DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Solid Modeling/Engineering and Design

Grade Level: 9-12

Date of Board Approval: 2016

DELAWARE VALLEY SCHOOL DISTRICT

Planned Instruction

Title of Planned Instruction: Solid Modeling/Engineering and Design

Subject Area: Technology Education **Grade(s):** 9-12

Course Description: Students will be exposed to the latest advancements in computer-aided drawing and design. Autodesk Inventor will give students a look into the world of solid modeling. Solid modeling is the creation of virtual; three-dimensional models, of any object, on the computer. Students will also perform rapid prototyping, which is the latest concept in engineering and design. Rapid prototyping is the creation of a product by sending a CADD drawing to a 3D printer or computer numerically controlled (CNC) machine. The 3D printer or CNC machine will then make the part. This class is ideal for students interested in engineering, or any career related to drawing and design

Time/Credit for the Course: 1 semester (70 hours) / ½ credit

Curriculum Writing Committee: Tom Moran

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Curriculum Map

1. **Marking Period One- Engineering and design terminology, concepts of the manufacturing process, introduction to design software, advanced procedures used in design software: 45 days.**

Marking Period One -Goals:

Unit #1: Engineering and Design Vocabulary

- Students will learn solid modeling and basic manufacturing terminology.
- Students will utilize the engineering software (Inventor Professional) because the software applies common engineering and design terminology to define its electronic tools.
- Students will relate the tools to features of a part

Unit #2: Manufacturing Processes

- Students will understand the processes which make up technological system of manufacturing
- Students will read about and discuss the different types of manufacturing
- Students will study manufacturing fundamentals, product development, production planning, production, and high performance manufacturing
- Students will discuss the impacts of technology on society, the environment and the economy

Unit #3: Introduction to Solid Modeling Software

- Students will learn basic tools of Inventor Professional
- Students will use that will transform and 2 dimensional AutoCAD drawing into a 3 dimensional model tools
- Students will create 2D sketches and turn them into 3D models using sketch and part feature tools
- Students will extrude and 2D sketch of a squared shape into a cube or rectangular model
- Students will revolve a half section sketch into a cylindrical model

Unit #4: Advanced Solid Modeling Processes

- Students will complete tutorials imbedded in the Inventor software
- Students will mater sketching tools and procedures learned in unit #3
- Students will utilize direct manipulation
- Students will create assemblies
- Students will develop drawings and edit drawing styles

- Students will know how to import and constrain parts from the content center
- Students will make derived parts and edit them
- Students will be able to insert iFeatures
- Students will develop presentation animations
- Students will work with plastics part and features
- Students will render parts and save them as jpeg files
- Students will animate the movement of assemblies and save them as mpeg files
- Students will import parts from the parts library and build bolted connections
- Students will be able to build sheet metal parts

Understanding of:

- Engineering vocabulary
- Manufacturing processes
- Basic design software tools
- Advanced design software tools and procedures

2. **Marking Period Two –** Use of precision measuring tools, reverse engineering, rapid prototyping, use of 3D printers, use of a CNC router, and application of these processes to develop an invention or innovation: 45 days.

Marking Period Two -Goals:

Unit #5: Precision Measuring Devises / Reverse Engineering

- Student will take precise measurements to .0001 using a micrometer (dial caliper)
- Students will utilize several other advanced measure tools such as inside and outside diameter calipers, depth gauges and thread gauges.
- Student will reinforce the skills they learned in the instructional tutorials imbedded in the Inventor software
- Student will reverse engineer 2 given parts, one of which will be a Lego because of their extremely tight tolerances
- Students will print their drawing files using the HP Design Jet 800 plotter

Unit #6: Rapid Prototyping / 3D Printer

- Student will discuss the importance of rapid prototyping and the advantages of the 3D printer.
- Student will convert their graphic reproduction of their Lego into a prototype using the 3D printer
- Students will know how to use the catalyst software to create a toolpath for their part.
- Student will learn how to use the 3D printer
- Students will use the hand tools and parts cleaner to remove the soluble support material from their part.
- Students will test their prototypes by attempting to assemble Legos.

