Effective Date: 2010

Hamburg Area School District

Name of Course: Computer Aided Drafting 1
Department: Industrial Technology and Engineering

Grade Level: 9-12
Instructional Time: 180 days
Length of Course: 30 cycles
Period Per Cycle: 6
Length of Period: 43 minutes

Texts and Resources:

Engineering Drawing and Design
Harnessing AutoCAD 2010
Using AutoCAD 2010
Mechanical Drawing – CAD Communications
Drafting and Design
Introducing AutoCAD 2010
AutoCAD and its Applications: Basics
AutoCAD and its Applications: Advanced
autodesk.com
afsonl.com
thebluebook.com
builderonline.com

Assessments:

Individual Projects
Group Projects
Chapter Questions
Tests and Quizzes
Self Evaluations
Rubrics
Demonstrations
Notebooks
Course Name: Computer Aided Drafting 1  
Unit: Introduction to Drafting  
Time Line: 3 cycles

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<th>Essential Content/ Essential Questions</th>
<th>Performance Objectives</th>
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<tr>
<td>What career opportunities are available in drafting?</td>
<td>• Identify various career opportunities related to drafting</td>
<td>3.4.10.A1.</td>
</tr>
</tbody>
</table>
| What history of drafting?              | • Identify different architectural styles  
• Differentiate between the main characteristics of architectural styles  
• Identify the historical influences that help shape structural designs  
• Recognize the historical impact on architectural designs | 3.4.10.B3.  
| What equipment is used in hand drafting? | • Identify and explain the use for the following equipment:  
• Pencil, eraser, erasing shield, drawing board, t-square, protractor, scale, dividers, compass, lettering guide, irregular curves, templates  
• Recognize the impact CAD has on the drafting profession | 3.4.10.B4.      |
### Course Plan

**Computer Aided Drafting 1**

**Unit: Drafting Fundamentals**

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</table>
| What are the fundamentals of sketching? | - Accurately sketch lines, circles, arcs, and other geometric shapes  
- Recognize and produce multi-view sketches  
- Recognize and sketch isometric drawings  
- Utilize the block technique to produce sketches | 3.4.10.B4.  
3.4.10.E4  
3.4.12.E4 |
| How are lines and lettering used in drafting? | - Identify lines found on a given industry drawing  
- Draw ASME standard lines using manual drafting and computer-aided drafting  
- Solve engineering problems using manual and computer-aided drafting  
- Use lettering equipment to produce freehand letters  
- Use a CADD system to create text | 3.4.10.B4.  
3.4.10.E4  
3.4.12.E4 |
| What is geometric construction? | - Draw parallel and perpendicular lines  
- Construct bisectors and divides lines and spaces into equal parts  
- Accurately draw polygons, tangencies, and ellipses  
- Solve an engineering problem by making a formal drawing with geometric constructions from an engineer’s sketch or layout | 3.4.10.B4.  
3.4.10.E4  
3.4.12.E4 |
### Course Name: Computer Aided Drafting 1
#### Unit: Introduction to AutoCAD

