

Hillsborough Township School District

Hillsborough High School

Applied Technology Curriculum

Mechanical Drawing 2

August 2012

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APPLIED TECHNOLOGY PROGRAM

Recognizing the individual's native potential for reasoning and problem solving, for imagining and creating, for constructing and expressing with tools and materials - from which technology and industry spring forth, - applied technology education capitalizes on this rich potential and develops content and experiences to contribute to the growth and development of human beings' technological capabilities. Applied technology education should be a fundamental study for all persons regardless of their educational or career goals and strive to develop technological literacy for all.

Due to the growing role that technology plays in everyday life and in the shaping of our society, educators and business people now realize that our schools must prepare students to respond to the demands of a technological society. As citizens, students need to understand the technological world, in which they live and be able to make informed decisions regarding technological development. As consumers, students need to be able to use and make informed purchasing decisions regarding technological systems. As employees, students must be able to learn and adapt to technological systems used in the workplace.

The make-up of a modern curriculum must reflect this by addressing what the student must know and be able to do in a society that is rapidly expanding technologically. It is imperative that schools recognize the demands of a technological society and provide a general curriculum that meets these demands. Applied technology education serves this purpose.

The needs of all students must be considered when developing high school applied technology programs. Broad-based courses which focus on technological literacy, computer literacy, and leisure pursuits in technology are offered as general electives. Intermediate-level courses are offered for students seeking further technological study and focus on specific technologies. Advanced courses are available for students who plan to pursue higher education in engineering, science, mathematics or a technical field. Advanced courses provided greater amounts of research-and-development time and engage student in more challenging design problems; some are oriented toward independent study projects.

The high school applied technology curriculum does not provide job-specific training programs for students. The curriculum does, however, provide general career skills as outlined by the U.S. Department of Labor in their 1992 report entitled *Learning a living: a blueprint for high performance*. Labeled as workplace know-how, these skills include: interpersonal skills, acquiring and evaluating information, understanding systems, selecting and using equipment and tools, problem-solving skills, and communication skills. These skills can be transferred to many entry-level jobs or can be used as the foundation for further study in engineering, science or mathematics, or for a technical program at a two-year college.

ASSESSMENT OF CURRICULUM

Assessment for the Mechanical Drawing II course will be based upon meeting, but not limited to, the following teacher created assignments and projects. Teacher evaluation and observation of student work will include:

- Oral Questioning
- Outlined Criteria/Specifications
- Quality
- Neatness
- Craftsmanship
- Documentation
 - Annotation
 - Dimensioning
 - Digital (Computer)
 - Hard Copy
- Homework
- Quizzes
- Tests
- Projects (Short-term & Long-term)
- Safety
- Cooperation
- Meeting Deadlines
- Group Work
- Individual Work
- Self-reflection
- Course Final Exam
- Other

COURSE OVERVIEW

Mechanical Drawing II introduces the student to the CAD system. The student will receive "hands-on" training and will develop the techniques that are essential in today's job market. The student will learn how to adapt basic technical drafting techniques to computer generated drawings of the various drafting disciplines.

The student will learn how to adapt the principles of descriptive geometry when applied to "real-world" applications, involving using the CAD system to create Isometric and 3-D drawings. The student will have the opportunity to work on drawings used in various technical fields, such as mechanical engineering, architecture and electronics. The student will learn current production techniques to automate the drawing process and how to develop intelligent technical documents. By the end of the course the students will explore the following areas of Mechanical Drawing II:

1. Computer Basics
 - o Software, Hardware
 - o Software Programs, Operating Systems
 - o Input, Output, Storage Devices
 - o Care and Maintenance of Computer Equipment
2. Create Shapes
3. Set Up A Drawing
 - o Create A New Blank Drawing
 - o Set Up Page Size and Orientation
 - o Set Up the Grid and Snap
 - o Save A CAD File
4. Create Orthographic Drawings
 - o 2-D and 3-D Layouts
 - o Visualize 3-D Objects From Different Views
5. Annotation and Dimensioning
 - o Baseline Dimensioning
 - o Linear Dimensioning
 - o Radial Dimensioning
 - o
6. Assembled Drawings
7. Working Drawings
8. Detailed Drawings
9. Surface Design and Sheet Metal Layouts
10. Bill of Materials

COURSE DESCRIPTION

Mechanical Drawing II

Credits: 5

Course Length: Full Year

Grade Level: 9-12

Prerequisite: Mechanical Drawing I

The student will learn the programming methods and techniques required to develop a working drawing and detailed layout for the CAD system. The students will learn the CAD system's file structure and how to manipulate its database. The students will learn how to navigate throughout the view window and apply programming applications and techniques.

