

# CIVIL ENGINEERING TECHNOLOGY

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## Program Outline

<b>Major:</b>	CVTY
<b>Length:</b>	3 Years
<b>Delivery:</b>	6 Semesters, plus 2 work terms
<b>Credential:</b>	Ontario College Advanced Diploma, Co-op
<b>Effective:</b>	2016-2017
<b>Location:</b>	Barrie
<b>Start:</b>	Fall (Barrie)

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### Description

This program is scheduled to take advantage of typical Canadian construction seasons. Upon graduation, the students are prepared to work with engineers, designers, and construction project managers as an integral part of the team. Students are exposed to three program principles: 1) proposal development (construction of roads, bridges, sewers, water mains, and other infrastructure), 2) cost estimation, and 3) field work (materials testing and project administration). The use of the latest codes and standards, site management techniques, and related computer technologies along with integrated work placement experiences equip graduates to succeed in this rapidly evolving and growing industry.

### Career Opportunities

Graduates may find work in the private sector as quantity surveyors (estimators), purchasers, site supervisors and project managers, drafters, or designers using computer aided Design (CAD) technology. They may also find employment as assistants in engineering offices. Public sector employment in a variety of government agencies, including municipal building inspection/code enforcement are employment options for graduates.

### Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- assemble, analyze, and appropriately apply civil engineering data from existing graphics, reports, and other documents;
- coordinate and facilitate the collection, processing, and interpretation of technical data related to civil engineering projects;
- communicate information effectively and accurately by analyzing, translating, and producing civil engineering documents;
- monitor that all work is completed in compliance with the rights and conditions of contractual obligations; applicable law, standards, bylaws, and codes; and the accepted principles and practices of civil engineering;
- schedule and coordinate civil engineering projects and monitor the quality and quantity of work;
- assist in planning, designing, inspecting, supervising, and constructing civil engineering projects;
- evaluate the methods employed and the use of equipment and materials involved in the implementation and completion of civil engineering projects;
- use electronic technology to support civil engineering projects;
- apply the principles of mathematics and science to analyze and solve technical problems related to civil engineering projects;
- manage and maintain systems for civil engineering project records, logs, and inventories;
- assist in the assessment of the political, social, and environment impacts of civil engineering projects;
- take into account the interdependence of the architectural, structural, mechanical, and electrical disciplines relating to civil engineering projects;
- liaise among the project stakeholders involved in the design and implementation of civil engineering projects;
- develop and use strategies and plans to enhance professional growth and competence;
- 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/](http://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 1	Sem 3	Sem 4	Work Term 2-dbl	Sem 5
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Fall	Winter	Summer	Fall	Winter	Summer	
2016	2017	2017	2017	2018	2018	2019
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Sem 6						
Summer						
2019						

### **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)
- Grade 12 Mathematics (C or U)

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/](http://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/](http://www.georgiancollege.ca/admissions/credit-transfer/)

**Graduation Requirements:**

- 33 Mandatory Courses
- 2 Communications Courses
- 3 General Education Courses
- 2 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 unless otherwise stated on the course outline.

**Mandatory Courses**

- CIVL1001 Quantity Estimation and Drawing Review
- CIVL2001 Geotechnical Analysis and Geosynthetics
- CIVL2002 Stormwater Management / Best Management Practices
- CIVL3000 Heavy Construction Estimating: Computer Applications
- CIVL3001 Estimating: Cost Analysis
- COMP1056 Civil Engineering Graphics
- COMP1057 CAD / Civil Construction
- COMP2124 Introduction to 3D Drafting
- COMP3032 3D CAD Civil / Construction
- CONS1003 Construction Practices
- CONS1004 Construction Practices and Design: Materials and Material Testing
- CONS2000 Construction Practices:Methods
- CONS2001 Construction Practices: Building Systems
- CONS2003 Construction Practices and Design: Municipal and Provincial Codes and Standards
- CONS2004 Construction Practices and Design: Highways
- CONS2008 Site Development
- CONS3000 Structural Analysis: Beams and Columns

