DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Introduction to Technology

Grade Level: 9-12

Date of Board Approval: _____2017_____

DELAWARE VALLEY SCHOOL DISTRICT

Planned Instruction

Title of Planned Instruction: Introduction to Technology

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

Course Description: This course is intended for all students who are interested in developing a basic understanding of and appreciation for our technological world. Students will explore and complete assignments and projects that focus on the areas of design & engineering, materials, and communication technology. Specific topics include, but are not limited to:

- lineal measurement
- sketching and mechanical drafting
- working drawings / plans & procedures
- structural engineering, design, construction and testing
- graphic design principals
- woodworking
    - terminology / joinery
    - hand and power tools
    - testing equipment
    - LASER engraving

Additionally, students will demonstrate safe appropriate use of hand & power tools in the completion of all assignments.

Time/Credit for the Course: 1 Semester, 90 days

Curriculum Writing Committee: Eric Thiele

Curriculum Map

1. **Marking Period One -Overview based on 45 days:**
   The fields of engineering and design require specific skill sets. 35-45 days

   Marking Period One -Goals:
   Understanding of:
   - **Lineal measurement with precision to 1/16”**
   - **Mechanical drawing/drafting tools**
   - **Single view & multi view projection**
   - **The importance of planning and documentation in the successful completion of projects**
   - **Planning within a budget**
   - **The various forces that act on all structures**
   - **Tools & equipment safety and use**
   - **Testing procedures for structural designs**

2. **Marking Period Two -Overview based on 45 days:**
   The use of renewable resources for goods and products is necessary for future sustainability. 45 days

   Marking Period Two -Goals:
   Understanding of:

- **Lineal measurement with precision to 1/16”**
- **Multi-view drawings and bill of materials**
- **Layout and measurement tools**
- **Safe use and operation of hand and power woodworking tools**
- **Safe use and operation of a LASER engraver**
- **Basic graphic design principles as it relates to proportion**
- **Importance of care and accuracy in processing material for quality**
- **Sequential order in processing and assembly**
- **Benefits of assuming responsibility**

UNIT:1

Big Idea # 1:

- Technology is created, used, and modified by humans

Essential Questions:

- What knowledge and skills are essential for humans to make sound decisions about creating, using, and modifying technologies?

Concepts:

- Decisions about the use of products and systems can result in known and unexpected consequences.
- Creating optimal solutions under constraints are a primary component of technological problem solving (e.g., tools/machines, materials, information, people, capital, energy, and time).

Competencies:

- Describe the complementary roles of scientific knowledge and technological application.
- Explain how making informed decisions about the development and use of technology may have known and unexpected consequences.

Big Idea #2:

- Technological design is a creative process that anyone can do which may result in new inventions and innovations, both expectedly and unexpectedly.

Essential Questions:

- How would you apply technological design and problem solving methods in the development of inventions and innovations?

Concepts:

- Technological design & problem solving requires the ability to clearly communicate engineered solutions.
- Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.
- Technological design & problem solving requires the application of hands-on abilities such as sketching, prototyping, and fabricating.

Competencies:

- Use design and problem solving skills to solve technological challenges.
- Use hands-on skills to create useful products and solve technological challenges.
- Transform ideas into technological products and/or systems.
- Clearly communicate engineered solutions in written, spoken, and graphical means.

Curriculum Plan

Unit: 1 **Time Range in Days:35-45**

Standard(s):
CC.3.5.9-10.C; CC.3.6.9-10.B; CC.2.1.HS.F.2; CC.2.1.HS.F.5 PA – 3.4.10.A1; 3.4.10.B1; 3.4.10.B4

Anchor(s):
S11.A.1.2; S11.A.1.3; S11.A2.1.2; S11.A3.1.2

Overview:
The fields of engineering and design require specific skill sets.

Focus Question(s):

- What are the factors that have influenced our design world?

Goals:

- Students will research various bridge designs and types, then design and build a scaled truss bridge of their own design. Orthographic view drawing and material budgeting, construction, testing, evaluation, and documentation will be required.
- Students will develop proper technique for creating drawings using mechanical drafting equipment

Objectives:
(Include DOK Levels, see attached DOK Wheel on page 13 and refer to definition of DOK levels on page 4 in the Curriculum Writing Guidelines packet.)