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 1	1 to 2 days 36 weeks	What are features in Inventor? How is Inventor a feature-based modeling program? What are the three types of features in AutoCAD? Which type of feature is used for construction purposes? What is the basic process for editing a part? How is AutoCAD a parametric modeling program? How can motion be modeled in AutoCAD?	AutoCAD is a mature parametric solid modeling program built for mechanical design and engineering. It is in wide use throughout the world. Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	Define a feature in Inventor. List the types of features in inventor. Explain how to edit a part. Define an assembly in Inventor. Explain how to model motion in Inventor. Explain the engineer's notebook. What is the basic process for editing a part?	Demonstrate Feature-based modeling. Discuss the types of features: Sketched, Places, Work. Demonstrate Parametric modeling and Assembly modeling. Discuss the three types of modeling motion: rotational, rotational-translational, and translational.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful Completion of safety test and assignments	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.	RH 9-12.4. Interpret words and phrases as they are used in a text, including determining technical, connotative, and figurative meanings, and analyze how specific word choices shape meaning or tone.

Introduction to Autodesk Inventor and AutoCAD

Benchmarks for standards for technological literacy: 8, 9 10, 11, 17

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 2	1 to 2 days 36 weeks	In which dialog box is the option for saving a thumbnail preview located and how is it displayed? Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	During the Inventor session, the user interface is accessed by selecting given options in the toolbar. Which operations cannot be undone with the undo button? In general what is the function of the Return button? What is the home view?	Explain the various components of Inventor's user interface. Locate the various components of the user interface. Open an existing file. Create a new file. Create and edit solid model geometry.	User interface overview. Demonstrate how to use the Inventor Standard Toolbar. Discuss the following terms: Orbit Display Opacity Shadow Projection View Cube Material Color Steering Wheels	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of magazine search Teacher questioning of student	9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

User Interface

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 3	3 to 5 days 36 weeks	Define sketch in Inventor. What is a constraint in Inventor? By default, in which mode is Inventor when a new part file is started? When using the Line tool, what information is provided in the three windows at the lower-right corner of the Inventor screen?	All parts in Inventor and AutoCAD start with a base 2D profile that is extruded, revolved, or swept into a solid. The profile is constructed in sketch mode. Explain the geometric constraints that Inventor can apply. What are the two basic types of constraints? Which tool allows you to manually apply a dimension?	Describe the procedure for creating a base sketch. Sketch curves, including lines and arcs. Explain the geometric constraints that Inventor can apply. Apply and display geometric constraints. Add dimensions to constrain a sketch. Extrude solid parts from a sketch.	Demonstrate the process for creating a Part. Sketch a 2D profile. Define and maintain the relationships between the geometry in the sketch. Student will extrude a fully constrained sketch. Teacher questioning of student	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Apply editing options to the feature and sketch.	9.4.12.O.4 9.4.12.O.11 9.4.12.O.1.12	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. Model technical competence by developing and applying processes and concepts in the design process.

Sketching Constraints and the Base Feature

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy	
Standard Level: Full Year Elective									
Unit 4	36 weeks	What is the difference between an ambiguous and an unambiguous sketch? If $d_3=2.5$ mm and $d_2=1.5$ mm, what is the solution calculated by Inventor for the equation d_3/d_2 ? How does Inventor indicate an invalid or unacceptable equation?	Ambiguous profiles are sketches that have several different profiles to extrude. Once a curve is drawn, how can you change its line type? What is the function of the Mirror and Revolve tool? How can you select multiple profiles for extrusion?	Explain how to create and select ambiguous profiles. Use dimension names to create dimensions with equations. Create and use construction geometry and centerlines to locate sketch objects. Use the Mirror tool in a sketch. Use the Revolve tool and explain its features.	Demonstrate the following unit lessons: - Creating Complex (Ambiguous) Profiles - Two point Rectangle Tool and Precise Input - Using the d0 Model Parameters in Equations in Dimensions Construction in Geometry - Sketch Mirror Tool Revolve Tool Inventor Precise Input Toolbar For 2D sketches	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.	

