

## PROGRAM INFORMATION

Academic Year	2024 - 2025
Credential	Ontario College Diploma
Program Delivery	Full - Time
Duration	2 Years
Length	4 Semesters
Program Code	T016 (PC) – Timmins Campus

## DESCRIPTION

### Cutting-edge skills for the biggest jobsites.

Similar to the video game Minecraft, the field of civil engineering oversees the design and maintenance of community environments such as roads, bridges, water systems, dams, pipelines, buildings and parks.

Blending lectures and lab work, this two-year diploma will prepare you to carry out technical functions across a broad range of civil engineering fields – including infrastructure construction, resource management and environmental protection.

You'll hone the math and physics skills you'll need for core courses in civil engineering and learn new crucial skills in AutoCAD and surveying. And, with a focus on sustainable design and construction practices, you'll prepare to support large-scale projects of all kinds. You'll study how engineering materials respond to pressure, temperature, and other stresses. You'll learn how fluid mechanics affect everything from clean water and sewer systems design to hydroelectric dams.

### Pathways to Success

Graduates of the Civil Engineering Technician Program may choose to continue their studies and complete an additional year at Confederation College to obtain a diploma in Civil Engineering Technology. Graduates of this program may be eligible to enroll in the Civil Engineering degree program at Lakehead University.

## CAREER OPPORTUNITIES

Northern College graduates can find employment in the following areas: Field and Laboratory Materials Testing, Field Surveying, Construction Estimation, Technical & Municipal Drafting, Road Construction Inspection, Project Management.

- Civil engineering technician
- Employed by consulting engineering and construction companies, public works, transportation, and other government agencies in a variety of industries.

## VOCATIONAL LEARNING OUTCOMES

1. Develop and use strategies to enhance professional growth and ongoing learning in the civil engineering field.
2. Comply with workplace health and safety practices and procedures in accordance with current legislation and regulations.
3. Complete duties and assist in monitoring that work is performed in compliance with contractual obligations, applicable laws, standards, bylaws, codes, and ethical practices in the civil engineering field.
4. Carry out sustainable practices in accordance with contract documents, industry standards and environmental legislative requirements.
5. Collaborate with the project team and communicate effectively with project stakeholders to support civil engineering projects.
6. Collect, process, and interpret technical data to produce written and graphical project-related documents.
7. Use industry-specific electronic and digital technologies to support civil engineering projects.
8. Participate in the design and modeling phase of civil engineering projects by applying engineering concepts, basic technical mathematics, and principles of science to the review and production of project plans.
9. Assist in the scheduling, cost estimation and monitoring of the progression of civil engineering projects by applying principles of construction project management.
10. Perform quality control testing and the monitoring of equipment, materials and methods involved in the implementation and completion of civil engineering projects.
11. Apply teamwork, leadership and interpersonal skills when working individually or within multidisciplinary teams to complete civil engineering projects.

## PROGRAM COURSES

The following reflects the planned course sequence for full-time offerings of the program. Programs at Northern College are delivered using a variety of instruction modes. Courses may be offered in the classroom or lab, entirely online, or in a hybrid mode which combines classroom sessions with virtual learning activities.

<b>Semester 1</b>		<b>Hours</b>
AR1016	Methods and Materials I/Detailing	84
CM1323	Professional Communications	42
GN1033	Health and Safety	42
IN1224	Computer Aided Drafting (CAD) I	56
IT1024	Introduction to Physics	56
MA1100	Mathematics I	56
MI1103	Surveying Principles I	42
 <b>Semester 2</b>		
AR2014	Statics	56
CM2303	Communications for the Workplace	42
CV2004	Municipal Design I	56
EN1016	Engineering Materials and Testing	84
GN1443	Indigenous Culture and Awareness	42
IN2073	CAD II for Civil Engineering	42
MA2104	Mathematics II	56
SU3010	Municipal Engineering	28
 <b>Semester 3</b>		
AR2024	Estimating I	56
CV3012	Highways I	28
CV3013	Municipal Design II	42
	General Education Elective	42
MA3205	Mathematics III with Calculus	70
SU2003	Plane Survey I	42
WE3044	Strength of Materials I	56
 <b>Semester 4</b>		
AR2023	Project Documentation	42
CV4012	Highways II	42
CV4013	Sustainable Practices	42
CV4023	Ontario Building Code for Civil	42
CV4033	Strength of Materials II – Civil	42
	General Education Elective	42
MA6023	Statistics	42
SU1003	GIS	42

