DESIGN AND ENGINEERING TECHNOLOGY

ASSOCIATE OF APPLIED SCIENCE (AAS) – 60 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- 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 enter the workforce as mechanical drafters, designers and engineering technicians. This degree also allows students to continue their education in a baccalaureate program at participating four-year institutions.

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 graphically, orally and with written communication skills in a professional manner.
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
51	Required courses
9	Restricted electives in course types
60	**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

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Curriculum requirement details

Required courses

Course	Crds
ARCH2248 - CADD Alternatives	3
BLDG1114 - Blueprint Reading I	2
CADD1000 - AutoCAD Basics	3
CADD1400 - Introduction to SolidWorks	3
CADD1410 - Introduction to Autodesk Inventor	3
COMM1120 - Introduction to Public Speaking	3
DET1104 - Mechanical Drawing I	4
DET1106 - Mechanical Drawing II	4
DET1114 - Manufacturing Processes	2
DET2200 - Advanced Modeling with SolidWorks	3
DET2210 - Advanced Modeling with Inventor	3
DET2230 - 3D Printing and Prototyping	2
DET2246 - Tool Design	3
DET2248 - CNC Applications	3
DET2250 - Reverse Engineering Applications	4
ENGL1101 - College Writing	3
ENGT1134 - Office Systems and Equipment	3

Other requirements or restricted electives

9 credits from these Course Types:

- General Education w/MnTC Goals

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Course summaries

ARCH2248 - CADD Alternatives ..... ***(3 credits)***
This course will familiarize the student with computer drafting and modeling software for the graphic design of residential construction.

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 will introduce students to the part modeling and drawing layout tools in Dassault's SolidWorks design software. Students will 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

CADD1410 - Introduction to Autodesk Inventor ..... ***(3 credits)***
This course will introduce students to the part modeling and drawing layout tools in Autodesk's Inventor software. Students will 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

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 while both speaking and listening.

Prerequisites:

- Assessment into ENGL 1101

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.

DET2200 - Advanced Modeling with SolidWorks ..... ***(3 credits)***
This course covers advanced part modeling, assembly modeling, sheet metal, weldments and presentation files in the latest version of the SolidWorks software package.

Prerequisites:

- CADD1400
- DET1106

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DET2210 - Advanced Modeling with Inventor ..... ***(3 credits)***
This course covers advanced part modeling, assembly modeling, sheet metal, frame generator and presentation files in the latest version of the Inventor software package.

Prerequisites:

- CADD1410
- DET1106

DET2230 - 3D Printing and Prototyping ..... ***(2 credits)***
This course covers the basic concepts of 3D printing and rapid prototyping utilizing various three-dimensional printers and scanning equipment.

Prerequisites:

- CADD1410

OR

- ARCH2248

OR

- CADD1400

DET2246 - Tool Design ..... ***(3 credits)***
The objective of this course is to develop an understanding of jigs, fixtures and dies and their function in part production. Students will analyze component pieces, classifications of jigs and fixtures, design criteria and costs associated with building and implementing various types of tooling.

Prerequisites:

- CADD1400
- CADD1410
- DET1106

Corequisites:

- CADD2200
- CADD2210

DET2248 - CNC Applications ..... ***(3 credits)***
The objective of this course is to develop students' knowledge of computer numerical control system components, programming codes for linear and circular interpolation and basic CAD/CAM integration.

Prerequisites:

- CADD1000
- CADD2200
- CADD2210
- DET1114

DET2250 - Reverse Engineering Applications ..... ***(4 credits)***
The objective of this course is for students to develop a set of production drawings of an existing product. Students will be required to reverse engineer the product and create all necessary views, layouts, annotations and instructions required for the product to be manufactured and assembled, while collaborating with a work group similar to those found in industry.

Prerequisites:

- CADD2200
- CADD2210
- DET1106
- DET2246

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ENGL1101 - College Writing ..... ***(3 credits)***
Meets MnTC Goal Area 1. This 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 academic sources and a short research project.

Prerequisites:

- Completion of ELL1080, ENGL0096, or ENGL0097 with a grade of C or higher OR placement into college-level English.

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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Program Plan — "Wadena AAS"

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
COMM1120 - Introduction to Public Speaking	3
DET1106 - Mechanical Drawing II	4

3 credits in one or more of the following:

General Education w/MnTC Goals

2nd Fall Term (15 credits)

Courses

Course	Crds
ARCH2248 - CADD Alternatives	3
DET2200 - Advanced Modeling with SolidWorks	3
DET2210 - Advanced Modeling with Inventor	3
DET2246 - Tool Design	3
ENGL1101 - College Writing	3

2nd Spring Term (15 credits)

Courses

Course	Crds
DET2230 - 3D Printing and Prototyping	2
DET2248 - CNC Applications	3
DET2250 - Reverse Engineering Applications	4

6 credits in one or more of the following:

General Education w/MnTC Goals

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