Hamburg Area School District

Name of Course: Computer Aided Drafting 2
Department: Industrial Technology and Engineering

Grade Level: 10-12
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

Assessments:
- Individual Projects
- Group Projects
- Chapter Questions
- Tests and Quizzes
- Self Evaluations
- Rubrics
- Demonstrations
## Course Plan

### Computer Aided Drafting 2

**Course Name:** Computer Aided Drafting 2  
**Unit:** CAD Basics Review  
**Time Line:** 4 cycles

<table>
<thead>
<tr>
<th>Essential Content/ Essential Questions</th>
<th>Performance Objectives</th>
<th>Standards/Anchors</th>
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</thead>
</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.C1. |
| 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. |
| 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. |
| 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 |
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| What are the basic concepts of three dimensional modeling? | • Describe how to locate points in 3D space  
• Describe and utilize the right-hand rule of 3D visualization  
• Explain the function of the ribbon  
• Display 3D objects from preset isometric viewpoints  
• Display 3D objects from any desired viewpoint  
• Edit a current visual style | 3.4.10.E4  
3.4.12.E4  
3.4.10.C1. |
| How are primitives and composites created? | • Construct 3D solid primitives  
• Explain the dynamic feedback presented when constructing solid primitives  
• Create complex solids using the UNION command  
• Remove portions of a solid using the SUBTRACT command  
• Create a new solid from the interference volume between two solids  
• Create regions | 3.4.10.E4  
3.4.12.E4  
3.4.10.C1. |
| What are the basics of mesh modeling? | • Explain tessellation division and values  
• Create mesh primitives  
• Create a smoothed mesh object  
• Create a refined mesh object  
• Construct mesh forms  
• Generate a mesh by converting a solid  
• Generate a mesh by converting a surface  
• Generate a surface by converting a mesh  
• Generate a solid by converting a mesh  
• Execute editing on mesh objects  
• Create a split face on a mesh  
• Produce an extruded mesh face  
• Apply a crease to mesh subobjects | 3.4.10.E4  
3.4.12.E4 |
## Essential Content/ Essential Questions

How are 3D models viewed and displayed?

## Performance Objectives

- Use the view cube to dynamically rotate the view of the model in 3D space
- Use the view cube to display orthographic plan views of all sides on the model
- Use steering wheels to display a 3D model from any angle
- Use the visual style options to create face and edge style display variations
- Render a 3D model

## Standards/Anchors

3.4.10.E4
3.4.12.E4
# Hamburg Area School District
## Course Plan
### Computer Aided Drafting 2
#### Unit: Essentials of 3D Drafting

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| How is show motion used to view a model? | • Explain the use of the show motion tool  
• Create still shots of 3D models  
• Create cinematic shots of 3D models  
• Replay single shots and a sequence of shots  
• Change the properties of a shot | 3.4.10.E4  
3.4.12.E4 |
| What are 3D coordinates and user coordinate systems? | • Describe rectangular, spherical, and cylindrical methods of coordinate entry  
• Draw 3D polylines  
• Describe the function of the world and user coordinate systems  
• Move the user coordinate system to any surface  
• Rotate the user coordinate system to any angle  
• Change the user coordinate system to match the plane of a geometric object  
• Use a dynamic UCS  
• Save and manage user coordinate systems  
• Restore and use named user coordinate systems  
• Control user coordinate system icon visibility in viewports | 3.4.10.E4  
3.4.12.E4 |
| How are model space viewports used? | • Describe the function of model space viewports  
• Create and save viewport configurations  
• Alter the current viewport configuration  
• Use multiple viewports to construct a drawing | 3.4.10.E4  
3.4.12.E4 |
| How are 3d text and dimensions created? | • Create text with a thickness  
• Draw text that is plan to the current view  
• Dimension a 3D drawing | 3.4.10.E4  
3.4.12.E4 |
## Hamburg Area School District
### Course Plan
#### Computer Aided Drafting 2

