

STRANDS AND STANDARDS

CAD MECHANICAL DESIGN 3



Course Description

The third in a sequence of courses that prepares individuals with an emphasis in developing technical knowledge and skills to develop working drawings in support of mechanical and industrial engineers, and related professionals. This includes instruction in the use of 3D Computer-Aided Design (CAD) software, threads & fasteners, welding symbols, geometric dimensioning & tolerancing, and assemblies.

Core Code	38.01.00.00.053
Concurrent Enrollment Core Code	38.01.00.13.053
Units of Credit	0.5
Intended Grade Level	11-12
Prerequisite	CAD Mechanical Design 2
Skill Certification Test Number	663
Test Weight	0.5
License Type	Secondary Education 6-12
Required Endorsement(s)	T&E Drafting (CAD)

STRAND 1

Students will be able to understand and properly specify the correct type of fasteners.

Standard 1

Define thread terminology.

Standard 2

Identify strengths, weaknesses and differences between different thread forms.

- Unified
- Acme
- Pipe
- Square
- Buttress

Standard 3

Calculate thread pitch.

Standard 4

Develop thread callout notes.

Standard 5

Draw the simplified and schematic thread forms for internal and external type threads.

Standard 6

Specify different types of cap screw and machine screws.

- Head types
- Hardness
- Finish

Standard 7

Identify standard threads sizes and lengths.

Standard 8

Correctly draw, locate, and label fasteners on production, assembly drawings, and parts lists.

STRAND 2

Students will be able to understand and identify basic welding symbols.

Standard 1

Understand, identify and draw basic weld symbols.

Standard 2

Understand and create detail drawings for welded part.

Standard 3

Understand and specify welds on drawings.

- Type
- Size and length
- Finish & contour
- Field welds
- Basic welding processes

STRAND 3

Students will be able to develop and correctly place sectional views and auxiliary views.

Standard 1

Be familiar with and appropriately use section views.

- Full
- Half
- Offset
- Broken out
- Removed
- Revolved

Standard 2

Section lines are evenly spaced and drawn at a 45-degree angle unless a more appropriate angle is justified.

Standard 3

Cutting plane lines, section lines, and break lines are drawn according to the alphabet of lines.

Standard 4

Visible edges, hidden lines, and contours behind the cutting plane are correctly shown.

STRAND 4

Students will be able to demonstrate the ability to create a flat pattern development.

Standard 1

Understand and calculate bend allowance.

Standard 2

Create a flat pattern development of a simple part to be made from sheet metal.

STRAND 5

Students will be able to understand and demonstrate the basics of Geometric Dimensioning and Tolerancing (GD&T).

Standard 1

Know basic GD&T terminology.

Standard 2

Understand, identify, and draw basic GD&T symbols.

Standard 3

Specify position and geometric tolerances.

Standard 4

Draw and place feature control symbols and datum references on a drawing.

- Specify form tolerances, e.g. straightness, flatness, roundness (circularity), cylindricity, profile of a line, and profile of surface.
- Specify orientation tolerances, e.g., angularity, parallelism, perpendicularity, and concentricity.
- Specify positional tolerances in reference to maximum material condition (MMC), regardless of feature size (RFS), and least material condition (LMC).

Standard 5

Specify and apply the tolerance symbols, tolerances and datums on various drawings.

STRAND 6

Students will create assembly and working drawings.

Standard 1

Develop a set of working drawings of six or more parts, of industry assembled parts.

- Draw all necessary views of each part.
- Draw only one part per sheet.
- Dimension parts as per ANSI Y14.5 standards.
- Apply appropriate tolerances.
- Apply necessary notes, material specifications, symbols, and other data.
- Complete a parts list of the parts, which include, parts number, manufacturer’s name, manufacturer’s stock number, material specs, quantity of each part, and notes for assembly.
- Complete an assembly drawing showing the relationship the parts to each other.
- Include title block and border on each production drawing sheet.

Skill Certificate Test Points by Strand

Example table below. Refer to instructions for specifics.

Test Name	Test #	Number of Test Points by Strand						Total Points	Total Questions
		1	2	3	4	5	6		
CAD Mechanical Design 3	663	7	6	14	3	13	3	46	38

Performance Skills

1. Create and maintain a portfolio of exemplary work.

2. Demonstrate practice of the *Technology & Engineering Professional Workplace Skills*.
<https://schools.utah.gov/cte/engineering/resources>
3. Participate in a significant activity that provides each student with an opportunity to render service to others, employ leadership skills, or demonstrate skills they have learned through this course, preferably through participation in a Career & Technical Student Organization (CTSO) such as the Technology Student Association (TSA).