses in English and mathematics taken through secondary school or Independent Learning Centres (at the general, advanced, college or university level)
- Academic and Career Entrance Certificate (ACE) program with communications and business, apprentice or technical mathematics*
- Mature student testing in English and mathematics that meets the minimum standards for admission (available through most testing services)*

- Ontario High School Equivalency Certificate (GED)
- English, Literature or Communication credit courses and most mathematics credit courses from accredited colleges/universities

Home school applicants:

- Applicants can write the mature student testing in English and mathematics that meets the minimum standards for admission (available through testing services)*

* available from Georgian College. For a complete listing please contact the Office of the Registrar.

Non-secondary school applicants who are 19 years of age or over by the first day of classes, and who lack the academic entrance qualifications, may be considered for entrance to an appropriate post-secondary diploma or certificate program as mature applicants. Mature applicants must meet all program specific prerequisites including all selection criteria; equivalencies are stated above. Applicants who are unsure whether they meet admission requirements should contact the Office of the Registrar. In addition, those applying as mature students and having no documentation of Grade 12 education must supply, if required, proof of age, such as a copy of an official birth certificate or driver's licence. Refer to Section 2.5 and 2.6 of the Academic Calendar for further details.

Credit transfer and course exemptions:

Applicants who have taken courses from a recognized and accredited post-secondary institution and/or have relevant life/learning experience may be eligible for credit transfer/course exemptions. Courses/experience must match at least 80% of the learning outcomes of a Georgian College course with a minimum grade of 60% or C achieved in previous coursework; some program exceptions apply (see program outline). For further information please visit the Credit Transfer Centre website: georgiancollege.ca/admissions/credit-transfer/

Graduation Requirements:

- 32 Mandatory Courses
- 2 Communications Courses
- 5 General Education Courses
- 3 Co-op Work Terms

Graduation Eligibility:

To graduate from this program, the passing weighted average for promotion through

each semester, from year to year and to graduate is 60%. Additionally, a student must attain a minimum of 50% or a letter grade of P (Pass) or S (Satisfactory) in each course in each semester.

Mandatory Courses

| | |
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| APDE2000 | Product Design Fundamentals |
| APDE2001 | Virtual Prototyping |
| APDE3000 | Advanced Product Design |
| APDE3003 | Design for Manufacturing and Assembly |
| APDE3006 | Product Design Professional Practice |
| AUTO1002 | Automotive Systems |
| COMP1025 | CAD - Mechanical |
| COMP2044 | CAD 3D Solids Modelling |
| COMP3020 | Geometric Dimensioning and Tolerancing |
| DRFT1008 | Introduction to Engineering Drafting |
| DRWG1008 | Drawing for Designers |
| DRWG2002 | Product Rendering |
| ENVR1000 | Environmental Science and Sustainability |
| MATH1018 | Introduction to Technical Mathematics |
| MATH1019 | Technical Mathematics |
| MATH2006 | Engineering Math: Calculus |
| MENG1006 | Manufacturing Processes |
| MENG1007 | Measurement and Machine Shop |
| MENG1008 | Engineering Materials |
| MENG2003 | Statics |
| MENG2005 | Fluid Mechanics |
| MENG2007 | Strength of Materials |
| MENG2008 | Thermodynamics |
| MENG3010 | Machine Design |
| MENG3011 | Dynamics |
| MENG3016 | Product and Process Reliability |
| MGMT2002 | Project Management |
| PHYS1001 | Physical Sciences |
| ROBT3000 | Automation Robotics and Computer Integrated Manufacturing |
| ROBT3002 | Automotive Quality Design |
| TECR3000 | Project and Technical Reports |
| TECR3004 | Project Report Presentation |

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 Terms

COOP1013 Technology Work Term 1

COOP2009 Technology Work Term 2

COOP3005 Technology Work Term 3

Course Descriptions:

APDE2000 Product Design Fundamentals 42.0 Hours

Through a variety of assignments, this course will introduce students to the processes of product design and development. Emphasis will be placed on understanding the processes involved, moving from design concept to production (creativity, experimentation, originality and skill development).