CONS3006 Construction Practices and Design: Reinforced Concrete  
 CONS3007 Construction Practices and Design: Structural Steel  
 CONS3008 Construction in Ontario  
 CONS3012 Numerical Analysis  
 CONS3013 Construction Practices and Design: Highways 2  
 ENVR1000 Environmental Science and Sustainability  
 MATH1028 Mathematics for Constructions  
 MENG2003 Statics  
 MENG2007 Strength of Materials  
 MGMT2002 Project Management  
 MGMT3013 Project Management for Civil Construction  
 MGMT3014 Contract Law and Ethics  
 SURV1001 Civil / Construction Surveying  
 SURV1003 Civil/Construction Surveying 2  
 SURV2003 Introduction to GIS and Geospatial Technology  
 TECR3009 Technical Project: Civil

#### 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

COOP1028 Civil Engineering Work Term 1  
 COOP2023 Civil Technology Work Term 2-3

#### Course Descriptions:

**CIVL1001 Quantity Estimation and Drawing Review 42.0 Hours**

Students are introduced to the reading of engineered drawings and measurement techniques. Skills in estimating techniques and industry practices are applied. Students examine infrastructure projects and tools, such as spreadsheets, used to prepare competitive estimates in an organized format.

**CIVL2001 Geotechnical Analysis and Geosynthetics 42.0 Hours**

Geotechnical science is a fundamental topic in civil construction projects. The focus of this course includes the study, analysis and design of various principles of soil science. Emerging and sustainable materials and methods are evaluated. Emphasis is placed on developing knowledge towards construction projects including retaining walls, and soil stability.

P- CONS1004 Construction Practices and Design: Materials and Material Testing

CIVL2002 Stormwater Management / Best Management Practices 21.0 Hours

This course includes the review of common stormwater management techniques and industry practices. Students discuss and evaluate current trends and best management practices for urban developments. Computer software skills related to hydraulic modelling are introduced. This laboratory course provides students with hands-on application of the common modelling software standard in the civil industry.

CIVL3000 Heavy Construction Estimating: Computer Applications 42.0 Hours

The heavy construction industry uses commercial software extensively to prepare its estimates for large infrastructure projects including highway, sewer, and water main. This course presents students with the challenge of estimating costs and scheduling for large projects, utilizing a project driven format and fostering team skills.

P- CIVL1000 Quantity Surveying: Construction Plans and Measurements

CIVL3001 Estimating: Cost Analysis 42.0 Hours

Using the knowledge developed in the measurement and pricing subjects, the student is introduced to concepts of cost planning from project inception to end of contract. This subject covers various types of conceptual estimating, including elemental costing and analysis.

P- CIVL3000 Heavy Construction Estimating: Computer Applications

COMP1056 Civil Engineering Graphics 42.0 Hours

Students develop CAD skills and produce drawings using the standards of the construction industry. The course addresses drawing production in design offices. Its purpose is to convey the process followed at each stage of development between project inception and completion, and explores the interrelationship between the project owner, professionals, regulatory authorities and contractors.

COMP1057 CAD / Civil Construction 42.0 Hours

Continuing the development of students' skill with CAD software by introducing larger scale projects, this course emphasizes the professional quality and standards for drawings in the civil/construction field. The necessity for document control, cross referencing of details, and compliance with formal standards and field practices is key.

P- COMP1056 Civil Engineering Graphics

COMP2124 Introduction to 3D Drafting 42.0 Hours

Students develop introductory 3D CAD skills and produce land-development drawings using current software in the construction industry. The course addresses drawing skills and common standards in consulting/design offices. Its purpose is to prepare the student with 3D CAD skills necessary for drawing development, plans review, and estimation.

