

# CIVIL ENGINEERING TECHNOLOGY

## ASSOCIATE OF APPLIED SCIENCE (AAS) - 60 CREDITS

### About this program

Students completing the Civil Engineering Technology program are prepared for employment in the civil engineering field. Civil engineering technicians plan, design and monitor construction and maintain public or private works systems with the collaboration and direction of engineers. They gather preliminary data, plan, budget, survey, design, prepare construction documents and administer contracts to provide safe and convenient facilities including highways, bridges, airports, structures, water treatment and distribution systems, and waste water collection and treatment systems. Opportunities are available with state, county and local government public works departments, as well as consulting engineering firms. Students will learn graphic communication skills, advanced surveying techniques and a variety of skills related to engineering technologies. Students also will be enrolled in general education classes selected to build a foundation for their technical courses. This AAS degree can prepare students to continue their education in a number of baccalaureate programs at four-year institutions.

### Additional information

**Computer Requirements:** To successfully be able to run the Advanced 3D program that this course requires, the minimum hardware specifications for the computers are: Processor Core i7 or equivalent, 4.0 GHz or greater Hard Drive Required: 500GB with at least 128GB free disk space; Recommended: 512 SSD with at least 128GB free RAM Required: 16 GB minimum; CD-RW/DVD Combo Drive Recommended Ethernet Network Required Wireless Network Required USB Flash Drive Strongly Recommended 4GB + (Sold in Campus Bookstores) Additional Information Recommended Graphics: ATI or NVIDIA graphics card Dedicated Graphics RAM 6 GB - not shared, 1,280 x 1,024 or higher screen resolution Internet connection for Autodesk® 360 functionality, web downloads, and Subscription Aware access Adobe® Flash® Player 10 Microsoft® Mouse-compliant pointing device Microsoft® Internet Explorer® 8 or higher Microsoft .NET Framework 4.5 SP1 SD Card Reader

### Program outcomes

1. Prepare civil construction drawings utilizing CAD software.
2. Select appropriate surveying techniques.
3. Demonstrate computer utilization skills.
4. Produce construction, legal and topographic surveys.
5. Calculate material quantities and final cost estimates.
6. Utilize effective communication skills.
7. Exhibit professional behavior as part of a project team.
8. Prepare material testing reports on soils and concrete.
9. Document the process and procedures during on-site construction inspections.
10. Experience on-the-job training in a related field.
11. Demonstrate design criteria for road design.

### Curriculum overview

<b>Crds</b>	<b>Requirement type</b>
51	Required courses
9	Restricted electives in course types
<b>60</b>	<b>Total</b>

**Developmental courses note:** A student may be required to enroll in developmental courses in reading, writing and math. A student's scores on the Accuplacer assessment will determine enrollment in developmental courses. The purpose of developmental courses is to prepare students for the demands of a college-level curriculum. *Credits may vary.*

**Accreditation:** Minnesota State Community and Technical College is accredited by the Higher Learning Commission, a regional accreditation agency recognized by the U.S. Department of Education. More information can be found at [www.minnesota.edu/accreditation](http://www.minnesota.edu/accreditation).

12. Utilize hydrology design skills.

## Curriculum requirement details

### Employment

Employment projections indicate an increase in the employment of civil engineering technicians. Employment opportunities will be found in Federal, State, and local government agencies as well as private firms, the construction, public utilities, and transportation industries. Spurred by population growth and baby boomer retirement, more civil engineer technicians will be needed to design and construct higher capacity transportation, water supply and pollution control systems, and repair or replace existing roads, bridges, and other public structures.

### Required courses

### Other requirements or restricted electives

#### 9 credits from these Course Types:

- General Education w/MnTC Goals

Course	Crds
CADD1000 - AutoCAD Basics .....	3
CIVL1100 - Survey I: Fundamentals of Surveying .....	3
CIVL1119 - Survey II: Land Surveys .....	3
CIVL1138 - CADD II: Plan Layout .....	3
CIVL2209 - Construction Inspection .....	3
CIVL2210 - Road Design .....	3
CIVL2230 - Civil Engineering Technology Internship ...	3
CIVL2234 - Utility Design .....	3
CIVL2238 - CADD III: Project Design .....	3
CIVL2240 - Introduction to Geographic Information Systems .....	3
CIVL2246 - Introduction to Hydrology .....	3
COMM1120 - Introduction to Public Speaking .....	3
CONM2204 - Materials Testing .....	3
ENGL1101 - College Writing .....	3
ENGT1118 - Construction and Manufacturing Math ....	3
ENGT1126 - Engineering Graphics .....	3
ENGT1134 - Office Systems and Equipment .....	3

## Course summaries

**CADD1000 - AutoCAD Basics** ..... (3 credits)

This course provides the fundamentals of computer-aided drafting (CAD) using the latest version of the AutoCAD drafting software. The course develops the CAD skills necessary to design and print complex two-dimensional drawings and sheet sets.

**CIVL1100 - Survey I: Fundamentals of Surveying** ..... (3 credits)

The student will learn the principles of vertical distance measurement, as well as construction staking and the compiling of field notes typical of the civil engineering field. This course will focus on the use of various surveying equipment and procedures including an introduction to global positioning system (GPS) concepts and methods.

**CIVL1119 - Survey II: Land Surveys** ..... (3 credits)

Students will learn civil engineering technology land surveying principles including topographic surveys, utilities, drainage and roadway alignment. This course emphasizes the use of Total Station and Global Positioning Systems (GPS) for collecting data as well as civil engineering software for processing data. Additionally, students will utilize GPS functionality on the Trimble TSC3 data collector and Trimble Business Center software.