- Students will develop proficiency in measuring to 1/16" precision. (DOK 3)
- Students will develop proficiency in drawing lines to 1/16" precision. (DOK3)
- Students will recognize the need for planning and use the engineering/design model. (DOK 1)
- Students will work within the constraints of style, size, and quantity of material. (DOK 3)
- Students will design, construct, and test their structure with emphasis placed on efficiency. (DOK 4)
- Students will document their work and respond to a writing prompt that will encourage them to analyze their results. (DOK 4)

Core Activities and Corresponding Instructional Methods:

1. Develop lineal measurement proficiency to the nearest 16th inch through the use of various handouts and worksheets as well as other physical objects in the lab.

2. Use basic mechanical drawing equipment to develop and improve accuracy in constructing various line types. Repetitive activity for skill development.
3. Independent and group work to research bridge types and applications.
    a. Truss bridge designs
    b. Influence on economic development
    c. Local examples of various types
4. Given size constraints, material budget, and information regarding the stress analyzer used for testing, students will use the engineering/problem solving model to design a scaled truss bridge.
5. Using the multi-view drawing as a template, students will construct their bridge prototype.
6. After completion, bridges will be weighed prior to testing to calculate the efficiency of the structure. This is simply the ratio of the live load divided by the dead load.
7. Determine the relationship between and factors influencing the structural failure of their design.
8. Using a writing prompt, analyze their work and make predictions to improve future results.
9. Time permitting, redesign, rebuild, and retest the structure, in an attempt to improve results.

Assessments:

Diagnostic:

- Oral response/discussion

Formative:

- Reading assignments, vocabulary/concept activities
- Drawing assignments

Summative:

- Prototype design and evaluate/test/document results

Extensions:

- Independently create a full size single-view drawing of a chosen part
- Independently study the influence of the Roebling bridge on the economic growth and development of this area
- Determine the number of bridges within a 10-mile radius and predict the effect of their failure

Correctives:

- Additional time for skill development

- Incorporate group work
- One on one instruction

Materials and Resources:

- Technology Engineering & Design reference text
- Supplemental bridge design handouts
- Mechanical drawing handouts
- Mechanical drawing tools/equipment
- Bridge building supplies
  - Balsa wood
  - Cutters
  - Glue
  - Pins
- Bridge testing equipment – stress analyzer
- Precision scale - grams

UNIT:2

Big Idea # 1:

- Technology is created, used, and modified by humans

Essential Questions:

- What knowledge and skills are essential for humans to make sound decisions about creating, using, and modifying technologies?

Concepts:

- Decisions about the use of products and systems can result in known and unexpected consequences.
- Creating optimal solutions under constraints are a primary component of technological problem solving (e.g., tools/machines, materials, information, people, capital, energy, and time).

Competencies:

- Use design and problem solving skills to solve technological challenges.
- Use hands-on skills to create useful products and solve technological challenges.
- Transform ideas into technological products and/or systems.
- Clearly communicate engineered solutions in written, spoken, and graphical means.
- Use graphics to demonstrate individuality

Big Idea #2:

- Technological design is a creative process that anyone can do which may result in new inventions and innovations.

Essential Questions:

- How would you apply technological design and problem solving methods in the development of inventions and innovations?

Concepts:

- Technological design & problem solving requires the ability to clearly communicate engineered solutions.
- Technological design & problem solving utilizes a series of steps that take place in a well-defined sequence.
- Technological design & problem solving requires the application of hands-on abilities such as sketching, prototyping, and fabricating.

Competencies:

- Use design and problem solving skills to solve technological challenges.
- Use hands-on skills to create useful products and solve technological challenges.
- Transform ideas into technological products and/or systems.
- Clearly communicate engineered solutions in written, spoken, and graphical means.