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<th>Essential Content/ Essential Questions</th>
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<tbody>
<tr>
<td>What is Computer Aided Drafting?</td>
<td>• Define computer-aided design and drafting.</td>
<td>3.4.10.B4.</td>
</tr>
<tr>
<td></td>
<td>• Describe typical AutoCAD applications.</td>
<td>3.4.10.E4</td>
</tr>
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<td>• Explain the value of planning your work and system management.</td>
<td>3.4.12.E4</td>
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<td>• Describe the purpose and importance of drawing standards.</td>
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<td>• Demonstrate how to start and exit AutoCAD.</td>
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<td>• Describe the AutoCAD interface.</td>
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<td></td>
<td>• Use a variety of methods to select AutoCAD tools.</td>
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<td></td>
<td>• Use the features found in the AutoCAD Help window.</td>
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</tr>
<tr>
<td>How are templates and drawings created?</td>
<td>• Start a new drawing.</td>
<td>3.4.10.E4</td>
</tr>
<tr>
<td></td>
<td>• Save your work.</td>
<td>3.4.12.E4</td>
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<tr>
<td></td>
<td>• Close files.</td>
<td></td>
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<tr>
<td></td>
<td>• Open saved files.</td>
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<td></td>
<td>• Work with multiple open documents.</td>
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<td>• Create drawing templates.</td>
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<td>• Determine and specify drawing units and limits.</td>
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</tbody>
</table>
**Essential Content/ Essential Questions** | **Performance Objectives** | **Standards/Anchors**
---|---|---
How are drawings edited in AutoCAD? | • Use appropriate values when responding to prompts.  
• Describe the Cartesian coordinate system.  
• Determine and specify drawing snap and grid.  
• Draw given objects using the **LINE** tool.  
• Describe and use several point entry methods.  
• Demonstrate an ability to use dynamic input and the command line.  
• Use direct distance entry with polar tracking and **Ortho** mode.  
• Revise objects using the **ERASE** tool.  
• Create selection sets using various selection options.  
• Use the **UNDO**, **U**, **REDO**, and **OOPS** tools appropriately. | 3.4.10.E4  
3.4.12.E4

What are basic object tools? | • Draw circles using the **CIRCLE** tool options.  
• Draw arcs using the **ARC** tool options.  
• Use the **ELLIPSE** tool to draw ellipses and elliptical arcs.  
• Use the **PLINE** tool to draw polylines.  
• Draw polygons using the **POLYGON** tool.  
• Draw rectangles using the **RECTANGLE** tool options.  
• Draw donuts and filled circles using the **DONUT** tool.  
• Draw true spline curves using the **SPLINE** tool. | 3.4.10.E4  
3.4.12.E4
Hamburg Area School District  
Course Plan  
Computer Aided Drafting 1

Course Name: Computer Aided Drafting 1  
Unit: Introduction to AutoCAD  
Time Line: 14 cycles

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| How do I use line standards, layers, and basic plotting? | • Describe basic line conventions.  
• Create and manage layers.  
• Draw objects on separate layers.  
• Use DesignCenter to copy layers and linetypes between drawings.  
• Print and plot your drawings. | 3.4.10.E4  
3.4.12.E4 |
| What tools are available to modify the view of a drawing? | • Increase and decrease the displayed size of objects.  
• Adjust the display window to view other portions of a drawing.  
• Use SteeringWheels for 2D applications.  
• Use transparent display tools and control display order.  
• Create named views that can be recalled instantly.  
• Create multiple viewports in the drawing window.  
• Explain the difference between redrawing and regenerating the display.  
• Use the Clean Screen tool. | 3.4.10.E4  
3.4.12.E4 |
| How do object snaps and autotrack make drawing easier? | • Set running object snap modes for continuous use.  
• Use object snap overrides for single point selections.  
• Select appropriate object snaps for various drawing tasks.  
• Use AutoSnap features to speed up point specifications.  
• Use AutoTrack to locate points relative to other points in a drawing. | 3.4.10.E4  
3.4.12.E4 |
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<tr>
<td>How are the construction tools used to create multiview drawings?</td>
<td>• Use the <strong>OFFSET</strong> tool to draw parallel objects.</td>
<td>3.4.10.E4</td>
</tr>
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<td></td>
<td>• Place construction points.</td>
<td>3.4.12.E4</td>
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<tr>
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<td>• Mark points on objects at equal lengths using the <strong>DIVIDE</strong> tool.</td>
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<td></td>
<td>• Mark points on objects at designated increments using the <strong>MEASURE</strong> tool.</td>
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<td>• Create construction lines using the <strong>XLINE</strong> and <strong>RAY</strong> tools.</td>
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<td>• Create orthographic multiview drawings.</td>
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<tr>
<td>How is text added to AutoCAD drawings?</td>
<td>• Describe and use proper text standards.</td>
<td>3.4.10.E4</td>
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<td>• Calculate drawing scale and text height.</td>
<td>3.4.12.E4</td>
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<td>• Develop and use text styles.</td>
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<td>• Use the <strong>MTEXT</strong> tool to create multiline text objects.</td>
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<td>• Use the <strong>TEXT</strong> tool to create single-line text.</td>
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<td>• Insert and use fields.</td>
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<td></td>
<td>• Check your spelling.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Edit existing text.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Search for and replace text automatically.</td>
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</tr>
<tr>
<td>How are tables used in AutoCAD?</td>
<td>• Create and modify table styles.</td>
<td>3.4.10.E4</td>
</tr>
<tr>
<td></td>
<td>• Insert tables into a drawing.</td>
<td>3.4.12.E4</td>
</tr>
<tr>
<td></td>
<td>• Edit tables.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Insert formulas into table cells to perform calculations on numeric data.</td>
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</table>
## Essential Content/ Essential Questions