Complex Sketching, Constraints, Formulas, and the Construction Geometry

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy	
Standard Level: Full Year Elective									
Unit 4	36 weeks	How can you change the color of a face? Which faces of a part can be used as sketch planes? Which dialog box is used to turn on the display of a CSI at the origin? Explain the difference between Join, Cut, and Intersect options of the Extrude tool. Explain how to turn on the visibility of a default work plane. Name four types of items that can be used, in part, to define a new work plane.	Parts can be created on one primary sketch and profile. However, additional, secondary sketches on the faces of the part and on work planes must be created. Project silhouette curves onto a sketch plane. Use the Cut and Intersect options of the Extrude tool. Display, adjust, and use the three fundamental work planes of a sketch. Create, display, and use additional work planes. Create and use new work planes.	Explain how to create secondary sketch features. Explain and use the five termination features in the Extrude tool. Apply operation and extent options of the extrude tool. Project silhouette curves to the sketch plane. Using content center, place a feature on a part. Create features with default work planes and midplane construction.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.		

Secondary Sketches and Work Planes

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 5	2 to 4 days 36 weeks	List four advantages of creating holes using the Hole tool over extruding circles. Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	There are several features that can be added to a part without drawing a sketch profile. What are hole centers? What are the three termination options for a hole? What is the purpose of a counterbore? Which tools are used to create a fillet and round?	Add holes to a part. Add threads to a part. Fillet edges on a part. Chamfer edges on a part. Create rectangular and circular patterns. Mirror features.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.	WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Adding Features

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy	
Standard Level: Full Year Elective									
Unit 6	4 to 6 days 36 weeks	What is the purpose of the Shell tool? Why would faces be removed during the shell operation? Which tool is used to create web? Which tool is used to create a Rib? What is a sketch coordinate system (SCS)? Which tool is used to engrave text? Which three types of “images” can be placed on a part using the Decal tool? What is the purpose of the Split tool?	There are several features that can be added to a part without drawing a sketch profile. Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester.	Create shelled parts. Add ribs and webs to parts. Create embossed and engraved parts. Add decals to parts. Create face drafts on parts. Bend parts. Create splits. What is a sketch coordinate system (SCS)? Which tool is used to engrave text? Which three types of “images” can be placed on a part using the Decal tool? What is the purpose of the Split tool?	Apply the Rib and Shell tools on a work plane. Create solids from open sketches. Moving the coordinate system on a sketch plane. Apply the text and emboss tools to engrave texts into a face. Define the following manufacturing processes: casting, forging, and injection molding.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.O.4 9.4.12.O.11 9.4.12.O.1.11 9.4.12.O.1.12	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others. Model technical competence by developing and applying processes and concepts in the design process.	
Adding More Features									

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy	
Standard Level: Full Year Elective									
Unit 7	2 - 4 days 36 weeks	From which type of file is an Inventor drawing created? Which type of geometry can appear in a drawing view? How can a drawing view be made so it will not print, but is still available in the drawing? What is a base view? How can a parent view be deleted without deleting the derived view? What are the two display styles for a view? How are drawing views updated when the part is edited?	Engineering drawings can be directly developed from Inventor parts, surfaces, and assemblies. These views are directly related to the part model. Reviewed throughout all units during the semester.	Create 2D drawings of Inventor solid and surface models. Explain the different views and how to create them. Specify paper size and border. Edit existing drawing views. Update drawing views when the part changes. What is a base view? How can a parent view be deleted without deleting the derived view? What are the two display styles for a view? How are drawing views updated when the part is edited?	Discussed and utilized in assignments based on project criteria and specifications Projects assigned as outlined in document Edit existing drawing views. Update drawing views when the part changes. How can a parent view be deleted without deleting the derived view? What are the two display styles for a view? How are drawing views updated when the part is edited?	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Student Discussion: Individual and Group (with or without Teacher) Utilized in projects during the semester	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice. 9.4.12.O.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.	