APDE2001 Virtual Prototyping 42.0 Hours

This course introduces solid modeling applications used on a large scale on the market. Model and assembly creation, basic finite element notions, and rapid prototyping techniques as well are included in this course. Using computer-based design tools, virtual models will be constructed and assembled. They will be checked for fit simulation and assessment of proper applications using finite element modeling methods. In addition to visualization of the virtual model, a real model will be produced by a rapid prototyping method.

APDE3000 Advanced Product Design 42.0 Hours

Through a series of design projects, the course will develop skills in product design and development. Emphasis will be placed on managing the criteria for both design and production in the development of a product. Students will develop creativity, consistency, and efficiency in the design process.

P- APDE2000 Product Design Fundamentals

APDE3003 Design for Manufacturing and Assembly 42.0 Hours

The focus of this course is to identify the manufacturing constraints that influence the design of parts and part systems. Students will be introduced to the Design for Manufacturability (DFM) methodology, and will be motivated to understand infeasible or impractical designs. The student will also explore specific aspects of DFM, such as Design for Assembly (DFA). Students will prepare a report or presentation, based on recent examples from industry, illustrating an applied understanding of DFM principles. (P- MENG1006 Manufacturing Processes or P- EML4207 Manufacturing Processes) and (P- MENG1008 Engineering Materials or P- EMS4101 Engineering Materials)

APDE3006 Product Design Professional Practice 42.0 Hours

This course orients students to the principles of business practices as they relate to designers and entrepreneurs. The content deals with topics such as legal and financial issues in management of small businesses, cost estimates, contracts, design protection, and business plans.

AUTO1002 Automotive Systems 42.0 Hours

This course provides students with basic technical knowledge of the automobile. Students become familiar with automotive terminology as well as the recent global developments in automobile technology.

COMP1025 CAD - Mechanical 42.0 Hours

This course will continue to develop CAD skills with emphasis on development of engineering drawings in the mechanical disciplines. Current software will be utilized in support of these outcomes.

P- DRFT1008 Introduction to Engineering Drafting

COMP2044 CAD 3D Solids Modelling 42.0 Hours

This course is designed to provide training in designing pertinent mechanical projects using a CAD software. Practical lab work in creating parametric solids, mechanical assemblies, form features, curves, and simple drawings. Utilizing form features, curves, sketches, expressions, blends, chamfers and extrusion in designing solid models will complement this course.

COMP3020 Geometric Dimensioning and Tolerancing 42.0 Hours

This course builds upon the preceding engineering graphics courses by advancing the process of documentation. Drawings will convey the essential information of materials, dimensions, geometric characteristics and permissible variation of size and form. Functional requirements of manufactured parts are emphasized.

P- COMP1025 CAD - Mechanical

COOP1013 Technology Work Term 1 640.0 Hours

Co-operative Education will provide students with the skills to conduct a college directed and self directed job search in their chosen field of study. Students will obtain a co-op work experience with an employer for a period of 14 weeks. All students are responsible to submit a work term report indicating achievement of specific learning outcomes during their 1st co-op work term. 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 each program.

COOP2009 Technology Work Term 2 560.0 Hours

Co-operative Education will allow students to gain new/enhanced technical work experience. As students begin to recognize their chosen academic strengths and career direction, they will be better prepared to choose their academic courses and

professional options. All students are responsible for submitting a work term report and employer evaluation form following this work term. It is expected that a student wishing to return to their Work Term 1 employer, be asked to seek new/more in depth responsibilities so that enhancement of program specific learning outcomes be achieved.