### What are basic object editing tools?
- Use the **FILLET** tool to draw fillets, rounds, and other rounded corners.
- Place chamfers and angled corners with the **CHAMFER** tool.
- Separate objects using the **BREAK** tool and combine objects using the **JOIN** tool.
- Use the **TRIM** and **EXTEND** tools to edit objects.
- Modify objects using the **STRETCH** and **LENGTHEN** tools.
- Change the size of objects using the **SCALE** tool.
- Use the **EXPLODE** tool.

### What are the polylines and spline editing tools?
- Edit polylines with the **PEDIT** tool.
- Create polyline boundaries.
- Edit splines with the **SPLINEDIT** tool.
- Convert polylines and splines.

### How are objects arranged and patterned?
- Relocate objects using the **MOVE** tool.
- Change the angular positions of objects using the **ROTATE** tool.
- Use the **ALIGN** tool to simultaneously move and rotate objects.
- Make copies of objects using the **COPY** tool.
- Draw mirror images of objects using the **MIRROR** tool.
- Use the **REVERSE** tool.
- Create patterns of objects using the **ARRAY** tool.

### Standards/Anchors

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<tr>
<td>3.4.10.E4</td>
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<td>3.4.12.E4</td>
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# Hamburg Area School District
## Course Plan
### Computer Aided Drafting 1
#### Unit: Introduction to AutoCAD

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| What are the grips, properties, and quick select tools? | - Use grips to stretch, move, rotate, scale, mirror, and copy objects.  
- Adjust object properties using the **Quick Properties** panel and the **Properties** palette.  
- Use the **MATCHPROP** tool to match object properties.  
- Edit between drawings.  
- Create selection sets using the **Quick Select** dialog box. | 3.4.10.E4  
3.4.12.E4 |

| How does one obtain information on a drawing? | - Use grips to stretch, move, rotate, scale, mirror, and copy objects.  
- Adjust object properties using the **Quick Properties** panel and the **Properties** palette.  
- Use the **MATCHPROP** tool to match object properties.  
- Edit between drawings.  
- Create selection sets using the **Quick Select** dialog box. | 3.4.10.E4  
3.4.12.E4 |
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| What are the basics of multi-view drawings?                                | • Prepare single and multi-view drawings  
• Select appropriate views for presentation  
• Draw view enlargements  
• Establish run outs  
• Explain the difference between first and third angle projections  
• Prepare formal multi-view drawings from an engineer’s sketch and actual industry layouts | 3.4.10.E4  
3.4.12.E4 |
| What is dimensioning and tolerancing?                                     | • Describe common dimension standards and practices.  
• Create dimension styles.  
• Manage dimension styles.  
• Set a dimension style current. | 3.4.10.E4  
3.4.12.E4 |
| What is angular and linear dimensioning?                                  | • Describe common dimension standards and practices.  
• Create dimension styles.  
• Manage dimension styles.  
• Set a dimension style current. | 3.4.10.E4  
3.4.12.E4 |
## Essential Content/ Essential Questions