**Course Name:** Computer Aided Drafting 2  
**Unit:** Essentials of 3D Drafting  
**Time Line:** 15 cycles

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| How are solid models extruded and revolted? | • Create solids and surfaces by extruding 2D profiles  
• Extrude planar surfaces  
• Create symmetrical 3d solids surfaces by revolving 3d profiles  
• Revolve planar surfaces  
• Use solid extrusions and revolutions as construction tools | 3.4.10.E4  
3.4.12.E4 |
| What are sweeps and lofts and how are they used in solid modeling? | • Sweep 2d shapes along a 2d or 3d path to create a solid or surface object  
• Create 3d solid or surface objects by lofting a series of cross sections | 3.4.10.E4  
3.4.12.E4 |
| How do you work with and create details on solid models? | • Change properties on solids  
• Align objects  
• Rotate objects in three dimensions  
• Mirror objects in three dimensions  
• Create 3d arrays  
• Fillet solid objects  
• Chamfer solid objects  
• Thicken a surface into a solid  
• Convert planar objects into surfaces  
• Slice a solid using various methods  
• Constructs details on solid models  
• Remove features from solid models | 3.4.10.E4  
3.4.12.E4 |
### Hamburg Area School District
### Course Plan
### Computer Aided Drafting 2

**Course Name:** Computer Aided Drafting 2  
**Unit:** Essentials of 3D Drafting  
**Time Line:** 15 cycles

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| How are subobjects edited?            | • Select subobjects(faces, edges, vertices)  
• Edit solids using grips  
• Edit face subobjects  
• Edit edge subobjects  
• Edit vertex subobjects  
• Extrude a closed boundary suing the PRESSPULL command  
• Extract a wireframe from a 3d solid using the XEDGES command | 3.4.10.E4  
3.4.12.E4 |
| How are solid models edited?          | • Change the shape and configuration of solid object faces  
• Copy and change the color of solid objects edges and faces  
• Break apart a composite solid composed of physically separate entities  
• Use the SOLIDEDIT command to construct and edit a solid model | 3.4.10.E4  
3.4.12.E4 |
| How are solid models displayed and analyzed? | • Control the display of solid models  
• Construct a 3d section plane through a solid model  
• Adjust the size and location of section planes  
• Create a dynamic section of a 3d solid model  
• Construct 2d and 3d section blocks  
• Create a flat, 2d projection of a 3d solid model  
• Create a multi-view layout of solid model using SOLVIEW and SOLDRAW  
• Construct a profile of a solid using SOLPROF  
• Perform an analysis of a solid model  
• Export and import solid model data | 3.4.10.E4  
3.4.12.E4 |
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<tr>
<td>What are the essentials of basic rendering and visual style settings?</td>
<td>• Describe the visual style manage palette</td>
<td>3.4.10.E4</td>
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<tr>
<td></td>
<td>• Change the settings for visual styles</td>
<td>3.4.12.E4</td>
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<td>• Create custom visual styles</td>
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<td>• Export visual styles to a tool palette</td>
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<td>• Render a scene using sunlight</td>
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<td>• Save a rendered images from the Render window</td>
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<td>What materials and available in AutoCAD?</td>
<td>• Attach materials to the objects in a drawing</td>
<td>3.4.10.E4</td>
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<td>• Changes the properties of existing materials</td>
<td>3.4.12.E4</td>
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<td>• Create new materials</td>
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<td>How does one use lighting in AutoCAD?</td>
<td>• Describe the types of lighting in AutoCAD</td>
<td>3.4.10.E4</td>
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<td>• List the user-created lights available in AutoCAD</td>
<td>3.4.12.E4</td>
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<td>• Changes the properties of lights</td>
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<td>• Generate and modify shadows</td>
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<td>• Add a background to your scene and control its appearance</td>
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<td>What are advanced rendering techniques?</td>
<td>• Make advanced rendering settings</td>
<td>3.4.10.E4</td>
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<td>• Set the resolution for a rendering</td>
<td>3.4.12.E4</td>
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<td>• Save a rendering to an image file</td>
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<td>• Add fog/depth cueing to a scene</td>
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<tr>
<td>How are walkthroughs and flybys used to visualize solid models?</td>
<td>• Create a camera to define a static 3d view</td>
<td>3.4.10.E4</td>
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<td>• Activate and adjust front and back clipping planes.</td>
<td>3.4.12.E4</td>
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<td>• Record a walkthrough of a 3d model to a movie file</td>
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<tr>
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<td>• Record a flyby of a 3d model to a movie file</td>
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<td>How are raster, vector, and web graphics used in AutoCAD?</td>
<td>• Compare raster and vector files</td>
<td>3.4.10.E4</td>
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<td></td>
<td>• Import and export raster files using AutoCAD</td>
<td>3.4.12.E4</td>
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<td>• Import and export vector files using AutoCAD</td>
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<td>• Set image commands to manipulate raster files</td>
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<td>• Create DWF, DWFx, and PDF files</td>
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