Create Part Drawings

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 8	2 - 4 days 36 weeks	What is the difference between a parametric dimension and reference dimension? Embedded, discussed, introduced, integrated, and reviewed throughout all units during the semester. Used as needed per assignment	The Drawing Annotation Panel contains the tools for annotating a drawing. What is feature control frame? How are properties of drawing annotations, such as color or line type, controlled? What is a hole note? What is a sketched symbol and when would you use one? What is a surface texture symbol? What is the purpose of a weld symbol? What is a revision table?	Specify a drafting standard. Edit a drafting standard. Dimension drawing views. Apply different annotations to an Inventor drawing.	Discussed and utilized in assignments based on project criteria and specifications Successful completion of projects and assignments with terminology and content	Prepare to annotate a drawing layout. Projects assigned as outlined in document	9.4.12.O.4 9.4.12.O.11 9.4.12.O.1.12	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Dimensioning and Annotating Drawings

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 9	1 week	What is the difference between an extrusion and a sweep? What is the difference between sweep and loft? What is a rail?	A sweep is a solid object created by extruding, or sweeping, a profile along a path. The path is simply a sketch that is dimensioned and constrained just as any other sketch. What is the difference between a 2D path and a 3D path? If a circle is swept around a square corner, what shape does the corner have on the finished part?	Explain the difference between an extrusion, sweep, and loft. Explain the process for creating a sweep. Create 3D sketches. Create 2D and 3D sweeps. Define inline work features. Create inline work features. Create Lofts.	Create a sweep path. Create a cross sectional profile. Create a profile that's not perpendicular to the path. Create a three dimensional sweep.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Sweeps and Lofts

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 10	1 week	What is an instance? Utilizes elements and content from previously outlined units.	An assembly shows how parts fit together to create the final product. When a part is placed in an assembly file, it is called an instance of the part. Which type of Inventor files must be open to set a project current? When a part is placed in an assembly, how many degrees of freedom does it have? What is a grounded part?	Create and use projects. Create an assembly from existing parts. Apply mating constraints using various options. Apply insert constraints using various options. Apply tangent constraints using various options. Edit constraints placed in an assembly. Edit parts in place within an assembly. Place standard fasteners into an assembly.	Build an assembly file. Create a project with folders. Define the following terms: - Place - component - Degrees of Freedom - Place constraint - Mate - Insert - constraint - Constrain edges of parts.	Teacher observation of student Student completing teacher assigned evaluation with rubric Successful completion of projects and assignments with terminology and content Teacher questioning of student	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Building Assemblies with Constraints

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full year Elective								
Unit 11	1 to 2 weeks	<p>Why would you need to add additional paths to a project?</p> <p>Which tool allows you to create new parts from within an assembly?</p> <p>Utilizes elements and content from previously outlined units.</p> <p>What does the contact solver do?</p> <p>What does the angle constraint do?</p> <p>What does it mean to drive a constraint?</p> <p>Why would you apply a constraint between two work planes, as opposed to the corresponding parts?</p>	<p>An angle assembly constraint works on part edges and faces, work planes, and work axes.</p> <p>What does the angle constraint do?</p> <p>What does it mean to drive a constraint?</p> <p>Why would you apply a constraint between two work planes, as opposed to the corresponding parts?</p>	<p>Add paths to a project.</p> <p>Create a part from within the assembly.</p> <p>Apply the angle constraint.</p> <p>Drive constraints.</p> <p>Constrain work planes.</p> <p>Apply assembly constraints to sketches.</p> <p>Create adaptive parts.</p> <p>Set the visibility of parts in an assembly.</p> <p>Create and use design views.</p>	<p>Constrain work planes and axes</p> <p>Assemble constraints and sketches.</p> <p>Student completing teacher assigned evaluation with rubric</p> <p>Successful completion of projects and assignments with terminology and content</p> <p>Documentation of activity</p> <p>Teacher questioning of student</p>	<p>Teacher observation of student</p> <p>Student</p> <p>Individual and Group (with or without Teacher)</p> <p>Documentation of activity</p>	<p>9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.</p> <p>9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process.</p> <p>9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.</p>	<p>RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.</p> <p>WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p>

