

# **Manufacturing Curriculum Outline**

## **Course Information – Shamokin Area School District**

Course Title: Manufacturing

Course ID Number: 090600

Course Length: 1 Period Per Day, Full Year

Credit Weight: 1 Credit

Credit Type: Elective

Grades Offered: 9-12

### **Course Description:**

“Manufacturing” is a technology course that emphasizes skills that can be used in a modern industrial setting. Students will interact with technology that is typically found in these settings. In addition, students will also complete a construction unit, which will introduce basic electrical, plumbing, and construction methods found within a residential setting.

### **Objectives:**

- Measurement
- Safety in an Industrial Setting
- Proper Use of Machinery
- Wood Working Concepts
- Concepts of Industry Practices
- Residential Plumbing, Electrical, and Construction

### **Grading Procedures:**

25% - Participation

25% - Class Work

25% - Test/Quiz

25% - Projects

## Unit 1 – Introduction

### Overview

This unit will take place at the inception of the class. Its purpose is to inform the students of the format of the course with regards to the objectives listed below.

### Objectives:

1. To familiarize students with course instructor and locations of lab and lecture areas.
2. To give a brief overview of the content that will be covered during the course.
3. To familiarize students with emergency procedures for both lab and lecture areas.
4. To familiarize students with normal daily class procedures. For example: Completing bell ringers, lavatory policies, lecture and lab practices, etc.
5. To familiarize students with course grading procedures.
6. To have students remember/apply for credentials to logon to the district network.

Suggested Unit Time Frame: Two Full Class Periods

PDE SAS Standards:

N/A

Assessments:

N/A

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## Unit 2 – Measurement

### Overview:

It is essential for students to be able to accurately read and use a ruler correctly down to  $1/16^{\text{th}}$  of an inch. This unit has students not only how to read a ruler but actually learn how a ruler works. Practice is done with reading a ruler and recording the measurements as well as placing measurements at the correct place on the ruler.

### Objectives:

1. To review the parts of an inch down to  $1/16^{\text{th}}$  of an inch.
2. To have students practice by placing the correct measurements at the correct place on the ruler.
3. To have students interpret the ruler and record specific measurements.
4. To assess student's knowledge of the ruler.

Suggested Unit Time Frame: Three Class Periods

PDE SAS Standards:

- 3.4.12.C3- Apply the concept that many technological problems require a multi-disciplinary approach.
- 3.4.12.E6- Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.

Assessments:  
Ruler Test

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## Unit 3 – General Safety

### Overview:

The purpose of this unit is to familiarize students with general safety concepts pertaining specifically to the materials lab but also concepts that can be transferred into “real world” applications.

### Objectives:

1. To familiarize students with safety concepts specific to the materials lab.
2. To explain how the knowledge from this unit can be transferred into the “real world.”
3. To assess student’s comprehension of safety concepts before allowing them to use machinery.

### Suggested Time Frame for Unit: Two Class Periods

### PDE SAS Standards:

**10.3.9.A:** Analyze the role of individual responsibility for safe practices and injury prevention in the home, school and community.

**10.3.9.D:** Analyze the role of individual responsibility for safety during organized group activities.

**10.3.12.A:** Assess the personal and legal consequences of unsafe practices in the home, school or community.

**3.4.10.A3:** Examine how **technology** transfer occurs when a new user applies an existing **innovation** developed for one purpose in a different function.

### Assessments-

General Lab Safety Test

## Unit 4 – Introduction to Wood Working

### Overview:

The purpose of this unit is to begin instructing students on lumber properties, lumber calculations, and wood working techniques.

### Objectives:

1. To familiarize students with materials lab procedures.
2. To demonstrate the safe and proper use of the various machines in the materials lab.
3. To explain various lumber properties including measuring board feet, defects in lumber, and identifying different species and specific purposes.
4. To have students manufacture the cutting board project.
5. To have students manufacture the chest project.
6. To have students be able to plan and estimate costs of classes.
7. To have students learn progressive sanding methods.
8. To define several types of joinery methods used in fine wood working.

**Suggested Time Frame: Approx. 55 Class Periods**

### PDE Standards:

3.4.10.A1- Illustrate how the development of technologies is often driven by profit and an economic market.

3.4.10.A3: Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.

3.4.12.A1- Compare and Contrast the rate of technological development over time.

3.4.10.B1- Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.

3.4.10.B4- Recognize the technological development has been evolutionary, the result of a series of refinements to a basic invention.

3.4.10.C3- Illustrate the concept that not all problems are technological and not every problem can be solved using technology.

3.4.12.C3- Apply the concept that many technological problems require a multi-disciplinary approach.

3.4.10.D1- Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

3.4.10.E6- Illustrate how manufacturing systems may be classified into types such as customized production, batch production, and continuous production.