## PROGRAM PROGRESSION

The following reflects the planned progression for full-time offerings of the program.

### Fall Intake

Sem 1: Fall 2024

Sem 2: Winter 2025

## WORK INTEGRATED LEARNING OPPORTUNITIES

N/A

## ARTICULATION/TRANSFER AGREEMENTS

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 coordinator for specific details if you are interested in pursuing such an option. Additional information can be found at [Articulation Agreements](#).

## ADDITIONAL INFORMATION

To be completed if applicable or N/A.

## PROGRAM SPECIFIC INFORMATION

[AutoCAD System Requirements](#)

## ADMISSION REQUIREMENTS

- Ontario Secondary School Diploma (OSSD)
- Grade 12 English (C, U)
- Grade 12 Math (C, U) (MCT4C preferred; MAP4C is accepted with a minimum GPA of 60%)
- Grade 12 Physics (C, U) recommended
- Or equivalent

Academic prerequisites for this program may be obtained free of charge through [Academic Upgrading](#). Applicants who do not have a high school diploma or equivalent and will have reached the age of 19 years on or before the start of the program must undergo academic testing and may be required to complete [Prior Learning Assessment & Recognition \(PLAR\)](#) process to demonstrate equivalency of admission requirements prior to admission into a program. For more details, please contact the Admissions Office at 705-235-7222 or [admissions@northern.on.ca](mailto:admissions@northern.on.ca).

### Additional Requirements for International Students

In addition to the general admission requirements, international students must have proof of English Proficiency and meet the requirements below.

1. Proof of Senior High School Diploma/Certificate
2. English Proficiency (we will require one of the following):
  - IELTS Academic International English Language Testing System: minimum overall score of 6.0 must be achieved with no individual band score under 6.0; however, we will accept one band at 5.5.
  - TOEFL (Test of English as a Foreign Language) – Internet Based Test (iBT) overall minimum score of 79
  - PTE (Pearson Test of English) Academic – Graduate Diploma: 58+

If your country of citizenship has English as its official language, we may accept alternate proof of English Proficiency. All educational documents must be submitted in English and will be dependent on the country of citizenship. For more information, please contact [admissions@northern.on.ca](mailto:admissions@northern.on.ca).

## GRADUATION REQUIREMENTS

- 14 Program Courses
- 2 Communications Courses
- 4 General Education Courses

## GRADUATION ELIGIBILITY

To graduate from this program, a student must attain a minimum of 60% or a letter grade of CR (Credit) in each course in each semester unless otherwise stated on the course outline. Students should consult departmental policies and manuals for additional detail and exceptions.

## GRADUATION WINDOW

Students unable to adhere to the program duration of two years (as stated above) may take a maximum of four years to complete their credential. After this time, students must be re-admitted into the program, and follow the curriculum in place at the time of re-admission.

## CONTACT INFORMATION

For questions about being admitted into the program, please contact Northern College Admissions at [admissions@northern.on.ca](mailto:admissions@northern.on.ca) or by phone at 705-235-3211 ext. 7222. For questions about the content of the program, contact the Program Coordinator.

Tina Thibault-Lambert, Program Coordinator  
Tel: 705-235-3211 ext. 2298  
Email: [lambertt@northern.on.ca](mailto:lambertt@northern.on.ca)

## COURSE DESCRIPTIONS

### Semester 1

#### **AR1016 Methods and Materials I/Detailing**

This course describes in detail the materials and construction techniques required for residential construction. Topics include sustainable design, soils and foundations, framing and the building envelope. Various options are discussed for each topic. Students will also use sketching and drafting techniques to complete various construction details.