**Prerequisites:**

**CIVL1138 - CADD II: Plan Layout** ..... (3 credits)

This course introduces students to industry-specific civil design software. Students will learn concepts relating to civil engineering drawings including topography, site planning, mapping and downloading survey data to create digital terrain models.

**Prerequisites:**

**CIVL2209 - Construction Inspection** ..... (3 credits)

This course involves the study and performance of procedures necessary in the inspection and documentation of general construction of public works projects. Topics include inspector responsibilities, project management and aggregate base, concrete and bituminous inspection.

**Prerequisites:**

**CIVL2210 - Road Design** ..... (3 credits)

The student will complete drawings and computations typical of those used in the design of roadways. These may include control line location maps, topographic drawings, cross sections, plan and profile earthwork computations.

**Prerequisites:**

**CIVL2230 - Civil Engineering Technology Internship** ..... (3 credits)

The civil engineering technology internship provides the student with an opportunity to apply skills and knowledge acquired in prior courses in the occupational setting. Students will develop a plan for the internship with the cooperation of the employer and the instructor.

**Prerequisites:**

**CIVL2234 - Utility Design** ..... (3 credits)

The student will learn principles of sanitary, storm and water system layouts, design and construction. Design criteria and standards, plan and profile principles, cost estimating, construction staking and inspection of the different systems will be emphasized.

**Prerequisites:**

**CIVL2238 - CADD III: Project Design** ..... (3 credits)

This course will focus on the application of civil design computer-aided drafting software for the completion of a project, where students apply principles of civil engineering drawing.

**Prerequisites:**

**CIVL2240 - Introduction to Geographic Information Systems** ..... (3 credits)

This course is an introduction to different types of geographic information systems (GIS) and their capabilities, with the main focus on ESRI ArcMAP software. Topics will include GIS data collection and input, GIS data types and basic mapping concepts.

**CIVL2246 - Introduction to Hydrology** ..... (3 credits)

This course will include introduction to hydraulic principles, hydrology, pipe and open channel flow, watershed analysis and storm water regulations.

**Prerequisites:**

**COMM1120 - Introduction to Public Speaking** ..... (3 credits)

Meets MnTC Goal Area 1. This course clarifies the process of oral communication, clarifies the basic principles of public speaking, and allows the student to increase the application of these principles both while speaking and while listening.

**Prerequisites:**

**CONM2204 - Materials Testing** ..... (3 credits)

This course covers inspection techniques, methods of material measurement, documentation, material sampling and testing methods for soils and concrete.

**ENGL1101 - College Writing** ..... (3 credits)

Meets MnTC Goal Area 1. College Writing is an introductory writing course designed to prepare students for later college and career writing. The course focuses on developing fluency through a process approach, with particular emphasis on revision. Students will consider purpose and audience, read and discuss writing and further develop their own writing processes through successive revisions to produce polished drafts. Course work will include an introduction to argumentative writing, writing from sources and a short research project.

**Prerequisites:**

**ENGT1118 - Construction and Manufacturing Math** ..... (3 credits)  
This course covers the application of common geometric and trigonometric calculations related to the construction and manufacturing industries.

**Prerequisites:**

**ENGT1126 - Engineering Graphics** ..... (3 credits)  
This course introduces and develops basic skills in drawing, lettering, orthographic projection, sections and dimensioning. Students in this course will apply the basic fundamentals of pictorial drawing, including isometric, oblique, perspective, shade and shadow, and freehand sketching.

**ENGT1134 - Office Systems and Equipment** ..... (3 credits)  
This course covers the application of Windows software systems in coordination with AutoCAD software as well as general office equipment set-up and use.



# CIVIL ENGINEERING TECHNOLOGY

## ASSOCIATE OF APPLIED SCIENCE (AAS) - 60 CREDITS

### Program Plan — "Primary"

Locations: Detroit Lakes

#### 1st Fall Term (15 credits)

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##### Courses

Course	Crds
CADD1000 - AutoCAD Basics .....	3
CIVL1100 - Survey I: Fundamentals of Surveying .....	3
ENGT1118 - Construction and Manufacturing Math .....	3
ENGT1126 - Engineering Graphics .....	3
ENGT1134 - Office Systems and Equipment .....	3

#### 1st Spring Term (15 credits)

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##### Courses

Course	Crds
CIVL1119 - Survey II: Land Surveys .....	3
CIVL1138 - CADD II: Plan Layout .....	3
CIVL2209 - Construction Inspection .....	3
CIVL2210 - Road Design .....	3
ENGL1101 - College Writing .....	3

#### 1st Summer Term (3 credits)

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##### Courses

Course	Crds
CIVL2230 - Civil Engineering Technology Internship .....	3

#### 2nd Fall Term (15 credits)

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##### Courses

Course	Crds
CIVL2234 - Utility Design .....	3
CIVL2240 - Introduction to Geographic Information Systems .....	3
COMM1120 - Introduction to Public Speaking .....	3
CONM2204 - Materials Testing .....	3

**3 credits in one or more of the following:**

General Education w/MnTC Goals

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#### 2nd Spring Term (12 credits)

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##### Courses

Course	Crds
CIVL2238 - CADD III: Project Design .....	3
CIVL2246 - Introduction to Hydrology .....	3

**6 credits in one or more of the following:**

General Education w/MnTC Goals

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