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Unit #7: Rapid Prototyping / CNC Router

- Students will draw a name plate in Inventor using the parameters given to them
- Students will know how to use the Modela software to translate the digital Inventor drawings of their names into a wooden prototype.
- Students will learn the basic procedures and setup for using CNC machinery.
- Students will build their name plate prototype out of wood or machinable wax using the Roland CNC router

Unit # 8: Final Project /Apply Design Process and CAD Software

- Students will effectively design, engineer and draw an assembled product
- Students will master their ability to effectively create parts, assemblies, presentations, mechanism simulations, renderings, animations, and documentation (drawings).

Understanding of:

- The use of precision measuring devices to reverse engineer parts
- The importance of and the process of rapid prototyping,
- The use of a 3D printer and CNC router
- How to apply all of the course content to develop an invention or innovation

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UNIT 1: Engineering and Design Vocabulary

Big Idea # 1: Technology is created used and modified by humans

Essential Questions: What is technological literacy?

Concepts: Technology and society mutually impact each other.

Competencies: Describe how technological development impacts economics, culture, and policies.

Big Idea #2: Technological design is a creative process that anyone can do which many result in new inventions and innovations.

Essential Questions: How would you explain technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Employ engineering design and problem solving skills to solve complex technological challenges.

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Curriculum Plan

Time Range in Days: 8-9 days

Standard(s):

-3.4 Technology and Engineering Education

Standards Addressed:

-3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s):

-S11.A.2.1, S11.A.3.1

Overview: It is important to have a thorough knowledge base of terminology used in any field related to engineering and design.

Focus Question(s): Why should students have a mastery of engineering and design terminology?

Goals: Student will know engineering and design terminology.

Objectives:

1. Students will learn solid modeling and basic manufacturing terminology. (DOK 1)
2. Students will utilize the engineering software (Inventor Professional) because the software applies common engineering and design terminology to define its electronic tools. (DOK 2)
3. Students will relate the tools to features of a part. (DOK 3)

Core Activities and Instructional Methods:

1. Students will define terms given to them on a vocabulary sheet via the network public files. They will use the software help database to search for the terms. They type the list in Microsoft Word. The students will also learn special function and instructions for the tools that relate to the terms. The special function and instruction commands are listed in Appendix A of the Inventor R5 textbook.
    a. Discussion: terms and electronic tools
    b. Hands-on: complete terminology assignment

Assessments:

Diagnostic:

Oral response during discussion

Formative:

Terminology list

Summative:

Terminology exam

Extensions:

Students that have mastered the basic vocabulary will be given more advanced terms to learn.

Correctives:

Individual instruction and demonstrations will be given to students having difficulty

Materials and Resources

Smart board, CADD lab, public files, software: Inventor Professional, Netop, Microsoft Word

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UNIT 2: Manufacturing Processes

Big Idea # 1: Technology is created used and modified by humans

Essential Questions: What is technological literacy?

Concepts: Technology and society mutually impact each other.

Competencies: Describe how technological development impacts economics, culture, and policies.

Big Idea #2: Technological design is a creative process that anyone can do which many result in new inventions and innovations.

Essential Questions: How would you explain technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Employ engineering design and problem solving skills to solve complex technological challenges.

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Curriculum Plan

Time Range in Days: 5-6days

Standard(s):

-3.4 Technology and Engineering Education

Standards Addressed:

-3.4.12.C2, 3.4.12.D2, 3.4.10.E7, 3.4.10.A2

Anchor(s):

-S11.A.2.1, S11.A.3.1

Overview: To understand the development and engineering of a product you have to understand the processes of manufacturing.

Focus Question(s): What are the processes of manufacturing and why is it so important to know them?

Goals: Students will understand the processed involved in manufacturing.

