

# CIVIL ENGINEERING TECHNICIAN - CONSTRUCTION

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## Program Outline

<b>Major:</b>	CVTN
<b>Length:</b>	2 Years
<b>Delivery:</b>	4 Semesters, plus 1 work term
<b>Credential:</b>	Ontario College Diploma, Co-op
<b>Effective:</b>	2012-2013
<b>Location:</b>	Barrie
<b>Start:</b>	Fall (Barrie)

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### Description

This two-year program prepares graduate technicians to work with engineers and construction project managers as part of a team constructing roads, bridges, sewers, water mains, and other infrastructure. Technicians develop information for cost estimation, perform materials testing, and assist in the administration of projects in the field. Teamwork and project-based learning are emphasized.

This program is common with the first four semesters of the Civil Technology program and graduates may choose to continue into the third year of that program.

### Career Opportunities

Graduates find work in the private sector assisting quantity surveyors (estimators), purchasers, site supervisors or project managers, drafters or detailers, using the latest in CAD technology. They may also find employment as assistants in engineering or construction offices. In the public sector, they may find employment in many government agencies or as site inspectors.

### Program Learning Outcomes

The graduate has reliably demonstrated the ability to:

- collect and appropriately apply civil engineering and construction data from existing graphics, reports, and other documents;
- contribute to the collection, processing, and interpretation of technical data related to civil engineering and construction projects;
- communicate information effectively and accurately by interpreting, translating, and producing civil engineering and construction documents;
- complete all work 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 and construction;
- monitor the quality and quantity of work for civil engineering and construction projects;
- contribute to designing, planning, inspecting, and constructing civil engineering and construction projects;
- contribute to the evaluation of equipment, materials, and methods employed in the implementation and completion of civil engineering and construction projects;
- use electronic technology to support civil engineering and construction projects;
- apply the principles of mathematics and science to analyze and solve technical problems related to civil engineering and construction projects;
- maintain civil engineering and construction project records, logs, and inventories;
- contribute to the assessment of the political, social, and environmental impacts of civil engineering and construction projects;
- recognize the interdependence of the architectural, structural, mechanical, and electrical disciplines relating to civil engineering and construction projects;
- facilitate communication among project stakeholders involved in the design and implementation of civil engineering and construction projects;
- develop and use personal and professional strategies and plans to enhance professional growth and competence;
- assist in the preparation of accurate estimates of time, cost, quality and quantity; tenders; and bids for civil engineering and construction projects;
- work in compliance with the theory and the accepted principles and practices of the civil engineering and construction industries;
- contribute to the human resource management of civil engineering and construction projects.

### **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 paid 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/](http://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

Sem 1	Sem 2	Work Term	Sem 3	Sem 4
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Fall	Winter	Summer	Fall	Winter
2012	2013	2013	2013	2014

### **Admission Requirements:**

Applicants must meet ONE of the following requirements to be eligible for admission to this program:

- OSS Curriculum: OSSD or equivalent with Grade 12 English (C) or (U) (ENG4C, ENG4U); plus any Grade 12 College Mathematics (MCT4C or MAP4C), or 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).
- Academic and Career Entrance Certificate (ACE) program with: Communications; Business, Apprentice or Technical Mathematics
- Ontario High School Equivalency Certificate (GED)
- Mature applicant with standing in the required courses and/or mature student testing that meets the minimum standards for admission

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. Each applicant will

be considered on an individual basis and acceptance will be determined by counselling, Communication Placement Assessment (CPA), previous post-secondary education and evaluation of experience. Some programs also have specific prerequisite requirements that must be met prior to admission. Mature applicants must meet all program specific prerequisites. 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.

**Graduation Requirements:**

- 19 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.

**Mandatory Courses**

- CIVL1000 Quantity Surveying: Construction Plans and Measurements
- CIVL2000 Engineering Standards and Practices
- COMP1056 Civil Engineering Graphics
- COMP1057 CAD / Civil Construction
- CONS1003 Construction Practices
- CONS1004 Construction Practices and Design: Materials and Material Testing
- CONS2000 Construction Practices:Methods
- CONS2001 Construction Practices: Building Systems
- CONS2002 Site Development and Drainage
- CONS2003 Construction Practices and Design: Municipal and Provincial Codes and Standards
- CONS2004 Construction Practices and Design: Highways
- ECON2004 Engineering Economy
- ENVR1000 Environmental Science and Sustainability
- MATH1018 Introduction to Technical Mathematics
- MATH1019 Technical Mathematics
- MENG2003 Statics

MENG2007 Strength of Materials  
MGMT2002 Project Management  
SURV1001 Civil / Construction Surveying

#### 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

COOP1028 Civil Engineering Work Term 1

#### **Course Descriptions:**

CIVL1000 Quantity Surveying: Construction Plans and Measurements 42.0 Hours

This course introduces the student blue print reading and measurement techniques. Skills in estimating techniques and industry practices are applied to a small project. Students examine infrastructure projects and the computerized tools used to prepare competitive estimates in the bid tender process. Cost analysis, profit requirements and specific performance issues are discussed.

CIVL2000 Engineering Standards and Practices 42.0 Hours

This course introduces the student to Standards from organizations including but not limited to CSA, (Canadian Standards Association), ASTM, (American Society for Testing and Materials), AASHTO, (American Association of State Highway Transportation Officials), and SCC, (Standards Council of Canada), as well as the professional practice requirements found in the industry today.

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

### 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

### CONS2002 Site Development and Drainage 42.0 Hours

This course focuses on the design and installation of municipal services. The main topics are piping materials, sewer and water main appurtenances, and loads (both structural and hydraulic) on storm and sanitary drainage systems.

### 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.

**ECON2004 Engineering Economy 42.0 Hours**

By understanding the financial constraints and opportunities of the industry, technologists contribute to decision making for capital projects and equipment. The course covers the concepts and techniques for the economic justification of engineering proposals and the economic benefits of capital expenditures.

**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

**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.

**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

**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.

**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.

**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.*