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<tr>
<td>What are additional dimensioning tools?</td>
<td>• Describe common dimension standards and practices.</td>
<td>3.4.10.E4</td>
</tr>
<tr>
<td></td>
<td>• Create dimension styles.</td>
<td>3.4.12.E4</td>
</tr>
<tr>
<td></td>
<td>• Manage dimension styles.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Set a dimension style current.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Define and use dimensioning and tolerancing terminology.</td>
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</tr>
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<td></td>
<td>• Set the precision for dimensions and tolerances.</td>
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<td></td>
<td>• Set up the primary units for use with inch or metric dimensions.</td>
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<td>• Create and use dimension styles with various tolerance settings.</td>
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<td>• Explain the purpose of geometric dimensioning and tolerancing (GD&amp;T).</td>
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</table>

<p>| How are dimensions edited?                            | • Define and use dimensioning and tolerancing terminology.                            | 3.4.10.E4              |
|                                                      | • Set the precision for dimensions and tolerances.                                    | 3.4.12.E4              |
|                                                      | • Set up the primary units for use with inch or metric dimensions.                   |                        |
|                                                      | • Create and use dimension styles with various tolerance settings.                   |                        |
|                                                      | • Explain the purpose of geometric dimensioning and tolerancing (GD&amp;T).                |                        |</p>
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| How are sections, revolutions, and conventional breaks used in drafting? | - Draw proper cutting-plane line representations  
- Draw sectional views, including full, half, aligned, broken-out, auxiliary, revolved, and removed sections  
- Identify features that should remain unsectioned in a sectional view  
- Prepare drawings with conventional revolutions and conventional breaks.  
- Modify the standard sectioning techniques as applied to specific situation  
- Identify sectioning techniques.  
- Add graphic patterns using the HATCH tool.  
- Insert hatch patterns into drawings using DesignCenter and tool palettes.  
- Edit existing hatch patterns with the HATCHEDIT tool and grips. | 3.4.10.E4  
3.4.12.E4 |
| Why are auxiliary views used in drafting? | - Describe the purpose of an auxiliary view  
- Explain how an auxiliary view is projected  
- Discuss and draw viewing-plane lines related to auxiliary views  
- Draw primary and secondary auxiliary views along with the related multi-views from given engineering problems | 3.4.10.E4  
3.4.12.E4 |
## Hamburg Area School District
### Course Plan
#### Computer Aided Drafting 1

**Course Name:** Computer Aided Drafting 1  
**Unit:** Advanced AutoCAD Features  
**Time Line:** 4 cycles

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</table>
| What is parametric drafting?           | • Explain parametric drafting processes and applications.  
                                         | • Create and edit parametric drawings.  
                                         | • Add and manage geometric constraints.  
                                         | • Add and manage dimensional constraints.  
                                         | • Convert dimensional constraints.       | 3.4.10.E4  
                                         |                                           | 3.4.12.E4 |
| What are basic pictorial drawings?     | • Describe the three basic types of pictorial drawings.  
                                         | • Construct accurate isometric drawings.  
                                         | • Dimension isometric drawings.          | 3.4.10.E4  
                                         |                                           | 3.4.12.E4 |
| What are standard blocks?              | • Create and save blocks.  
                                         | • Insert blocks into a drawing.  
                                         | • Edit a block and update the block in a drawing.  
                                         | • Create blocks as drawing files.  
                                         | • Construct and use a symbol library of blocks.  
                                         | • Purge unused items from a drawing.      | 3.4.10.E4  
                                         |                                           | 3.4.12.E4 |
| What are block attributes?             | • Define attributes.  
                                         | • Create and insert blocks that contain attributes.  
                                         | • Edit attribute values and definitions in existing blocks.  
                                         | • Create title blocks, revision blocks, and parts lists with attributes.  
                                         | • Display attribute values in fields.      | 3.4.10.E4  
                                         |                                           | 3.4.12.E4 |