Objectives:

1. Students will understand the processes, which make up the technological systems of manufacturing. (DOK 1)
2. Students will read about and discuss the different types of manufacturing. (DOK 1)
3. Students will study manufacturing fundamentals, product development, production planning, production, and high performance manufacturing. (DOK 1)
4. Students will discuss the impacts of technology on society, the environment and the economy (DOK 1)

Core Activities:

1. In class, read unit 4, chapters 11-15, pgs. 226-32. Complete the Understanding Concepts questions at the end of each chapter.
    a. Hands-on: bookwork
2. Discuss the information learned in the 5 manufacturing, engineering and design chapters
    a. Discussion: bookwork

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Assessments:

Diagnostic:

Oral response

Formative:

Chapter discussion

Summative:

Review questions

Extensions:

Students that finish early will be given additional reading from the chapter to further their knowledge of the manufacturing system

Correctives:

Individual instruction and demonstrations will be given to students having difficulty

Materials and Resources

Technology: Engineering and Design textbook

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UNIT 3: Introduction to Solid Modeling Software

Big Idea #1: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Question: How would you explain and apply technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Utilize computer-aided engineering design software to solve advanced, real-world technological problems.

Big Idea #2: Technological literacy is the ability to use, assess and manage technology around us.

Essential Question: What is the importance of technological literacy?

Concepts: Technological literacy is required for all citizens in a democratic society for shared decision-making

Competencies: Use current technological systems efficiently, identify undesirable results, then design, produce, test and utilize engineering analysis to optimize solutions.

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Curriculum Plan

Time Frame: 11-13 days

Standards: Pennsylvania Core State Standards for Science and Technology and Engineering Education

Standards Addressed:

3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s) or Adopted Anchor(s):

S11.A.2.1, S11.A.3.1

Overview: Solid modeling software is used in the engineering and design stages of product development.

Focus Question(s): What are the basic tools of design software and how are they applied?

Goals: Students will know how to use the basic tools and functions of the design software.

Objectives:

1. Students will learn basic tools of Inventor Professional. (DOK 1)
2. Students will use that will transform and 2 dimensional AutoCAD drawing into a 3 dimensional model tools. (DOK 2)
3. Students will create 2D sketches and turn them into 3D models using sketch and part feature tools. (DOK 4)
4. Students will extrude and 2D sketch of a squared shape into a cube or rectangular model (DOK 4)
5. Students will revolve a half section sketch into a cylindrical model (DOK 4)

Core Activities and Instructional Methods:

1. Use the AutoCAD drawing tool to import 2 dimensional CAD drawings then convert them into 3 dimensional models
    a. Discuss and demonstrate: commands
    b. Hands-on: reinforce commands via practice part
2. Create sketches of specific parts on pgs 215-217 then use the extrude and revolve tools to changed them into solid models
    a. Discuss and demonstrate: commands
    b. Hands-on: reinforce commands via practice part

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Assessments:

Diagnostic:

Oral response during discussion

Formative:

Student progress on practice problem

Summative:

CAD to solid and Practice problem parts

Extensions:

Higher learning students may experiment with more advanced tools to create other features on their part

Correctives:

Individual instruction and demonstrations will be given to students having difficulty

Materials and Resources

Smart board, CADD lab, software: Inventor Pro and Netop

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UNIT 4: Advanced Solid Modeling Software Processes

Big Idea #1: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Question: How would you explain and apply technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Utilize computer-aided engineering design software to solve advanced, real-world technological problems.

Big Idea #2: Technological literacy is the ability to use, assess and manage technology around us.

Essential Question: What is the importance of technological literacy?

Concepts: Technological literacy is required for all citizens in a democratic society for shared decision-making

Competencies: Use current technological systems efficiently, identify undesirable results, then design, produce, test and utilize engineering analysis to optimize solutions.

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Curriculum Plan

Time Frame: 18-20 days

Standards: Pennsylvania Core State Standards for Science and Technology and Engineering Education

Standards Addressed:

3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s) or Adopted Anchor(s):

S11.A.2.1, S11.A.3.1

Overview: To be able to use solid modeling software at a professional level, students will have to be able to use its more advanced tools and processes.

Focus Question(s): What are the more advanced tools and procedures and how are they applied in engineering and design?