P- COOP1013 Technology Work Term 1 or P- FLD4201 Co-Op Work Term 1 (4 Mths)

COOP3005 Technology Work Term 3 560.0 Hours

Co-operative Education will allow students to gain further technical work experience. As students realize their chosen academic strengths and career direction, they will be better able to choose their academic courses and professional options. All students are required to submit a work term report and employer evaluation form following this work term. It is expected that a student wishing to return to a Work Term 1 or Work Term 2 employer, be asked to seek new/more in depth responsibilities so that enhancement of program specific learning outcomes will be achieved.

P- COOP2009 Technology Work Term 2 or P- FLD4202 Co-Op Work Term 2 (4 Mths)

DRFT1008 Introduction to Engineering Drafting 42.0 Hours

This course introduces students to reading, understanding, and creating engineering drawings. Emphasis is on creating accurate, clear sketches and CAD drawings based on current professional practices. Standards and conventions are presented and their applications are shown using CAD.

DRWG1008 Drawing for Designers 42.0 Hours

This is a project oriented studio course designed to develop students' graphic representation skills, as well as presenting techniques for representing different materials. Emphasis will be placed on sketching and drawing automotive styles, concepts and interior space in relation to the human figure.

DRWG2002 Product Rendering 42.0 Hours

This project-based studio course deals with the process, techniques and skills used in the rendering of product design concepts. It is designed to further enhance the student's developing, drawing and rendering skills. Emphasis will be placed on automotive subjects and their relation to the human figure through the utilization of a range of media and materials.

P- DRWG1008 Drawing for Designers or P- GAT3267 Drawing For Designers

ENVR1000 Environmental Science and Sustainability 42.0 Hours

This course focuses on ecological principles, population dynamics and energy resources in order to assess their impact on the environment. The major types of pollution are examined and their effects on the various components of the ecosphere analyzed. Strategies for pollution control and the conservation of the Earth's resources are examined in the context of economic considerations and sustainable development.

MATH1018 Introduction to Technical Mathematics 42.0 Hours

This course provides 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.

MATH1019 Technical Mathematics 42.0 Hours

This course extends the mathematics ideas taught in Introduction to Technical Mathematics through advanced mathematics problems needed for mechanical engineering programs. Mathematical reasoning and problem solving will be reinforced through problems in an engineering context. Mathematics concepts reinforced and extended are algebra, systems of linear equations, vectors and oblique triangles, graphs of trigonometric functions, and complex numbers.

P- MATH1018 Introduction to Technical Mathematics

MATH2006 Engineering Math: Calculus 56.0 Hours

This course in calculus is intended to develop practical skills in differential and integral calculus. As well, it is intended to illustrate various applications of calculus to technical problems. The rules of differentiation will be introduced, and methods of differentiating various algebraic and transcendental functions will be developed. Applications of differential calculus to finding roots of equations by Newton's methods, to finding maxima and minima, and to developing power series representation for functions will be studied. Methods of algebraic integration will be introduced, with both definite and indefinite integrals being determined for a variety of functions. The use of tables of integrals for finding solutions for difficult integrals will be introduced. Numerical integration using Simpson's rule will also be developed.

MENG1006 Manufacturing Processes 42.0 Hours

This course will familiarize students with the methods and capabilities of various manufacturing processes within the categories of moulding, cutting, forming, assembly, finishing and automation.

MENG1007 Measurement and Machine Shop 56.0 Hours

A project on the use of hand tools, precision measuring devices and the operation of basic machine tools is assigned. The student is required to set up the machine tool, select the cutter, establish the cutting rate and produce components to a specified tolerance.

MENG1008 Engineering Materials 42.0 Hours

This course will familiarize the student with the properties of metal, ceramic, polymer and composite engineering materials. Methods to protect materials and alter their properties will be investigated.

MENG2003 Statics 42.0 Hours

This course is an introduction to the equilibrium of externally applied forces and internally developed reaction forces as applied to engineering structures and machines.