Working with Assemblies

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 12	1 to 2 weeks	What are the three motion constraints that relate relative motion of one component to another? Utilizes elements and content from previously outlined units.	Besides the assembly constraints for positioning components, there are three motion constraints that can relate the relative motion of one component to another. What can be used to determine if components in motion interfere with each other?	Use the rotation motion constraint. Use the rotation-translation motion constraint. Use the collision detector feature of the Drive Constraint dialog box.	Discussed and utilized in assignments based on project criteria and specifications Student completing teacher assigned evaluation with rubric Projects assigned as outlined in document	Teacher observation of student Student Successful completion of projects and assignments with terminology and content	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.

Motion Constraints and Assemblies

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy	
Standard Level: Full Year Elective									
Unit 13	1 to 2 weeks	A surface defines the form and shape of an object, but does not have volume. A solid also defines the form and shape of an object, but it has volume.	Utilizes elements and content from previously outlined units.	<p>How does the process for creating a surface differ from the process used to create a solid?</p> <p>Briefly describe how to change the display of an existing surface from translucent to opaque.</p> <p>Define Quilt.</p> <p>Which tool is used to create a new surface that is offset from the original surface?</p>	<p>Explain the differences between surfaces and solids.</p> <p>Adjust the display of a surface.</p> <p>Explain the basic process for creating a surface.</p> <p>Offset a surface from a solid or surface.</p> <p>Replace a face on a solid with a face that matches the shape of a surface.</p> <p>Use surfaces as construction geometry.</p>	<p>Apply the following features to surface modeling:</p> <ul style="list-style-type: none"> - Surface - Display - Extruded surface - Revolved surfaces - Lofted surfaces - Swept surfaces <p>Analyze object faces and surfaces.</p>	<p>Teacher observation of student</p> <p>Student completing teacher assigned evaluation with rubric</p> <p>Successful completion of projects and assignments with terminology and content</p> <p>Teacher questioning of student</p>	<p>9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.</p> <p>9.4.12.O.11 Demonstrate understanding of processes and concepts that are key to understanding the design process.</p> <p>9.4.12.O.12 Model technical competence by developing and applying processes and concepts in the design process.</p>	<p>RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.</p> <p>WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p>

Surfaces

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Full Year Elective								
Unit 14	1 week	How is the first view placed in an assembly drawing? Utilizes elements and content from previously outlined units.	Various parts and subassemblies join together through given constraints to form an assembly. Briefly describe how to prevent certain components from being sectioned in a section view. When creating a break out view, what is the depth specifying when the Form Point option is used? How do you add a tolerance to a dimension? Briefly describe how to replace dimension text with new text. How can a design view representation be used as a drawing view?	Create 2D orthographic, section, and break out views from assemblies. Annotate assembly drawings. View, modify, and insert parts lists. Create drawing views using design view representations.	Discussed and utilized in assignments based on project criteria and specifications Student completing teacher assigned evaluation with rubric Projects assigned as outlined in document Successful completion of projects and assignments with terminology and content Student Discussion: Individual and Group (with or without Teacher) Documentation of activity	Teacher observation of student Student Teacher questioning of student	9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice. 9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process. 9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.	RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take. WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.

