![Western Technical College logo]

Western Technical College

10606137 Sketching & AutoCAD Level 1

Course Outcome Summary

Course Information

Description	Autodesk AutoCAD is a powerful tool for manufacturing, architecture, and construction. Learn how to effectively leverage this diverse software! Topics include navigating the user interface, command bar and ViewCube, managing .dwg files, drawing and modifying objects, drawing with accuracy, reusing content, generating drawings and other output, along with many productivity tips for future engineers of any discipline. Although the focus is on developing technical drawing skills for mechanical engineering, upon completion of this course you will be able to confidently use AutoCAD for architecture, construction, landscaping, manufacturing, engineering, or product design.
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.

Learner Supplies

One 1" three-ring binder. **Vendor:** To be discussed in class. Required.

Course Competencies

1. **Develop basic sketching skills for a mechanical drawing.**

Assessment Strategies
1.1.   Drawing
1.2.   Written Objective Test

Criteria

You will know you are successful when

1.1.   you produce engineering drawings utilizing proper drafting techniques.
1.2.   you accurately describe an object's geometry.
1.3.   your dimensioned drawings are in accordance with ANSI ASME Y14 standard drafting regulations.

Learning Objectives
1.a.   Define and use full, half, quarter english scales, metric scales, architectural scales, and engineering scales.
1.b.   Identify and produce basic line types.
1.c.   Use proper lettering techniques.
1.d.   Draw basic geometric shapes utilizing geometric construction techniques.
1.e.   Use proper symbology on a sketch.
1.f.   Develop proper sketching techniques to convey neatness, knowledge, and an orderly disciplined mind.
1.g.   Develop an understanding of orthographic projection principles.
1.h.   Apply orthographic projection principles in the creation of an engineering sketch.
1.i.   Describe the purpose and function of an isometric drawing.
1.j.   Develop the ability to produce an isometric sketch.
1.k.   Describe the purpose and function of a section view drawing.
1.l.   Develop the ability to produce a section view drawing.
1.m.   Describe the purpose and function of an auxiliary view drawing.
1.n.   Develop the ability to produce an auxiliary view drawing.
1.o.   Apply all size and location dimensions to a sketch.
1.p.   Demonstrate knowledge of various dimensioning practices (datum, point to point, etc.).
1.q.   Define and differentiate types of limits or tolerances applied to dimensions.
1.r.   Define and differentiate types of fits and allowances applied to dimensioned parts.

2.   Evaluate various types of mechanical drawing symbology.

Assessment Strategies
2.1.   Drawings
2.2.   Written Objective Test

Criteria

You will know you are successful when

2.1.   you identify engineering drawing symbols.
2.2.   you identify how the engineering drawing symbols are interrelated.

Learning Objectives
2.a.   Identify the basic surface finish symbols.
2.b.   Define the term datum and identify datum surfaces on engineering drawings.
2.c.   Identify geometric dimension and tolerancing symbols.
2.d.   Identify welding symbols.

3.   Explore the current release of software.

Assessment Strategies
3.1.   Drawing
3.2.   Written Objective Test

Criteria

You will know you are successful when

3.1.   you distinguish the various components of the Graphical User Interface utilized in the software and the operating system.
3.2.   you manipulate the software to produce a drawing.

Learning Objectives

3.a.   Describe the screen layout and user interface.
3.b.   Interact with the screen using menu structure, toolbars, dialogue boxes, tool pallettes, windows, and keyboard.
3.c.   Select and follow appropriate commands to perform specific tasks.
3.d.   Assess information from the info center and help menu.
3.e.   Use commands to begin, edit, save, and file drawings correctly.

4.   Create 2D part geometry using basic applications of AutoCAD.

Assessment Strategies

4.1.   Drawings
4.2.   Written Objective Test

Criteria

You will know you are successful when

4.1.   you turn in hard copy plots of selected drawings which convey proper drafting technique and adhere to industry standards i.e. proper views, size/location dimensions, feature representation, etc.

Learning Objectives

4.a.   Set up a drawing with the proper units, drafting settings, limits, etc. to achieve desired results.
4.b.   Locate points utilizing various methods including coordinate entry, direct distance, screen cursor, etc.
4.c.   Manipulate basic drawing operations to create desired shapes.
4.d.   Use drawing aids and tools to create precision drawings (OBJECT SNAP).
4.e.   Use the software tools to speed up point specification (DYNAMIC INPUT).
4.f.   Use the software tools to locate points relative to other points in a drawing (TRACKING).

5.   Modify 2D part geometry using basic applications of AutoCAD.

Assessment Strategies

5.1.   Drawings
5.2.   Written Objective Test

Criteria

You will know you are successful when

5.1.   you turn in hard copy plots of selected drawings which convey proper drafting technique and adhere to industry standards i.e. proper views, size/location dimensions, feature representation, etc.