#### **CM1323 Professional Communications**

In this course, students will learn essential skills for success in college and the workplace. This course focuses on developing and strengthening oral and written communication skills, and critical thinking ability. During this course, students will engage in a variety of forms of communication with a focus on upholding the principles of academic integrity. Students will develop the skills necessary to create discipline-specific documents, practice business etiquette and professionalism, and apply critical thinking strategies to practical scenarios. Upon successful completion of this course, students will be able to plan and draft concise, coherent and well-organized writing assignments that are tailored to specific audiences and purposes.

#### **GN1033 Health and Safety**

This course introduces the student to health and safety in their home, in society and within an occupational setting. Students learn about the social and personal benefits of safe work practices and the methods to best prevent accidents or injuries. Students will review the role, rights, and responsibilities of an individual in today's health and safety conscious world. Students also learn how to read and interpret the Occupational Act and Regulations

#### **IN1224 Computer Aided Drafting (CAD) I**

This is an introductory course designed to teach students the basics of using the AutoCAD drafting software to create 2 dimensional drawings. Lessons include using the draw, modify, layering and annotation commands.

#### **IT1024 Introduction to Physics**

This course is an introductory course into the study of physics. It consists of 6 theory units and a corresponding laboratory component. The topics covered include measurement, motion, forces, work and energy, fluids, and heat. The lab component gives students the opportunity to connect with the acquired theory.

#### **MA1100 Mathematics I**

This course covers basic algebra properties, graphing the straight line, basic geometry and trigonometry, and solving a system of equations graphically and algebraically. It also covers vector addition by components and by the cosine and sine laws.

#### **MI1103 Surveying Principles I**

This course is an introduction to the basic principles of Plane Surveying. The theory and use of theodolites/total stations, steel tapes and levels will be covered. Basic surveying calculations for direction, coordinates and area will be included.

## Semester 2

### **AR2014 Statics**

This is an introduction to engineering statics/mechanics tailored to the needs of Mechanical and Civil students. The major topics include vectors, moments, couples, centroids and moment of inertia. Students will learn how to find the reaction forces at the supports and the internal force in members using the method of joints and the method of sections. Students will also learn how to calculate the centroid and the area moment of inertia for simple shapes and some commercial shapes. Applied statics/mechanics is the basis for all calculations in areas such as stress analysis, machine design, hydraulics and structural design.

### **CV2004 Municipal Design I**

This course introduces students to the two basic tenets of fluid mechanics: hydrostatics and fluid flow. Hydrostatics pertains to the study of fluids at rest and the forces they exert on surfaces or objects they contact. This facet of fluid mechanics equips students to solve problems related to the design of dams, swimming pool walls, air tanks, and various other modern daily necessities. Fluid flow, on the other hand, addresses the behavior of fluids in motion and their interaction with surfaces and objects. Understanding fluid flow aids students in determining pipe sizes for water distribution systems, assessing potential damage from river floods, harnessing rivers for hydroelectric power development, and solving other hydraulic problems. This course also introduces students to the use of Autodesk Civil 3D software for Municipal Design.

### **CM2303 Communications for the Workplace**

In this course, students will develop professional communication skills required for success in the workplace. Students will continue to develop and strengthen their oral and written communication skills and critical thinking abilities. During this course, students will use various modes of communication to complete assignments designed to meet program and professional expectations. Students will utilize a variety of technologies for the purpose of creating a professional presence in a digital environment. Students will develop the necessary skills to create polished workplace documents such as letters, resumes, cover letters and reports tailored to specific audiences. Students will learn to conduct themselves with professionalism in both workplace interviews and job searches. Upon successful completion of this course, students will be able to create clear, concise and coherent workplace and employment documents that are error-free and designed for specific audiences and purposes.