P- COMP1057 CAD / Civil Construction

**COMP3032 3D CAD Civil / Construction 42.0 Hours**

Students continue the development of skill with 3DCAD software. Example construction projects from local industry are explored, assessed, and compared. Advanced software functions are identified and used during the production of project-drawings.

P- COMP2124 Introduction to 3D Drafting

**CONS1003 Construction Practices 42.0 Hours**

An introductory study of the methods, and to a lesser extent materials, commonly used in Civil Engineering construction. Students address various equipment and their applications in the field. Efficiency and effectiveness are emphasized along with effective logistical management of a site. This course includes a significant Health & Safety component.

**CONS1004 Construction Practices and Design: Materials and Material Testing 42.0 Hours**

This course introduces concrete, asphalt, aggregates, and other construction materials and their applications in civil engineering projects. Students are introduced to engineering standards and the standard test methods associated with these common building materials. Mixed designs for concrete and asphalt are explored and tested.

**CONS2000 Construction Practices:Methods 42.0 Hours**

A study of materials and methods commonly used or seen in construction associated with architecture and infrastructure development are the basis for this course. Also included are common calculations and contract specifications for various types of projects.

**CONS2001 Construction Practices: Building Systems 42.0 Hours**

This course consists of advanced construction theory topics for architecture and design projects. Emphasis is placed on refinement of building design, materials and construction details. The course integrates architectural drawing standards, acceptable construction detailing principles, building code requirements and building systems.

P- CONS2000 Construction Practices:Methods

**CONS2003 Construction Practices and Design: Municipal and Provincial Codes and Standards 42.0 Hours**

This course introduces the student to practical standards from organizations such as the MTO, (Ministry of Transportation, Ontario), OPS, (Ontario Provincial Standards), and municipal requirements, which explore the application of these standards in design and specification writing.

**CONS2004 Construction Practices and Design: Highways 42.0 Hours**

This course examines the classification of highways with an emphasis on function. Studies include the relationship of spirals, curves, vertical curves, and super elevation.

Students design a highway by conducting appropriate planning and using accepted geometric features and their interrelationships including alignment, intersections, and drainage. Legislation regarding the jurisdiction of roads in Ontario is examined.

**CONS2008 Site Development 42.0 Hours**

This course includes site plans and subdivision development, with regards to design and installation of municipal services. The main topics are land development, piping materials, sewer and water main appurtenances, and other utilities. Loads (both structural and hydraulic) on storm and sanitary drainage systems are reviewed.

**CONS3000 Structural Analysis: Beams and Columns 42.0 Hours**

This course incorporates the study of beam analysis and design in various materials, further investigation of combined stresses and the introduction of column design and indeterminate beams.

P- MENG2007 Strength of Materials

**CONS3006 Construction Practices and Design: Reinforced Concrete 42.0 Hours**

This course explores the design procedures for reinforced concrete. The design elements include one and two way slabs, beams and columns. Drawing details for placement of reinforcing steel are developed.

P- MENG2007 Strength of Materials

**CONS3007 Construction Practices and Design: Structural Steel 42.0 Hours**

The students design basic structural elements and steel including beams and columns and their connections. Connections, including welded and bolted, are evaluated under various loading conditions.

P- MENG2007 Strength of Materials

**CONS3008 Construction in Ontario 42.0 Hours**

This course familiarizes the student with the current environment within which the construction industry functions, and provides them with up-to-date management techniques. The application of quality standards, with specific emphasis on the quality/business aspects of the standard; as well as strategies for business planning and financial analysis as required by, or alluded to, in the standard, are thoroughly explored.

**CONS3012 Numerical Analysis 42.0 Hours**

The focus of this course includes statistical analysis of numerical data within the field of Civil Technology. Elementary statistical methods including hypothesis testing and linear regression are studied.

P- CONS2000 Construction Practices:Methods

**CONS3013 Construction Practices and Design: Highways 2 42.0 Hours**



Students build knowledge on the topic of road building and highway design. Topics include geometric guidelines, traffic management, construction inspection, and advanced topics/trends in road building.