Goals: Students will be able to use solid modeling software and a professional level.

Objectives:

1. Students will complete tutorials imbedded in the Inventor software. (DOK 4)
2. Students will mater sketching tools and procedures learned in unit #3. (DOK 4)
3. Students will utilize direct manipulation. (DOK 4)
4. Students will create assemblies. (DOK 4)
5. Students will develop drawings and edit drawing styles. (DOK 4)
6. Students will know how to import and constrain parts from the content center. (DOK 4)
7. Students will make derived parts and edit them. (DOK 4)
8. Students will be able to insert iFeatures. (DOK 4)
9. Students will develop presentation animations. (DOK 4)
10. Students will work with plastics part and features. (DOK 4)
11. Students will render parts and save them as jpeg files. (DOK 4)
12. Students will animate movements of assemblies and save them as mpeg files. (DOK 4)
13. Students will import parts from the parts library and build bolted connections. (DOK 4)

Core Activities and Instructional Methods:

1. Complete the specified tutorials listed in the public files.
    a. Demonstration: tutorials, commands, and procedures
    b. Hands-on: tutorials

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Assessments:

Diagnostic:

Oral response during discussion

Formative:

Student progress and understanding of tutorials

Summative:

Tutorials and final project

Extensions:

These tutorials will be complete self-paced timeline (but will be graded on a mandatory timeline to keep slower students from falling behind). If an advanced student finishes the tutorials early the may move on to the "Advanced" tutorials

Correctives:

Individual instruction and demonstrations will be given to students having difficulty

Materials and Resources

Smart board, CADD lab, software: Inventor Pro, and Netop

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UNIT 5: Precision Measuring Devices / Reverse Engineering

Big Idea #1: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Question: How would you explain and apply technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Utilize computer-aided engineering design software to solve advanced, real-world technological problems.

Big Idea #2: Technological literacy is the ability to use, assess and manage technology around us.

Essential Question: What is the importance of technological literacy?

Concepts: Technological literacy is required for all citizens in a democratic society for shared decision-making

Competencies: Use current technological systems efficiently, identify undesirable results, then design, produce, test and utilize engineering analysis to optimize solutions.

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Curriculum Plan

Time Range in Days: 12-14 days

Standards: Pennsylvania Core State Standards for Science and Technology and Engineering Education

Standards Addressed:

3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s) or Adopted Anchor(s):

S11.A.2.1, S11.A.3.1

Overview: Reverse engineering is a widely used process in engineering, and design and the ability to accurately use precision measuring devices is a crucial part of the process.

Focus Question(s): How are precision measuring devices and reverse engineering used in engineering and design?

Goals: Students will know how to correctly use precision measuring devices to reverse engineer a part.

Objectives:

1. Student will take precise measurements to .0001 using a micrometer (dial caliper). (DOK 2)
2. Students will utilize several other advanced measure tools such as inside and outside diameter calipers, depth gauges and thread gauges. (DOK 2)
3. Student will reinforce the skills they learned in the instructional tutorials imbedded in the Inventor software. (DOK 1)
4. Student will create an exact virtual replica of 2 given parts, one of which will be a Lego because of their extremely tight tolerances (DOK 4)
5. Students will print their drawing files using the HP Design Jet 800 plotter. (DOK 2)

Core Activities and Instructional Methods:

1. Students will create exact graphic reproductions of and draw two specifically chosen parts. The parts will challenge them to use the measuring tools and procedures they have learned so far. Students have the option of finding their own parts but the instructor must approve the parts.
    a. Demonstration: use of advanced measuring tools
    b. Hands-on: graphic reproductions

2. They will have to develop a drawing file of one of the reproductions, which will reinforce their ability to create drawing files. All of these skills will be applied during the creation of their final project
    a. Demonstration: drawing files and use of plotter
    b. Hands-on: create drawing file and print it out on the plotter

Assessments:

Diagnostic:

Oral response during demonstration

Formative:

Graphic reproductions and drawing files

Summative:

Final project

Extensions:

Advanced students will be given more difficult objects to reproduce

Correctives:

Individual instruction and demonstrations will be given to students having difficulty

Materials and Resources

Smart board, CADD lab, software: Inventor Pro, and Netop

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UNIT 6: Rapid Prototyping / 3D Printer

Big Idea #1: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Question: How would you explain and apply technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Utilize computer-aided engineering design software to solve advanced, real-world technological problems.