Learning Objectives

5.a.   Activate object selection modes to select entities for editing.
5.b.   Operate the modify and edit commands to create and change drawings.
5.c.   Utilize automatic editing features available in the software (GRIPS).

6.   Organize drawings using layers.

Assessment Strategies

6.1.   Drawings
6.2.   Written Objective Test

Criteria

You will know you are successful when

6.1.   you create organized CAD files using layers.

Learning Objectives

6.a.   Create, modify, copy, and delete layers utilizing the appropriate dialogue boxes.
6.b.   Utilize layers, linetypes, color, and lineweights in a drawing.
6.c.   Manipulate display and plots by turning layers on/off, freeze/thaw, locking, etc.
6.d.   Change the properties of an entity.

7.   View drawings using different drawing displays.

Assessment Strategies

7.1.   Written Objective Test
7.2.   Drawing

Criteria

You will know you are successful when

7.1.   you manipulate display commands in CAD to view and work on drawings.

Learning Objectives

7.a.   Utilize the Zoom options to effectively view the drawing.
7.b.   Use the Pan command for movement about your drawing.
7.c.   Utilize viewports in conjunction with annotative dimensioning styles.

8.   Add annotation to an engineering drawing.

Assessment Strategies

8.1.   Drawings
8.2.   Written Objective Test

Criteria

You will know you are successful when

8.1.   you add annotation (i.e. notes, specifications, and bill of material) to a drawing in accordance with industry standards.
8.2.   you produce a drawing that conveys information whereby a part could be manufactured.

Learning Objectives

8.a.   Add text to a drawing.
8.b.   Change text using appropriate commands and/or dialogue boxes.
8.c.   Create, modify, copy, and delete text styles in a drawing.
8.d.   Utilize the ANNOTATIVE options to achieve proper text sizes in viewports.
8.e.   Use the table creation command.

9.   Perform dimensioning using proper commands.

Assessment Strategies

9.1.   Drawings
9.2.   Written Objective Test

Criteria

You will know you are successful when

9.1.   you add dimensions to a drawing in accordance with industry standards.
9.2.   you utilize annotative dimensioning styles within viewports, with different scale factors, to maintain the same dimension sizes.
9.3.   you produce a drawing that conveys information whereby a part could be manufactured.

Learning Objectives

9.a.   Interpret and use ANSI Y14.5 drafting standards and symbology on all drawing assignments.
9.b.   Add numerical values to drawings utilizing the dimensioning commands.
9.c.   Use the BASELINE and CONTINUE dimensioning options where applicable.
9.d.   Utilize the MULTILEADER command to place local notes on a drawing.
9.e.   Adhere to ANSI/ASME Y14 standards.
9.f.   Use the proper character codes to display symbols with dimensioning text. (MULTILINE TEXT OPTION)
9.g.   Use ANNOTATIVE dimensioning, utilizing the layouts and viewports, for proper dimension size.
9.h.   Edit dimension placement using GRIPS and appropriate commands.
9.i.   Edit dimension text and appearance on a drawing using the properties window and other appropriate commands.
9.j.   Create, modify, and copy dimension styles.

10.   Add section patterns to an engineering drawing.

Assessment Strategies

10.1.   Drawings
10.2.   Written Objective Test

Criteria

You will know you are successful when

10.1.   you can add hatch patterns to a section view on a drawing.
10.2.   you identify and manipulate hatch patterns for desired effects.

Learning Objectives

10.a.   Acquaint self with the hatch patterns available in the software.
10.b.   Add hatch patterns to selected area utilizing the pick point or select object methods.
10.c.   Set the proper scale factor for hatch patterns.

11.   Produce plots using layouts and viewports.

Assessment Strategies

11.1.   Drawings
11.2.   Written Objective Test

Criteria

You will know you are successful when

11.1.   you create and manipulate multiple viewports for desired results.
11.2.   you create drawings containing title blocks and viewports plotted at various scales.

Learning Objectives

11.a.   Set up layouts using titleblocks and viewports.
11.b.   Differentiate between paper/model space.
11.c.   Apply appropriate scale and visibility to the viewport.
11.d.   Use dimension styles and proper techniques to dimension and annotate a drawing in paper/model space.
11.e.   Produce hard copy plots with multiple viewports at various scale factors.

12.   Operate output devices.

Assessment Strategies

12.1.   Drawings

Criteria

You will know you are successful when

12.1.   you provide a scaled, hard copy of a finished drawing to the instructor.

Learning Objectives

12.a.   Set the proper parameters in the print dialogue box to obtain proper results.
12.b.   Set up and operate the printer/plotter.
12.c.   Print scaled, hard copies of drawing assignments.