

Curriculum/Content Area: ATE	Course Length: Term
Course Title: CAD-Computer Aided Design	Date last reviewed: May 8, 2015
Prerequisites: none	Board approval date: June 16, 2015

### Desired Results

**Course description and purpose:** This course will study drafting, visualizing and techniques as well as multiview representation of technical drawings. AutoCAD 2D drafting and 3D modeling Inventor software will be used to create technical drawings. Students will be introduced the engineering design process and careers that relate to the CAD industry.

<p><b>Enduring Understandings (EUs):</b> Students will understand that...</p> <ol style="list-style-type: none"> <li>1. Technical computer generated drawings affect our society.</li> <li>2. Variation in a process and the measurement of its product is unavoidable, these properties are characterized by precision and accuracy.</li> <li>3. 2D and 3D drawings require a systematic approach in order to fully understand their distinct purposes.</li> <li>4. Sketches, drawings, and images are used to record and convey specific types of information depending upon the audience and the purpose of the communication.</li> <li>5. Detail and accuracy affect all avenues of life.</li> <li>6. Technical professionals use a variety of models to represent systems, components, processes and other designs including graphical, computer, physical, and mathematical models.</li> </ol>	<p><b>Essential Questions (EQs):</b></p> <ol style="list-style-type: none"> <li>1. How can technical information be communicated?</li> <li>2. Compare and contrast 2D and 3D computer CAD software?</li> <li>3. When is it best to leverage 2D or 3D software?</li> <li>4. How and why do engineers apply Orthographic projection in their field?</li> <li>5. Why is it important to be precise and accurate with measurements?</li> <li>6. How can technical drawing being applied/interpreted and where can technical drawings be applied in the design field?</li> </ol>
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## Assessment Evidence

Performance assessments: computer generated, technical drawings and sketches	Other assessments: assignments, quizzes
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### Unit One: Sketching and Technical Communication

- A. Line Types
- B. Sketching
- C. Annotations

#### Standards:

##### Wisconsin Technology and Engineering Standards

ENG2.b.1.e: Expressing ideas to others, verbally and through sketches and models, is an important part of the design process.

ENG2.b.2.e: Discuss how models are used to communicate and test design ideas and processes.

ENG4.a.4.m: Demonstrate two-dimensional and three-dimensional representations of the designed solution.

MNF.1.b.2.e: Learn basic methods of verbal, written and graphical communication as it relates to manufacturing.

##### CCSS

CCSS.ELA-Literacy.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

CCSS.ELA-Literacy.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

#### Learning Targets:

I can

- draw a technical sketch
- make proper legible annotation/notation
- implement the different types of technical drawings
- produce a multi-view technical drawing of an object
- delineate difference between the different types of pictorial drawings
- create a pictorial technical drawing of an object

## Unit Two: 2D AutoCAD & 3D Modeling Software

- A. 2D Design Creation
- B. 3D Modeling

### Standards:

#### Wisconsin Technology and Engineering Standards

ENG2.b.3.m: Modeling, testing, evaluating and modifying are used to transform ideas into practical solutions.

ENG2.b.4.h: A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

ENG4.a.4.m: Demonstrate two-dimensional and three-dimensional representations of the designed solution.

ENG4.c.1.e: Discuss the process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many.

ENG5.a.3.e: Recognize and use everyday symbols such as numbers and symbols to communicate key ideas.

ENG5.b.5.m: Use computers, calculators and technology in various applications.

ENG5.b.7.h: Use computers and calculators to access, retrieve organize, process, maintain, interpret and evaluate data and information in order to communicate.

#### CCSS

CCSS.ELA-Literacy.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.

CCSS.ELA-Literacy.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

### Learning Targets:

I can:

- implement functions of 2D and 3D software
- create a multiview technical drawing of an object
- identify the different types of technical pictorial drawings
- create a pictorial technical drawing of an object
- analyze a technical drawing and remedy the error(s)

## Unit Three: Drawing Views

- A. Isometric/Pictorial
- B. Section, Oblique, and Auxiliary

**Standards:**

**Wisconsin Technology and Engineering Standards**

ENG4.a.4.m: Demonstrate two-dimensional and three-dimensional representations of the designed solution.

**CCSS**

CCSS.ELA-Literacy.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  
 CCSS.ELA-Literacy.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

**Learning Targets:**

I can:

- explain the purpose of and design an Auxiliary View
- determine the need for and design a Section view
- evaluate the situation(s) and appropriately design an Assembly Drawing
- implement an Oblique Drawing under necessary situations

**Unit Four: Dimensioning & Precision Measurement**

- A. English System
- B. Metric System
- C. Conventional Measuring Systems

**Standards:**

**Wisconsin Technology and Engineering Standards**

BB1.a.2.e: Identify that systems have parts or components that work together to accomplish a goal.

BB1.b.4.m: Use appropriate tools to measure and layout a piece of material (e.g., length, width, thickness, angles, circles, arcs and volume) within tolerances.

ICT1.a.6.e: Demonstrate that letters, characters, icons and signs are symbols that represent ideas, quantities, elements and operations.

ENG5.b.7.h: Use computers and calculators to access, retrieve organize, process,

maintain, interpret and evaluate data and information in order to communicate.  
MNF1.e.1.e: Explore manufacturing systems that produce products in quantity  
MNF1.e.1.e: Explore manufacturing systems that produce products in quantity  
AC1.b.5.e: Add, subtract, multiply and divide in the Standard Measuring System to the 1/4” and the Metric Measuring System to centimeters.

**CCSS**

CCSS.ELA-Literacy.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  
CCSS.ELA-Literacy.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

**Learning Targets:**

I can...

- measure to the precision of 1/1000 of an inch
- measure to the precision of one millimeter
- make unit conversions between fractions and decimal inches
- recognize the significance of measured values of numbers
- explain why parts have tolerance dimensions

**Unit Five: Assemblies & Working Drawings**

- A. Assemblies
- B. Working Drawings

**Standards [CCSS (Literacy), Next Generation Science, ACT College and Career Readiness, etc.]**

ENG4.a.4.m: Demonstrate two-dimensional and three-dimensional representations of the designed solution  
ENG4.c.1.e: Discuss the process of designing involves presenting some possible solutions in visual form and then selecting the best solution(s) from many.

**CCSS**

CCSS.ELA-Literacy.RST.11-12.4 Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11–12 texts and topics.  
CCSS.ELA-Literacy.WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

**Learning Targets:**

I can...

- model an assembly and its sub-assemblies
- produce a working drawing
- analyze discrepancies in drawing types
- correlate changes made in design drawings