

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

**Hamburg Area School District
Course Plan
Computer Aided Drafting 1**

**Course Name: Computer Aided Drafting 1
Unit: Introduction to Drafting**

Time Line: 3 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What career opportunities are available in drafting?	<ul style="list-style-type: none"> • Identify various career opportunities related to drafting 	3.4.10.A1.
What history of drafting?	<ul style="list-style-type: none"> • 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. 3.4.10.B4.
What equipment is used in hand drafting?	<ul style="list-style-type: none"> • 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.

**Hamburg Area School District
Course Plan
Computer Aided Drafting 1**

**Course Name: Computer Aided Drafting 1
Unit: Drafting Fundamentals**

Time Line: 3 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the fundamentals of sketching?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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

**Hamburg Area School District
Course Plan
Computer Aided Drafting 1**

**Course Name: Computer Aided Drafting 1
Unit: Introduction to AutoCAD**

Time Line: 14 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is Computer Aided Drafting?	<ul style="list-style-type: none"> • Define computer-aided design and drafting. • Describe typical AutoCAD applications. • Explain the value of planning your work and system management. • Describe the purpose and importance of drawing standards. • Demonstrate how to start and exit AutoCAD. • Describe the AutoCAD interface. • Use a variety of methods to select AutoCAD tools. • Use the features found in the AutoCAD Help window. 	3.4.10.B4. 3.4.10.E4 3.4.12.E4
How are templates and drawings created?	<ul style="list-style-type: none"> • Start a new drawing. • Save your work. • Close files. • Open saved files. • Work with multiple open documents. • Create drawing templates. • Determine and specify drawing units and limits. 	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

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How are drawings edited in AutoCAD?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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
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Computer Aided Drafting 1**

**Course Name: Computer Aided Drafting 1
Unit: Introduction to AutoCAD**

Time Line: 14 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How do I use line standards, layers, and basic plotting?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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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Time Line: 14 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How are the construction tools used to create multiview drawings?	<ul style="list-style-type: none"> • Use the OFFSET tool to draw parallel objects. • Place construction points. • Mark points on objects at equal lengths using the DIVIDE tool. • Mark points on objects at designated increments using the MEASURE tool. • Create construction lines using the XLINE and RAY tools. • Create orthographic multiview drawings. 	3.4.10.E4 3.4.12.E4
How is text added to AutoCAD drawings?	<ul style="list-style-type: none"> • Describe and use proper text standards. • Calculate drawing scale and text height. • Develop and use text styles. • Use the MTEXT tool to create multiline text objects. • Use the TEXT tool to create single-line text. • Insert and use fields. • Check your spelling. • Edit existing text. • Search for and replace text automatically. 	3.4.10.E4 3.4.12.E4
How are tables used in AutoCAD?	<ul style="list-style-type: none"> • Create and modify table styles. • Insert tables into a drawing. • Edit tables. • Insert formulas into table cells to perform calculations on numeric data. 	3.4.10.E4 3.4.12.E4

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**Course Name: Computer Aided Drafting 1
Unit: Introduction to AutoCAD**

Time Line: 14 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are basic object editing tools?	<ul style="list-style-type: none"> • 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. 	3.4.10.E4 3.4.12.E4
What are the polylines and spline editing tools?	<ul style="list-style-type: none"> • Edit polylines with the PEDIT tool. • Create polyline boundaries. • Edit splines with the SPLINEDIT tool. • Convert polylines and splines. 	3.4.10.E4 3.4.12.E4
How are objects arranged and patterned?	<ul style="list-style-type: none"> • 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. 	3.4.10.E4 3.4.12.E4

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Unit: Introduction to AutoCAD**

Time Line: 14 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the grips, properties, and quick select tools?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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

**Hamburg Area School District
Course Plan
Computer Aided Drafting 1**

**Course Name: Computer Aided Drafting 1
Unit: Drafting Views and Annotations**

Time Line: 6 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are the basics of multi-view drawings?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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

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**Course Name: Computer Aided Drafting 1
Unit: Drafting Views and Annotations**

Time Line: 6 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What are additional dimensioning tools?	<ul style="list-style-type: none"> • Describe common dimension standards and practices. • Create dimension styles. • Manage dimension styles. • Set a dimension style current. • Define and use dimensioning and tolerancing terminology. • Set the precision for dimensions and tolerances. • 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&T). 	3.4.10.E4 3.4.12.E4
How are dimensions edited?	<ul style="list-style-type: none"> • Define and use dimensioning and tolerancing terminology. • Set the precision for dimensions and tolerances. • 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&T). 	3.4.10.E4 3.4.12.E4

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Time Line: 6 cycles

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
How are sections, revolutions, and conventional breaks used in drafting?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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

Essential Content/ Essential Questions	Performance Objectives	Standards/Anchors
What is parametric drafting?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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?	<ul style="list-style-type: none"> • 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