### Assessments:

Cutting Board Project

Chest Project

Machine Safety Test

Bill of Materials: Cutting Board

Bill of Materials: Chest Project

Board Feet Calculations Worksheet

Class Participation

Lab Clean-Up Participation

Midterm Exam

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## Unit 5 – Intermediate Wood Working

**Overview:** As the course continues, students will be introduced to more advanced wood working concepts including joinery and moving parts.

**Objectives:**

1. Students will complete the Foot Stool Project (Even-Odd School Years) or the End Table Project (Odd-Even School Years).
2. Students will complete the Folding Stool Project.
3. Students will learn how to properly and safely use machinery that is used for specific purposes (i.e. Mortisers, Dowel Rod Maker, etc.)
4. Students will complete a "Bill of Materials" for the foot stool or end table projects.
5. Students will complete a "Bill of Materials" for the folding stool project.
6. Students will be introduced to the five processes of manufacturing.

**Suggested Time Frame:** Approx. 50 Class Periods

**PDE Standards:**

- 3.4.10.A1- Illustrate how the development of technologies is often driven by profit and an economic market.
- 3.4.10.A3: Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
- 3.4.12.A1- Compare and Contrast the rate of technological development over time.
- 3.4.10.B1- Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
- 3.4.10.B4- Recognize the technological development has been evolutionary, the result of a series of refinements to a basic invention.
- 3.4.10.C3- Illustrate the concept that not all problems are technological and not every problem can be solved using technology.
- 3.4.12.C3- Apply the concept that many technological problems require a multi-disciplinary approach.
- 3.4.10.D1- Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
- 3.4.10.E6- Illustrate how manufacturing systems may be classified into types such as customized production, batch production, and continuous production.

**Assessments:**

Foot Stool or End Table Projects

Folding Stool

Bill of Materials for Foot Stool or End Table Projects

Bill of Materials for Folding Stool

Class Participation

Lab Clean-Up Participation

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## Unit 6 – Construction Methods

**Overview:** During this unit, students will have the opportunity to experience lectures and hands-on activities that relate to all areas of construction. These experiences include, blue prints, safety in the work place, building materials, foundations, framing, plumbing, electrical, water heaters, HVAC, and insulation.

**Objectives:**

1. To introduce students to the concept of blue prints.

2. To introduce students to the concept of safety regulations (OSHA).
3. To introduce students to the concept of typical building materials.
4. To introduce students to the concept of foundations both modern and ancient.
5. To introduce students to the concept of residential wooden framing.
6. To introduce students to the concept of basic residential plumbing practices.
7. To introduce students to the concept of basic residential electrical practices.
8. To introduce students to the concept of residential/light commercial water heaters.
9. To introduce students to the concept of residential/light commercial HVAC systems.
10. To introduce students to the concept of residential insulation practices.
11. To have students learn, first hand, how to solder with copper pipe.
12. To have students learn, first hand, how to complete some basic residential electrical circuits.

**Suggested Time Frame: Approx. 30 Class Periods**

**PDE Standards:**

- 3.4.10.A1- Illustrate how the development of technologies is often driven by profit and an economic market.
- 3.4.10.A3: Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
- 3.4.12.A1- Compare and Contrast the rate of technological development over time.
- 3.4.10.B1- Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
- 3.4.10.C3- Illustrate the concept that not all problems are technological and not every problem can be solved using technology.
- 3.4.12.C3- Apply the concept that many technological problems require a multi-disciplinary approach.
- 3.4.10.D1- Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

**Assessments:**

Worksheets Tailored to Each Lecture  
Water Heater Research Assignment  
HVAC Research Assignment  
Copper Soldering Activity  
Residential Electrical Activity  
Final Exam

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## **Unit 7 – Writing Prompts**

Per the administration, this unit is to be conducted at least one time each marking period.

**Overview:**

Students are to practice their comprehension and writing skills in order to perform better on state mandated testing. The prompt has been altered in order to fit into the regular curriculum for the class. Students will be finding a current article from a “reliable” online periodical resource which relates to technology.

**Objectives:**

1. To have students locate an article from a reliable online resource.
2. To have students summarize the article in one paragraph.

3. To have students form an educated opinion on the evolving technology and support their opinion using a resource which is documented with parenthetical notations.
4. To have students complete the assignment using APA formatting guidelines.

Suggested Time Frame: Approx. 2 Class Periods Per Occurrence.

**PDE Standards:**

CC.1.2.9-10.B -Cite strong and thorough textual evidence to support analysis of what the text says explicitly as well as inferences and conclusions based on an author's explicit assumptions and beliefs about a subject.

CC.1.4.9-10.C Develop and analyze the topic with relevant, well-chosen, and sufficient facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience's knowledge of the topic; include graphics and multimedia when useful to aiding comprehension.

**Assessments:**

Technology Current Event Assignment

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