P- CONS2004 Construction Practices and Design: Highways

ENVR1000 Environmental Science and Sustainability 42.0 Hours

Students will be introduced to 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.

MATH1028 Mathematics for Constructions 42.0 Hours

This course provides a foundation in mathematics subjects related to architectural and construction applications. Students will develop skills in mathematical thinking and problem solving, by employing the use of algebra, trigonometry and two- and three-dimensional geometry.

MENG2003 Statics 42.0 Hours

The ability to analyze how structures react to applied forces is fundamental for Mechanical Engineering Technologists. Students will be introduced to the analysis of forces in and on externally loaded rigid bodies in static equilibrium. The equations of equilibrium are developed based on the Newtonian laws. Other concepts studied include force components, equilibrium, and free-body diagrams. Trusses and machines are also analyzed using the method of joints, the method of sections, and the method of members.

MENG2007 Strength of Materials 42.0 Hours

This course introduces students to the internal stresses and strains developed in engineering materials when externally loaded. Stresses, and resultant strains, studied include axial stress, shear stress, bending stress, and torsion. Bearing stress and stresses on oblique planes are also covered.

P- MENG2003 Statics

MGMT2002 Project Management 42.0 Hours

Throughout their career, technologists will be involved in many projects. Students will be introduced to the fundamental principles necessary for the successful management of any project. Through simulation and real project planning, students will develop skills in creating proposals, budgets, risk assessments, Gantt charts, critical path reports, progress reports, and other industry standard planning and reporting techniques.

MGMT3013 Project Management for Civil Construction 42.0 Hours

Furthering knowledge from MGMT2002, students will apply project management principles through an example project. The project topic and content focuses around a

specific objective in the field of Civil Technology. Students begin the preparation, planning, and tracking of a capstone project from inception to completion.

P- MGMT2002 Project Management

MGMT3014 Contract Law and Ethics 42.0 Hours

Students study contract law and ethics as it relates to the provincial Technician and Technologist. Students will examine and evaluate example legal issues and cases. Bidding processes and contract administration are discussed. This is a comprehensive look at the construction industry and value of construction contracts and ethics.

SURV1001 Civil / Construction Surveying 42.0 Hours

This is an introductory course to plane surveying as related to the construction industry. Emphasis is placed on obtaining field skills in linear measurement and the operation of levels, transits, theodolites and total stations. Elevations, horizontal, vertical, and spiral curves are explored.

SURV1003 Civil/Construction Surveying 2 21.0 Hours

Furthering on the topics from SURV1001, students continue the development of surveying skills. Example construction projects related to site layout are reviewed. This is a hands-on laboratory course with practical job training for students entering the field of Civil Technology.

P- SURV1001 Civil / Construction Surveying

SURV2003 Introduction to GIS and Geospatial Technology 42.0 Hours

This hands-on laboratory course will provide students with an opportunity to utilize geospatial technology and complete assignments using Geographic Information Systems (GIS) software. Field application using Global Positioning Systems (GPS) will be incorporated and students will manipulate digital maps and various forms of spatial data for civil applications.

P- SURV1003 Civil/Construction Surveying 2

TECR3009 Technical Project: Civil 42.0 Hours

The student demonstrates 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 develops around a specific design and project simulation incorporating all of the learning the student has obtained to date. Students may use experience from their work terms as the basis for this design project and report or they may choose a relevant scenario as approved by faculty.

(P- COMM1016 Communication Essentials or P- COMM1017 Work Environment Communication or P- COMM1014 Media Communication or P- COMM1015 Proposal Writing or P- COMM1019 Virtual Communication or P- COMM1020 Technical Communication or P- COMM1021 Dynamic Presentations or P- COMM1022 The Visual World) and P- MGMT2002 Project Management

**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.*