Big Idea #2: Technological literacy is the ability to use, assess and manage technology around us.

Essential Question: What is the importance of technological literacy?

Concepts: Technological literacy is required for all citizens in a democratic society for shared decision-making

Competencies: Use current technological systems efficiently, identify undesirable results, then design, produce, test and utilize engineering analysis to optimize solutions.

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Curriculum Plan

Time Range in Days: 3-4 days

Standards: Pennsylvania Core State Standards for Science and Technology and Engineering Education

Standards Addressed:

3.4.10.C1, 3.4.10.C2, 3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s) or Adopted Anchor(s):

S11.A.2.1, S11.A.3.1

Overview: Rapid prototyping is the process of using computer driven machines (3D printer) to creating a working prototype in a fraction of the time as compared to more traditional methods. Rapid prototyping is a key element in production today.

Focus Question(s): How do we create prototypes in a fraction of the time as traditional method?

Goals: Students will know how to use a 3D printer to create a prototype.

Objectives:

1. Students will know how to use the catalyst software to create a toolpath for their part. (DOK 2)
2. Student will learn how to use the 3D printer. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Discuss the safest and most efficient process for using the 3D printer.
2. Create pack in printer and build part
    a. Demonstration: Catalyst software
    b. Hands-on: create toolpath
3. -Remove support material and clean part to be graded
    a. Demonstration: 3D printer operation
    b. Hands-on: create prototype

Assessments:

Diagnostic:

Observation of oral response during demonstration of Catalyst software and 3D printer

Formative:

Digital image and toolpath of Lego

Summative:

Prototype of Lego

Drawing printout of prototype

Materials and Resources

Smart board, Computer, Inventor Software, Catalyst software, Dimension 3D printer, consumable materials (model and support material

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UNIT 7: Rapid Prototyping / CNC Router

Big Idea #1: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Question: How would you explain and apply technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Utilize computer-aided engineering design software to solve advanced, real-world technological problems.

Big Idea #2: Technological literacy is the ability to use, assess and manage technology around us.

Essential Question: What is the importance of technological literacy?

Concepts: Technological literacy is required for all citizens in a democratic society for shared decision-making

Competencies: Use current technological systems efficiently, identify undesirable results, then design, produce, test and utilize engineering analysis to optimize solutions.

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Curriculum Plan

Time Range in Days: 3-4 days

Standards: Pennsylvania Core State Standards for Science and Technology and Engineering Education

Standards Addressed:

3.4.10.C1, 3.4.10.C2, 3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s) or Adopted Anchor(s):

S11.A.2.1, S11.A.3.1

Overview: Rapid prototyping is the process of using computer driven machines (CNC router) to creating a working prototype in a fraction of the time as compared to more traditional methods. Rapid prototyping is a key element in production today.

Focus Question(s): How do we create prototypes in a fraction of the time as traditional method?

Goals: Students will know how to use a CNC router to create a prototype.

Objectives:

1. Students will know how to use the Modela software to translate the digital Inventor drawings of their names into a wooden prototype. (DOK 2)
2. Students will learn the basic procedures and setup for using CNC machinery. (DOK 2)

Core Activities and Corresponding Instructional Methods:

1. Students will create an electronic toolpath of a nameplate using CNC driver software (Modela)
    a. Demonstration: Modela software
    b. Hands-on: creating toolpath in Modela
2. Students will create a nameplate using the Roland CNC router
    a. Demonstration: Roland CNC router
    b. Hands-on: create nameplate on CNC router

Assessments:

Diagnostic:

Observation of oral response during demonstration of toolpath software and CNC router

Formative:

Digital image and toolpath of nameplate

Summative:

Prototype of nameplate

Materials and Resources

Computer, Inventor Software, Modela Software, Roland CNC Router, Lumber

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UNIT 8: Final Project / Applying Design Process and CAD Software

Big Idea #1: Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Question: How would you explain and apply technological design and problem solving methods in the development of inventions and innovations?