### **EN1016 Engineering Materials and Testing**

This course is primarily a laboratory course in concrete theory and soil mechanics. Ready mixed concrete is the most widely used construction material in the world. It is extremely versatile, strong, and economical in comparison to other materials. It lends itself well to a vast array of applications in construction. In addition, its attributes relative to sustainability are relevant to the entire construction industry. Concrete principles and theory constitute the first portion of this course. The study of soil mechanics is important since soil is the most readily available construction material, and all structures must be supported on soil or rock. The student will learn the theory on which the most common laboratory and field tests are based and perform related tests.

### **GN1443 Indigenous Culture and Awareness**

This general education course will provide students with an introduction to Canadian Indigenous Nations' history, sovereignty, land titles, cultural history and current critical issues. Topics addressed include the content of Indigenous rights, economic and social development, community and political processes, and business law and policies, justice & social services. Canadian Indigenous History and Relations is a general education course that has been incorporated into all programs at Northern College.



## **IN2073 CAD II for Civil Engineering**

In this course, students will engage in a more applied approach to using Computer Drafting software. With a combination of theory and applicable practice, the student will learn the process of preparing Architectural, Civil and Structural Construction Drawings. Lessons will familiarize the students on Design Principles and procedures and prepare them to complete the term project.

## **SU3010 Municipal Engineering**

Municipal Engineering involves the study of Engineering Surveys, Construction Surveys, blueprint reading and the design and construction of municipal infrastructure. Emphasis will be placed on sustainable urban infrastructure design and construction practices.

## **MA2104 Mathematics II**

MA2104 is the second course in the math stream for students in an Engineering Technician / Technology program. The emphasis of this course is on solving equations relating to quadratics, logarithms, exponentials, with sections on factoring, fractional equations, manipulating exponent and radical expressions, and complex numbers, and for some programs studying systems of linear equations and determinants. Applications of the basic concepts, to particular fields of study, will be covered. The second semester Mathematics course is designed to give the student the mathematical tools required to function in his/her special field of study. Students are encouraged to seek help after class hours if problems are encountered in the course. Every effort will be made to identify problem areas to the student, but in the final analysis, it is the responsibility of the student to ask for help. Prerequisite: MA1100 – Mathematics I (with 60%)

## **Semester 3**

### **AR2024 Estimating I**

Students are introduced to proper measurement techniques of construction items and components found in commercial and municipal projects. Emphasis is placed on accuracy of measurement, quantity take-off concept, sound estimating principles, and construction materials. Appropriate software solutions will be applied.

### **CV3012 Highways I**

In this course, the student will learn about the many different concepts related to the design of highways. From sight distances to minimum curve radii; and from superelevation to road classification this course will attempt to encompass the many considerations one must make when designing a highway. Simple highway design will be examined. Civil 3D functionality with respect to highway design will be introduced.

### **CV3013 Municipal Design II**

Municipal Design II is a combination of wastewater collection system design and urban storm design. Sewers are underground conduits that convey wastewater mostly under gravity to the treatment plant. Hydrologic design entails the collection of surface water runoff to safer conduits on to point of discharge. This course will be an interaction of three courses: Biology, Chemistry and Hydraulics. Biochemistry will focus on sources of wastewater contamination and treatment thereafter. Hydraulics will focus on sizing of appropriate pipes to convey the design flow. This course is also to continue to teach students the advance of how to use Autodesk Civil 3D software for Municipal Design as well as introduces the students to the Autodesk Storm and Sanitary Analysis SSA application.



## **WE3044 Strength of Materials I**

This course examines the behaviour of engineering materials under various loading conditions. The concepts of stress and strain are critically examined with emphasis on the application of those concepts to practical design and analysis problems. Topics include direct normal and shear stresses; axial deformation and thermal stress; torsional shear stress and torsional deformation; shearing forces and bending moments in beams; pressure vessel stresses; welded and bolted (riveted) connections.

