# DESIGN AND ENGINEERING TECHNOLOGY

## CERTIFICATE – 30 CREDITS

## About this program

The Design and Engineering Technology program prepares students for employment in a wide variety of engineering-related disciplines. Students are trained across multiple two-dimensional and three-dimensional software platforms to generate drawings of parts, assemblies and layouts, as well as other manufacturing and construction-related documentation specifically required by employers. The curriculum incorporates 3D printing, 3D scanning and rapid prototyping as tools for taking student designs from computer models to three-dimensional solids. Graduates of the program are prepared to enter the workforce as mechanical drafters, designers and engineering technicians.

## Program outcomes

1. Produce and interpret engineering drawings and models using multiple software packages and various design methodologies, including two-dimensional layouts, three-dimensional layouts and designs, and three-dimensional printed solid models.
2. Demonstrate a knowledge of manufacturing processes and materials utilized in modern manufacturing.
3. Effectively communicate in a professional manner graphically, orally and with written communication skills.
4. Function effectively as part of a design team to complete projects while following and maintaining industry standards.
5. Demonstrate knowledge of computer numerical control concepts related to industrial machining, 3D printing and CAD/CAM operations.
6. Perform the math required to communicate and document design concepts.
7. Apply critical thinking concepts to identify and solve design concerns for industry-specific projects.

## Curriculum overview

| Crds | Requirement type |
|---|---|
| 24 | Required courses |
| 6 | Restricted electives in course types |
| 30 | **Total** |

**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. The Higher Learning Commission 230 South LaSalle Street, Suite 7-500 Chicago, IL 60604-1411 http://www.ncahigherlearningcommission.org Phone: 312.263.0456 / 800.621.7440

# Curriculum requirement details

## Required courses

| Course | Crds |
|---|---|
| BLDG1114 - Blueprint Reading I | 2 |
| CADD1000 - AutoCAD Basics | 3 |
| CADD1400 - Introduction to SolidWorks | 3 |
| CADD1410 - Introduction to Autodesk Inventor | 3 |
| DET1104 - Mechanical Drawing I | 4 |
| DET1106 - Mechanical Drawing II | 4 |
| DET1114 - Manufacturing Processes | 2 |
| ENGT1134 - Office Systems and Equipment | 3 |

## Other requirements or restricted electives

**6 credits from these Course Types:**

- General Education w/MnTC Goals

# Course summaries

**BLDG1114 - Blueprint Reading I** ..... ***(2 credits)***
This course provides the student with a working knowledge of blueprints and specifications. The student gains an understanding of blueprints, then interprets and applies this knowledge to job situations.

**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.

**CADD1400 - Introduction to SolidWorks** ..... ***(3 credits)***
This course introduces students to the part modeling and drawing layout tools in Dassault's SolidWorks design software. Students learn the concepts of parametric sketching and modeling, sketched feature creation and editing, placed feature creation and editing, and model-derived drawing layouts.

***Prerequisites:***

- CADD1000
- DET1104

**CADD1410 - Introduction to Autodesk Inventor** ..... ***(3 credits)***
This course introduces students to the part modeling and drawing layout tools in Autodesk's Inventor software. Students learn the concepts of parametric sketching and modeling, sketched feature creation and editing, placed feature creation and editing, and model-derived drawing layouts.

***Prerequisites:***

- CADD1000
- DET1104

**DET1104 - Mechanical Drawing I** ..... ***(4 credits)***
The objective of this course is to develop students' knowledge and use of machine and mechanical drafting, lettering practices, line identity and application, orthographic projection, dimensioning practices, and detail, section and auxiliary drawings.

**DET1106 - Mechanical Drawing II** ..... ***(4 credits)***
The objective of this course is to develop students' use and knowledge of mechanical fasteners and welding symbols and their application on weldment drawings and documentation of basic assemblies and sub-assemblies. Students will also develop an understanding of tolerancing types and rules, including fundamental knowledge of geometric dimensioning and tolerancing symbols, datums and material conditions.

***Prerequisites:***

- CADD1000
- DET1104

**DET1114 - Manufacturing Processes** ..... ***(2 credits)***
This course develops students' understanding of the manufacturing processes utilized for casting, molding, forming, separating and assembling a variety of manufacturing materials.

**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.

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## CERTIFICATE – 30 CREDITS

## Program Plan — "Wadena Certificate"

Locations: Wadena

### 1st Fall Term (14 credits)

#### Courses

| Course | Crds |
|---|---|
| BLDG1114 - Blueprint Reading I | 2 |
| CADD1000 - AutoCAD Basics | 3 |
| DET1104 - Mechanical Drawing I | 4 |
| DET1114 - Manufacturing Processes | 2 |
| ENGT1134 - Office Systems and Equipment | 3 |

### 1st Spring Term (16 credits)

#### Courses

| Course | Crds |
|---|---|
| CADD1400 - Introduction to SolidWorks | 3 |
| CADD1410 - Introduction to Autodesk Inventor | 3 |
| DET1106 - Mechanical Drawing II | 4 |

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

General Education w/MnTC Goals