MENG2005 Fluid Mechanics 42.0 Hours

This course will provide the student with a basic understanding of fluid properties, fluid statics and dynamics, and fluid flow. The flow of incompressible fluids in pressure systems constitutes the major portion of this course. Fluid measurement is covered both in the lecture and the laboratory portion of the course.

MENG2007 Strength of Materials 42.0 Hours

This course is designed to familiarize the student with some basic concepts of strength of materials, particularly direct stress and strain, bending and torsional stresses.

P- MENG2003 Statics or P- EML4113 Statics or P- MENG2011 Statics and Dynamics or P- EML4237 Statics And Dynamics

MENG2008 Thermodynamics 56.0 Hours

This introductory course in Thermodynamics provides students with experience in analyzing problems related to the First Law, Second Law, and Thermodynamic Processes. This course also provides students with further experience in analyzing problems related to refrigeration and air conditioning. Laboratory sessions employing refrigeration and air conditioning apparatus assist in providing practical experience.

MENG3010 Machine Design 42.0 Hours

Machine design studies the conversion of one type of motion to another. Along with the change in the type and direction of motion, the rotational speed and torque may also change. This course begins with a review and further development of stress analysis (statics). At that point, specific components of machines, such as shafts and bearings and belts, chains and gears will be addressed.

MENG3011 Dynamics 42.0 Hours

Dynamics is the study of motion and force systems on bodies in motion. The course will be an overview of the application of Newton's Laws to rectilinear and curvilinear motion problems. Plane motion, work/energy, impulse/ momentum, force analysis, and mechanical vibration will be studied as well as motivation to understand and analyze linkages.

MENG3016 Product and Process Reliability 42.0 Hours

This course introduces students to the subject of reliability. The principles and techniques of reliability are considered within the framework of the cycle of a product

from initial market requirements to customer use. Topics include reliability of distributions, analysis techniques, liability, and plant and product safety.

MGMT2002 Project Management 42.0 Hours

This course introduces the fundamental principles necessary for successful management of projects. Project planning, management and control techniques will be discussed and the application of computers in project management will be studied.

PHYS1001 Physical Sciences 42.0 Hours

This is a course designed to introduce students to the basic concepts of Physics. It deals with topics which include basic mechanics, simple harmonic motion natural frequencies and sound; heat, thermal expansion, temperature and heat transfer; electromagnetic waves, light optics electricity and magnetism. These concepts are developed by considering practical related examples. Laboratory experiments may be used to illustrate and investigate the principles involved.

ROBT3000 Automation Robotics and Computer Integrated Manufacturing 42.0 Hours

The course will introduce modern industrial assembly techniques using robotics and other computer-controlled automated systems. The student will study the safety requirements and devices required for robotic systems, the conveyor and feeder systems used to support automated assembly, the motion control devices and systems used in robotics and other positioning systems, and the various types of robots used for assembly operations.

ROBT3002 Automotive Quality Design 42.0 Hours

Using industry publications, this course will train the student to use the specific techniques and approaches adopted by the automotive industry to ensure that manufacturers are able to design and produce quality products. This includes Total Quality Management, Advance Product Quality Planning, Failure Mode and Effect Analysis, Production Part Approval Process, and Value Analysis/Value Engineering.

TECR3000 Project and Technical Reports 14.0 Hours

The student will demonstrate communication skills by completing and presenting, both written and orally, a major technical report of at least 3000 words in the narrative portion of the report. The course is largely self directed. The content of the report will be developed around a technical topic that is relevant to the student's program area in Engineering Technology. The content of the report may be based on original research and/or based on a current review of the literature on a specific technical field and/or based on data obtained or processes worked on during the student's co-op experiences.

TECR3004 Project Report Presentation 28.0 Hours

Students will demonstrate technical and communication skills by presenting, both written and orally, a capstone technical project. The topic is chosen by the student in

Project Report 1 and is largely self-directed. This course will focus on the communication of technical information.

P- TECR3000 Project and Technical Reports

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.