## **General Education Elective**

General Education Courses are selected online each semester by the student from a list provided and exposes students to a related area of study outside of their immediate academic discipline. Certain programs have predetermined electives.

## **MA3205 Mathematics III with Calculus**

This course covers topics such as: graphs of trigonometric functions, trigonometric identities and equations, the study of analytic geometry including the properties of the circle, the parabola and the ellipse. Students will also be introduced to Calculus. The course expands with the study of the rate of change and the derivative of algebraic functions with applications to graphing, optimization and minimum and maximum problems. Students will also be introduced to integration of algebraic functions with applications to area and centroids.

Prerequisite: MA2014 - Mathematics II

## **SU2003 Plane Survey I**

Plane Survey I is a continuation of Survey Principles. A "hands-on" project-oriented approach is emphasized, wherein survey principles are practiced in the field. Projects will include operating an automatic level to run a level loop and operating a total station to measure the distances and interior angles of a survey traverse. Emphasis will be placed on maintaining proper field notes.

## **Semester 4**

### **AR2023 Project Documentation**

This Project Documentation course has been designed to equip professionals in the construction industry with the essential knowledge and skills required for the effective creation, management, and utilization of project documentation. This course covers various critical aspects, including the process of tendering a construction project, an examination of the documents integral to a standard construction contract, and key elements of project planning and scheduling. Throughout the course, students will gain practical insights into using the National Master Specification NMS, review the stipulated price contract outlined in CCDC2, understand the process of Contract Administration activities, understand Construction Tender procedures, apply Ontario specifications OPSS and OPSD for contract administration, utilize MS Project for creating construction project schedules, and using MS Excel for managing Construction Progress Payments and Project Forecasting. Prerequisites: AR1016 Methods and Materials I/Detailing

### **CV4013 Sustainable Practices**

This course explores sustainable practices within the field of civil engineering. Students will learn about sustainable design and the social, economic and environmental factors affecting it. The course presents practical applications and case studies within the context of the LEED rating system.

## **CV4012 Highways II**

This course is a continuation of Highways I and has an emphasis on the mathematics of road design including the calculation of circular curves, vertical curves, and spiral curves. The student will manually also draft cross sections from field notes in accordance with an approved road design. Finally, time permitting, the student will calculate and lay off a spiral-circular-spiral curve arrangement. Continuation of advanced Civil 3D applications.

## **CV4023 Ontario Building Code for Civil**

This course exposes the students to Part-9 Foundations and Structural Framing, Part-3 Building Classification and Construction, and Part-4 Structural Design with reference to the Ontario Building Code.

## **CV4033 Strength of Materials II – Civil**

This course provides a comprehensive exploration of beam analysis and design. It covers the relationships between bending moment and flexural stress, as well as vertical shear and shear stress in beams. Additionally, the course delves into beams under torsional loading and investigates the concept of combined stresses. Furthermore, this course will examine the general case and special case of combined stress and Mohr's circle and finally the calculation of beam deflections utilizing various methods. Finally, time permitting, we will delve into the area of indeterminate structural analysis.

## **General Education Elective**

General Education Courses are selected online each semester by the student from a list provided and exposes students to a related area of study outside of their immediate academic discipline. Certain programs have predetermined electives.

## **MA6023 Statistics**

This course will cover such topics as: Measures of Central and Dispersion Tendencies; Distributions (Frequency, Probability, Binomial and Normal); Quality Process Control; Correlation and Regression Models and Hypothesis Testing. This course will have applications to various fields in engineering while using Microsoft Excel. Pre-requisites: MA1100 Mathematics I

## **SU1003 GIS**

Gain an understanding of GIS fundamental concepts and terminology including the role of GIS in business, government, surveying, and natural resources. Learn how to create and manipulate data using GIS. Examine the collection, management, analysis and presentation of spatial data, concepts of database systems, data modeling and digital mapping.