Curriculum Plan

Unit: 2 **Time Range in Days:35-45**

Standard(s):
(Number Only- See Appendix for Description) CC.3.5.9-10.C; CC.3.6.9-10.B; CC.2.1.HS.F.2; CC.2.1.HS.F.5 PA – 3.4.10.A1; 3.4.10.B1; 3.4.10.B4

Anchor(s):
S11.A.1.2; S11.A.1.3; S11.A2.1.2; S11.A3.1.2

Overview:
The fields of manufacturing, engineering and design require specific skill sets.

Focus Question(s):

- What are the factors that have influenced our design world?

Goals:

- Students will read and interpret a set of working drawings, then execute those plans to create a product.

Objectives:

- Students will improve proficiency in measuring to 1/16" precision (DOK 1)
- Students will continue to recognize the need for planning and use the engineering/design model (DOK 1)
- Students will work within the constraints of a set of working drawings to build to a set tolerance (DOK 3)
- Students will demonstrate safe and proper use of the necessary layout, measurement, and processing tools and equipment to build a product (DOK 2)
- Students will develop confidence in their ability to and appreciation for work (DOK 3)
- Students will document their work and respond to a writing prompt that will encourage them to reflect on their effort (DOK 4)
- Students will demonstrate graphic design principals and develop an individual design (DOK 3)

Core Activities and Corresponding Instructional Methods:

1. Continue to develop lineal measurement proficiency to the nearest 16th inch through the use of various handouts and worksheets as well as other physical objects in the lab.
2. Independent and group work to view and interpret working drawings.
3. Following lectures, demonstrations, and safety testing, students will safely & effectively
    a. Use layout and measuring tools
    b. Use basic hand and power tools
    c. Use stationary woodworking machines and equipment
    d. Use a LASER engraver
4. Develop an understanding of basic woodworking terminology related to board layout and grain direction
5. Use appropriate tools and techniques to assemble various parts
6. Demonstrate sanding and finishing methods as discussed
7. Develop an understanding of basic graphic design principals
8. Demonstrate proper procedure for adjusting the LASER engraver to accommodate different sizes/types of materials.

Assessments:

Diagnostic:

- Oral response/discussion

Formative:

- Reading assignments, vocabulary/concept activities
- Drawing review and interpretation

Summative:

- Product construction and assembly

Extensions:

- Working with a set of prepared plans students will review and discuss the procedures for the accurate completion of this project.
- Review the steps of problem solving and breaking a problem into smaller pieces.
- Discuss the importance of accuracy in cutting material and the effect on quality and appearance.
- Demonstrate/Discuss correct use of layout and measurement tools on chosen materials.
- Demonstrate/Discuss steps in squaring a board – checking for square.
- Review various power tools needed for specific operations and the sequence of use.
- Introduce sanding procedures when preparing to stain and clear coat a project.
- Create an individual LASER engraved product

Correctives:

- Individual instruction and demonstrations will be given to students having difficulty

Materials and Resources:

- ○ Technology Engineering & Design reference text
- ○ Safety glasses
- ○ Equipment/Tools & Various layout & measuring tools
  - o Belt/Disk Sander
  - o Scroll Saw o Band Saw
  - o Radial Arm Saw
  - o Jointer
  - o Motorized Miter Box
  - o Palm Sander
  - o Router/Shaper
  - o Hand drill
  - ○ LASER engraver
  - ○ Corel Draw design software
- ○ Materials
  - o 1x6 Pine & Oak lumber
  - o Wood glue / wood filler
  - o Clamps & Sand paper – 100 / 150 / 220 grit
  - o Assorted sealers/stains

Primary Textbook(s) Used for this Course of Instruction

Name of Textbook: **Technology Engineering & Design**

Textbook ISBN #: **978-0-07-876810-1**

Textbook Publisher &Year of Publication: **Glencoe/McGraw-Hill 2008**

Curriculum Textbook is utilized in **Introduction to Technology**:

Checklist to Complete and Submit:

(Scan and email)

_____ Copy of the curriculum using the template entitled "Planned Instruction," available on the district website.

_____ 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.

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

First Reviewer Printed Name_____

First Reviewer Signature_____ Date_____

Second Reviewer Printed Name_____

Second Reviewer Signature _____ Date_____