



SPRING GROVE AREA SCHOOL DISTRICT



PLANNED COURSE OVERVIEW

Course Title: Materials Fabrication Grade Level(s): 10-12 Units of Credit: .5 Classification: Elective	Length of Course: 15 cycles Periods Per Cycle: 6 Length of Period: 43 minutes Total Instructional Time: 64.5 hours
---	---

Course Description

This class examines processes used in modern fabrication. Wood, metal, and polymer materials are utilized in conjunction with laboratory safety to explore a variety of manufacturing processes. This class will allow students to learn and experience the fabrication of a variety of materials and processes used in manufacturing. The student will pay a lab fee for this course.

Instructional Strategies, Learning Practices, Activities, and Experiences

Classroom Discussion Student/Teacher-Made Project Sheets Teacher/Lecture on Machine Safety	Follow up with Demonstrations Teacher/Student Discussion Hand Tool Safety Lessons	Students Working with Hand Tools and Machinery Teacher/Student Problem-Solving
--	---	---

Assessments

Proper Safety Quizzes Project Reflections Constructed Response Prompts	Test Product for Quality Control Using Proven Methods Project Rubrics	Ability to Measure to the Nearest 1/1000 of an Inch Final Exam Manipulative Final Project
--	--	---

Materials/Resources

Fabrication Labs Tech Ed Resource Library	Materials Testing Equipment	Computer Numerical Control (CNC) Equipment
--	-----------------------------	--

Adopted: 8/18/08

Revised: 5/21/18

Machine Safety and Tools	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>The students will demonstrate the knowledge needed to work safely with metal working tools and equipment.</p> <ul style="list-style-type: none"> • Saws and Cutting Operations • Drilling and Fabrication • Finishing and Hardware • Equipment Safety • Measuring and Quality Control • Reading Plans <p><u>Related Vocabulary:</u> dimensions tolerance machine guards eye protection materials flow quality control drilling steps coarse/fine threads hardwood/soft woods veneer</p>	<p>Science and Technology Standards 3.4.10.A2. ~ Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems. 3.4.10.C1. ~ Apply the components of the technological design process. 3.4.10.D2. ~ 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 such as customized production, batch production, and continuous production.</p> <p>Mathematics Standards CC.2.1.HS.F.3 ~ Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays. CC.2.1.HS.F.4 ~ Use units as a way to understand problems and to guide the solution of multi-step problems.</p> <p>English Language Arts Standards CC.1.2.9–10.J ~ Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. CC.1.3.9–10.J ~ Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>

CNC Machinery	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>The students will understand and apply the principles of automation in a manufacturing environment.</p> <ul style="list-style-type: none"> • Program CNC Machines • Setup and Production of CNC Parts • Careers in Materials Fabrication <p><u>Related Vocabulary:</u> assembly line computer-integration manufacturing mass production production cycle production line workstation</p>	<p>Science and Technology Standards</p> <p>3.4.10.A2. ~ Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.</p> <p>3.4.10.C1. ~ Apply the components of the technological design process.</p> <p>3.4.10.D2. ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p> <p>3.4.10.E6. ~ Illustrate how manufacturing systems may be classified into such as customized production, batch production, and continuous production.</p> <p>3.4.10.D1. ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.</p> <p>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.</p> <p>3.4.10.C3. ~ Illustrate the concept that not all problems are technological and not every problem can be solved using technology.</p>

Engineering	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>The students will apply principles and skills associated with engineering to solve a design problem.</p> <ul style="list-style-type: none"> • Measuring and Quality Control • Reading Plans • Equipment Safety • Hand Tool Safety <p><u>Related Vocabulary:</u> quality control blue prints materials list piloting soldering polarity prototype</p>	<p>Science and Technology Standards</p> <p>3.4.10.A2. ~ Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.</p> <p>3.4.10.C1. ~ Apply the components of the technological design process.</p> <p>3.4.10.D2. ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p> <p>3.4.10.E6. ~ Illustrate how manufacturing systems may be classified into such as customized production, batch production, and continuous production.</p> <p>3.4.10.D1. ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.</p> <p>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.</p> <p>3.4.10.C3. ~ Illustrate the concept that not all problems are technological and not every problem can be solved using technology.</p> <p>Mathematics Standards</p> <p>CC.2.1.HS.F.3 ~ Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.</p> <p>CC.2.1.HS.F.4 ~ Use units as a way to understand problems and to guide the solution of multi-step problems.</p>

Production	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>The students will demonstrate the knowledge needed to plan and run a production line project.</p> <ul style="list-style-type: none"> • Production Types • Moving Materials • Testing Production Solutions <p><u>Related Vocabulary:</u> assembly line computer-integration manufacturing mass production production cycle production line workstation</p> <p>*Enrichment and Expanded Opportunities: Automation and Robotics Student Guides, Teacher Prepared Information Sheets, Reference Books, Independent Study</p> <p>*Remediation and Intervention Strategies: Teacher Observation of Students, Student/Teacher Conferencing, Notebook and Project Review</p> <p>*Applies to Entire Course</p>	<p>Science and Technology Standards 3.4.10.A2. ~ Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems. 3.4.10.C1. ~ Apply the components of the technological design process. 3.4.10.D2. ~ 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 such as customized production, batch production, and continuous production.</p> <p>Mathematics Standards CC.2.1.HS.F.3 ~ Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays. CC.2.1.HS.F.4 ~ Use units as a way to understand problems and to guide the solution of multi-step problems.</p> <p>English Language Arts Standards CC.1.2.9–10.J ~ Acquire and use accurately general academic and domain-specific words and phrases, sufficient for reading, writing, speaking, and listening at the college- and career-readiness level; demonstrate independence in gathering vocabulary knowledge when considering a word or phrase important to comprehension or expression. CC.1.3.9–10.J ~ Acquire and use accurately grade-appropriate general academic and domain-specific words and phrases; gather vocabulary knowledge when considering a word or phrase important to comprehension or expression.</p>