DELAWARE VALLEY SCHOOL DISTRICT

PLANNED INSTRUCTION

A PLANNED COURSE FOR:

Manufacturing Technology

Grade Level: 10-12

Date of Board Approval: _____2024_____

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Planned Instruction

Title of Planned Instruction: Manufacturing Technology

Subject Area: Technology Education Grade(s): 10-12

Course Description: This course is designed for students who have successfully completed **Introduction to Technology** and or **Technology Systems** and is created to emulate, to some degree, a manufacturing environment. Students will form a student enterprise, conduct market research, then design and manufacture a product. The purpose of this exercise is to challenge students to think independently and cooperatively for a solution to a problem. Using a problem solving/design model common to engineers, students will take their ideas from concept to concrete while developing a greater appreciation for the technology and products that are often taken for granted.

Time/Credit for the Course: 90 hours/ 1/2 credit

Curriculum Writing Committee: Eric Thiele

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Course Weighting: Manufacturing Technology

Participation	**20%**
Safety Tests	**35%**
Projects	**45%**
Total	**100%**

Curriculum Map

Overview: In Unit 1 of Manufacturing Technology, students will have a review of the measurement unit learned in the Introduction to Technology course, as well as a safety review of the equipment used in the Introduction to Technology course. Upon completion of the review, students will begin using the machines to build a storage box. Students will then apply what they learned to program a CNC router and use their skills to design and build a wooden house sign. Unit 2 involves students working in teams to develop a working business plan, complete with working drawings that would be used to secure a loan from the bank. They must design and build a prototype to accompany the business plan, at which point the students vote to determine which project should be built as a class. Jigs and fixtures are developed to aid in the production of 25 identical products during this unit.

Goals:

Students will have an understanding of lineal measurement with precision to 1/16" inch
Students will apply mechanical drafting tools and principles to design solutions
Students will construct a predesigned storage box to within 1/16" tolerance
Students will design a house sign and program a CNC router to carve their sign
Students will develop a working business plan with their team
Students will design single and multi-view drawings
Students will create a prototype while staying within a budget
Students will develop jigs and fixtures to aid in the completion of the manufacturing project
Students will work together to create 25 identical projects, some of which will be sold to generate funds for the program

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UNIT: 1

Big Ideas:

- Technology is created, used, and modified by humans.
- 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).
- Technological design is a creative process that anyone can do which may result in new inventions and innovations.
- 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.

UNIT: 2

Big Ideas:

- Technology is created, used, and modified by humans.
- 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).
- Technological design is a creative process that anyone can do which may result in new inventions and innovations.
- 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.

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Primary Textbook(s) Used for this Course of Instruction

Name of Textbook (reference): Technology Engineering & Design

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

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

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Curriculum Plan

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

Standard(s):
3.4.12.A2, 3.4.12.A3, 3.4.12.C2, 3.4.10.D1, 3.4.10.D2, 3.4.10.E6, 3.4.10.E7, 3.5.9-12.M

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

Eligible Content:

- What are the factors that have influenced our designed world?
- What does "necessity is the mother of invention" mean to you?

Objectives:

1. Students will develop proficiency in reading and interpreting a set of working drawings, then execute those plans to create a product. (DOK3)
2. Students will demonstrate safe correct use of hand and power tools while working independently on an assigned product. (DOK3)
3. Students will recognize individual differences between the products and conclude the reason for this occurrence. (DOK1)
4. Students will develop skills and self-confidence as they create this product. (DOK 3)

Core Activities and Corresponding Instructional Methods:

1. Continue to develop lineal measurement proficiency and cutting ability to the nearest 16^{th} inch through the use of a required construction project.
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
4. Develop an understanding of basic woodworking terminology related to board layout and grain direction.
5. Use appropriate tools and techniques for sequential assembly of various parts.
6. Demonstrate sanding and finishing methods as discussed.
7. Analyze the processes and procedures used and critique work individually and collectively.

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Assessments:

Diagnostic:

- Oral response/discussion

Formative:

- Reading assignments, vocabulary/concept activities
- Drawing review and interpretation
- Apply concepts and create product

Summative:

- Product construction and assembly
- Final analysis/critique

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Curriculum Plan

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

Standard(s):

3.4.12.A2, 3.4.12.A3, 3.4.12.C2, 3.4.10.D1, 3.4.10.D2, 3.4.10.E6, 3.4.10.E7, 3.5.9-12.M

Anchor(s):

S11.A.1.2; S11.A.1.3; S11.A2.1.2; S11.A3.1.2

Eligible Content:

- What are the factors that have influenced our designed world?
- What does "necessity is the mother of invention" mean to you?
- How has manufacturing changed over time?

Objectives:

1. Students will create and design a set of working drawings, then execute those plans to create a product. (DOK 4)
2. Students will demonstrate safe correct use of hand and power tools while working independently and collectively on a selected product. (DOK 2)
3. Students will recognize the need for high organization and precision in order to create a product that is desirable. (DOK 3)
4. Students will develop individual skills, group skills, and self-confidence as they create a product. (DOK 3)
5. Students will apply concepts of manufacturing to create a high quality product. (DOK 4)

Core Activities and Corresponding Instructional Methods:

1. Create a product based on basic criteria of
    a. Function
    b. Size
    c. Complexity
    d. Cost
    e. Marketability
2. Research, sketch, and develop working drawings for selected product
3. Prototype the design
4. Analyze and redesign/modify original plan
5. Review/revise processes and develop a process/flow chart
6. Design and construction needed fixtures and templates
7. Establish work groups for various processes/tasks and begin product run

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Assessments:

Diagnostic:

- Oral response/discussion

Formative:

- Reading assignments, vocabulary/concept activities
- Drawing/planning review and interpretation
- Creating a working business plan
- Selecting product to develop and prototype
- Prototyping selected product
- Market analysis for product selected

Summative:

- Product construction and assembly
- Marketing and sales