Concepts: Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.

Competencies: Utilize computer-aided engineering design software to solve advanced, real-world technological problems.

Big Idea #2: Technological literacy is the ability to use, assess and manage technology around us.

Essential Question: What is the importance of technological literacy?

Concepts: Technological literacy is required for all citizens in a democratic society for shared decision-making

Competencies: Use current technological systems efficiently, identify undesirable results, then design, produce, test and utilize engineering analysis to optimize solutions.

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Curriculum Plan

Time Range in Days: 18-20 days

Standards: Pennsylvania Core State Standards for Science and Technology and Engineering Education

Standards Addressed:

3.4.10.C1, 3.4.10.C2, 3.4.12.C2, 3.4.12.D2, 3.4.10.E7

Anchor(s) or Adopted Anchor(s):

S11.A.2.1, S11.A.3.1

Overview: The content learned in this class needs to be reinforced to a mastery level and is essential to understanding the process of developing an effective product.

Focus Question(s): Why is it so important to know how to use all of this information to invent or innovate a product.

Goals: Students will be able to effectively develop an invention or innovation of a product.

Objectives:

1. Students will be able to effectively design, engineer and draw an assembled product. (DOK 4)

Core Activities and Corresponding Instructional Methods:

1. Students will create their final project. Students will be given little if any assistance during the final project. Students will have to refer to earlier tutorials and the help function within the software to work through their problems.
    a. Hands-on: final project

Assessments:

Formative:

Progress of final projects

Summative:

Final project

Materials and Resources

Computer, Inventor Software, CNC router, and driver software

Primary Textbook(s) Used for this Course of Instruction

- There are no primary textbooks used in this class

Appendix

STANDARDS:

3.4. Technology and Engineering Education

3.4.A The Scope of Technology

- 3.4.10.A2 - Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.4.C Technology and Engineering Design

- 3.4.10.C1: Apply the components of the technological design process.
- 3.4.10.C2: Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments
- 3.4.12.C2: Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.D Abilities for a Technological World

- 3.4.12.D2: Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.E The Design World

- 3.4.10.E7: Evaluate structure design as related to function, considering such factors as style, convenience, safety, and efficiency

ANCHORS:

S11.A.1: Reasoning and Analysis

- S11.A.1.1: Analyze and explain the nature of science in the search for understanding the natural world and its connection to technological systems.
- S11.A.1.2: Identify and analyze the scientific or technological challenges of societal issues; propose possible solutions and discuss implications.

S11.A.1.3: Describe and interpret patterns of change in natural and human-

S11.A.2 Processes, Procedures, and Tools of Scientific Investigations

- S11.A.2.1 - Apply knowledge of scientific investigation or technological design to develop or critique aspects of the experimental or design process.

S11.A.3 Systems, Models, and Patterns

- S11.A.3.1 – Analyze the parts of a simple system, their roles, and their relationships to the system as a whole.

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Checklist to Complete and Submit with Curriculum:

_____ **A hard copy of the curriculum using The template entitled "Planned Instruction," available on the district website**

_____ **Hard copies of all supplemental resources not available electronically**

_____ **The primary textbook form(s)**

_____ **The appropriate payment form, in compliance with the maximum curriculum writing hours noted on the first page of this document**

_____ **A USB/Flash Drive containing a single file that will print the curriculum in its intended sequence from beginning to end and all supplemental resources that are available in electronic format.**

Each principal and/or department chair has a schedule of First and Second Readers/Reviewers. Each Reader/Reviewer must sign & date below.

First Reader/Reviewer Printed Name_____

First Reader/Reviewer Signature_____ Date_____

Second Reader/Reviewer Printed Name_____

Second Reader/Reviewer Signature _____ Date_____