



Western Technical College

10606147 Sketching & AutoCAD Level 2

Course Outcome Summary

Course Information

Description Students will build upon their learn basic knowledge of design intent of a product/process through sketching and other technical communication skills. The course further develops the student's skill in readying engineering drawings including detail, assembly, welding, piping and electrical. Sketching instruction will be enhanced by disassembling, measuring and drawing the parts that make up an assembly. Students continue to build upon the concepts, commands and techniques used to create two-dimensional drawings using AutoCAD software. Further development and improvement of skills through efficient use of the software is emphasized. The AutoCAD topics include draw and modify commands, display and inquiry commands, layering, annotating and symbol creation methods. Paper/model space, view ports and layouts are used for plotting. Development and improvement of skills through efficient use of the software is emphasized.

Career Cluster Science, Technology, Engineering and Mathematics

Instructional Level Associate Degree Courses

Total Credits 2

Total Hours 72

Textbooks

Engineering Graphics Essentials with AutoCAD 2023. Copyright 2023. Plantenberg, Kirstie. Publisher: Schroff Development Corporation. **ISBN-13:** 978-1-63057-519-9. Required.

Course Competencies

1. Obtain information about a drawing using AutoCAD inquiry commands.

Assessment Strategies

1.1. Drawings

1.2. Written Objective Test

Criteria

You will know you are successful when

- 1.1. you use the software to answer questions about an AutoCAD entity and an AutoCAD drawing file.
- 1.2. you use the software to accurately calculate mathematical areas.

Learning Objectives

- 1.a. Calculate the area and perimeter of an object.
- 1.b. Use the ADD and SUBTRACT options in the AREA command.
- 1.c. Use the MEASURE option to define the distance between two points.
- 1.d. Identify the location of a point.
- 1.e. Utilize appropriate commands to obtain information about an entity or drawing file.

2. Interpret threads and fasteners.

Assessment Strategies

- 2.1. Drawings
- 2.2. Written Objective Test

Criteria

You will know you are successful when

- 2.1. you use proper symbology, in accordance to industry standards, to call out and represent threads and fasteners.

Learning Objectives

- 2.a. Define nomenclature associated with common threads and fasteners.
- 2.b. Draw threads, fasteners and holes correctly on mechanical drawings.
- 2.c. Identify and call out the components of a thread note.
- 2.d. Calculate various types of bolt and screw clearance holes.

3. Use tolerance methods.

Assessment Strategies

- 3.1. Drawings
- 3.2. Written Objective Test

Criteria

You will know you are successful when

- 3.1. you specify a tolerance to the accuracy required for the design to work properly.

Learning Objectives

- 3.a. Explain why tolerance standards are necessary.
- 3.b. Utilize various tolerance methods on mechanical drawings.
- 3.c. Define various types of fits.
- 3.d. Calculate minimum and maximum material conditions (MMC and LMC).

4. Interpret electrical drawings and symbology.

Assessment Strategies

- 4.1. Drawings
- 4.2. Written Objective Test

Criteria

You will know you are successful when

- 4.1. you identify electrical engineering drawing symbols.
- 4.2. you can distinguish between the different types of electrical drawings commonly used in industry.

Learning Objectives

- 4.a. Identify the four main types of electronic and electrical drawings.
- 4.b. Identify reference designator letters, numerical values of common electrical components.
- 4.c. Identify elements of an electrical schematic drawing.

- 4.d. Identify graphic symbols used for common electrical components.
- 4.e. Identify elements of wiring or connection drawings.
- 4.f. List and describe the four basic types of printed circuit boards.
- 4.g. Identify logic function symbols.

5. Create symbols for multiple use in an engineering drawing.

Assessment Strategies

- 5.1. Drawings
- 5.2. Written Objective Test

Criteria

You will know you are successful when

- 5.1. you create symbols (BLOCKS) to be used on a drawing.
- 5.2. you save symbols (BLOCKS) to be used on a drawing.
- 5.3. you use the BLOCK EDITOR command to change symbols (BLOCKS) to be used on a drawing.
- 5.4. you utilize AutoCAD tool palettes.

Learning Objectives

- 5.a. Utilize the BLOCK command to create and save symbols.
- 5.b. Insert symbols and libraries into a drawing.
- 5.c. Modify a symbol and update the current block definition to reflect changes.
- 5.d. Copy symbols from one drawing file to another using the appropriate dialogue box.
- 5.e. Use tool palettes effectively including, creating, renaming, deleting them and setting up the desired properties.
- 5.f. Set up tool palettes with symbology used in the drawing.

6. Take apart and reassemble a mechanical assembly (Hand Winch).

Assessment Strategies

- 6.1. Portfolio

Criteria

You will know you are successful when

- 6.1. you can take apart and reassemble the mechanical assembly used for the portfolio.
- 6.2. you complete the assignment which questions the use, materials, manufacturing processes and possible improvements to the assembly.

Learning Objectives

- 6.a. Describe the function of the assembly.
- 6.b. Question the design factors and process involved in the development of the assembly.
- 6.c. Take apart the product using common hand tools.
- 6.d. Put the assembly back together upon completion of analysis.

7. Obtain dimensions of the parts that make up the assembly using measuring instruments.

Assessment Strategies

- 7.1. Portfolio

Criteria

You will know you are successful when

- 7.1. you obtain accurate measurements of the various parts in the assembly demonstrated through hand sketches.

Learning Objectives

- 7.a. Identify various measuring instruments (scale, micrometer, caliper).
- 7.b. Use measuring instruments to read dimensions of the components parts.

8. Sketch the component parts in the assembly.

Assessment Strategies

- 8.1. Portfolio

Criteria

You will know you are successful when

- 8.1. you produce engineering sketches of parts and assemblies, utilizing proper drafting techniques and adhering to ANSI ASME Y14 standard drafting regulations.
- 8.2. you complete a portfolio of the project containing all sketches, class notes, questionnaire, self assessment.

Learning Objectives

- 8.a. Explain the views and/or type of drawing which best illustrates the components which make up the assembly.
- 8.b. Draw necessary views to fully describe the components which make up the assembly.
- 8.c. Add dimensions and annotation to the drawings adhering to industry standards.

9. Create 2D working drawings utilizing sketching and AutoCAD skills and techniques.

Assessment Strategies

- 9.1. Drawings
- 9.2. Written Objective Test

Criteria

You will know you are successful when

- 9.1. you produce engineering sketches of parts and assemblies, utilizing proper drafting techniques and adhering to ANSI ASME Y14 standard drafting regulations.
- 9.2. you produce CAD drawings of parts and assemblies, utilizing proper drafting and CAD techniques and adhering to ANSI ASME Y14 standard drafting regulations.

Learning Objectives

- 9.a. Examine and use the terminology related to working drawings, i.e. detail drawings and assembly drawings. etc.
- 9.b. Create an assembly drawing from part files.
- 9.c. Describe the function of an item list or bill of material (BOM) in an assembly drawing.
- 9.d. Explain when and where exploded assembly drawings are used.
- 9.e. Utilize CAD commands and sketching techniques to produce the necessary views to describe the part to be manufactured.
- 9.f. Utilize CAD commands and sketching techniques to add the dimensions and specifications required to manufacture the part.
- 9.g. Utilize CAD commands and sketching techniques to produce a bill of material list.
- 9.h. Apply visible or hidden attributes to blocks.
- 9.i. Edit attributes defined for existing blocks.
- 9.j. Extract attributes into an AutoCAD table and place it on the drawing.