Assembly Drawings

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Semester Elective								
Unit 15	1 to 2 weeks	<p>How is visibility controlled in an animation?</p> <p>Utilizes elements and content from previously outlined units.</p>	<p>Exploded views of an assembly are created in a separate file. A single presentation file can contain many exploded views of the assembly.</p> <p>What are the two methods of creating explosions?</p> <p>What separate file are exploded views created in?</p> <p>Briefly describe how to set a view for a given sequence.</p> <p>How many lights can a lighting style have?</p> <p>How can the brightness be controlled for an individual light?</p>	<p>Create automatic and manual explosions.</p> <p>Add linear and rotational tweaks to create and modify exploded views.</p> <p>Modify animations to make the components move at the correct time and speed.</p> <p>Use design views to create multiple exploded views.</p> <p>Set different camera angles to emphasize areas of an assembly.</p> <p>Rearrange the sequences of an animation.</p> <p>Apply colors, styles, textures, and lights to create a refined presentation.</p>	<p>Discussed and utilized in assignments based on project criteria and specifications</p> <p>Projects assigned as outlined in document</p> <p>Use design views to create multiple exploded views.</p> <p>Set different camera angles to emphasize areas of an assembly.</p> <p>Rearrange the sequences of an animation.</p> <p>Apply colors, styles, textures, and lights to create a refined presentation.</p>	<p>Teacher observation of student</p> <p>Student completing teacher assigned evaluation with rubric</p> <p>Successful completion of projects and assignments with terminology and content</p> <p>Student Discussion: Individual and Group (with or without Teacher)</p> <p>Documentation of activity</p>	<p>9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.</p> <p>9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process.</p> <p>9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.</p>	<p>RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.</p> <p>WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p>

Presentation Files

Unit	Pacing # of Weeks	Essential Questions	Enduring Understandings	Content	Skills	Assessment	NJCCCS CPI	Common Core Literacy
Standard Level: Semester Elective								
Unit 16	1 to 2 weeks	<p>Utilizes elements and content from previously outlined units.</p> <p>Define drawing as related to sheet metal.</p> <p>What is the developed length?</p> <p>What determines the thickness of a face created with the Face tool?</p> <p>What is a relief and what purpose does it serve?</p> <p>What is the purpose of the Cut tool?</p> <p>What is a Hem?</p> <p>How many types of Hems can be created?</p> <p>What are the seven options for the relief shape when creating a corner seam?</p> <p>Which type of punch tool can be used across a bend line or through which a bend line can pass?</p>	<p>A sheet metal part generally refers to a part formed from relatively thin, flat sheet metal stock, which is typically 0.01" and 0.18" thick.</p> <p>Create sheet metal styles.</p> <p>Add features to a sheet metal part with the Face tool and Flange tool.</p> <p>Specify relief settings.</p> <p>Override sheet metal styles.</p> <p>Create a flat pattern from a folded part.</p> <p>Create cutouts in sheet metal parts.</p> <p>Create a folded sheet metal part from a developed pattern.</p> <p>Control the shape of the seam between two edges using the Corner Seam tool.</p> <p>Use punch tools to create holes or emboss sheet metal parts.</p>	<p>Define terms related to sheet metal parts.</p> <p>Create sheet metal styles.</p> <p>Add features to a sheet metal part with the Face tool and Flange tool.</p> <p>Specify relief settings.</p> <p>Override sheet metal styles.</p> <p>Create a flat pattern from a folded part.</p> <p>Create cutouts in sheet metal parts.</p> <p>Create a folded sheet metal part from a developed pattern.</p> <p>Control the shape of the seam between two edges using the Corner Seam tool.</p> <p>Use punch tools to create holes or emboss sheet metal parts.</p>	<p>Teacher observation of student</p> <p>Student completing teacher assigned evaluation with rubric</p> <p>Successful completion of projects and assignments with terminology and content</p> <p>Student Discussion: Individual and Group (with or without Teacher)</p> <p>Teacher questioning of student</p> <p>Documentation of activity</p>	<p>9.4.12.O.4 Select and employ appropriate reading and communication strategies to learn and use technical concepts and vocabulary in practice.</p> <p>9.4.12.O.1.11 Demonstrate understanding of processes and concepts that are key to understanding the design process.</p> <p>9.4.12.O.1.12 Model technical competence by developing and applying processes and concepts in the design process.</p>	<p>RH 9-12.9. Analyze how two or more texts address similar themes or topics in order to build knowledge or to compare the approaches the authors take.</p> <p>WHST 9-12.6. Use technology, including the Internet, to produce and publish writing and to interact and collaborate with others.</p>	

Sheet Metal Parts