



**SPRING GROVE AREA SCHOOL DISTRICT**



**PLANNED COURSE OVERVIEW**

<b>Course Title:</b> Technology Education Independent Study <b>Grade Level(s):</b> 12 <b>Units of Credit:</b> 1 <b>Classification:</b> Elective	<b>Length of Course:</b> 30 cycles <b>Periods Per Cycle:</b> 6 <b>Length of Period:</b> 43 minutes <b>Total Instructional Time:</b> 129 hours
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***Course Description***

The purpose of this course is to enhance the students' experiences and abilities prior to post-secondary education and to provide additional enrichment for students who have completed Technology Education courses offered at Spring Grove Area High School. The course is based on the students' desires to develop experiences and skills within the technology framework. The course will offer an additional educational experience for students who have a desire to explore and expand their knowledge in a technology-based area of study.

***Instructional Strategies, Learning Practices, Activities, and Experiences***

Teacher Demonstrations Constructive Response Journal Logs	Independent Research Project Construction Posted Objectives and Agenda	Bell Ringers
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***Assessments***

Journal Entries	Independent Projects	Project Slide Shows
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***Materials/Resources***

Technology Laboratory Procedures and Equipment as Provided by Instructor	Technology Resources and Equipment as Needed to Meet Student Goals
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**Adopted:** 6/30/2011

**Revised:** 5/21/18

Designing and Materials Selection	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Design and Function B. Materials Estimation</p> <p><u>Related Vocabulary:</u> dimension scale</p> <p><u>Essential Question:</u> What methods are used to design, select and fabricate materials into a useful object?</p>	<p><b>3.4.12.A2</b> – Describe how management is the process of planning, organizing, and controlling work.  <b>3.4.12.A3</b> – Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM).  <b>3.4.10.A2</b> – Interpret how systems thinking applies logic and creativity with appropriate comprise in complex real-life problems.  <b>3.4.10.A3</b> – Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.  <b>3.4.10.C1</b> – Apply the components of the technological design process.  <b>3.4.10.C2</b> – Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.  <b>3.4.12.C2</b> – Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.  <b>3.4.12.C3</b> – Apply the concept that many technological problems require a multi-disciplinary approach.  <b>3.4.10.D1</b> – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.  <b>3.4.10.D2</b> – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.  <b>3.4.12.E6</b> – Compare and contrast the importance of science, technology, engineering, and math (STEM) as it pertains to the manufactured world.</p>

Product Selection and Research	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Research Guidelines                      B. Materials Classification and Utilization                      C. Testing with Engineering Principles</p> <p><u>Related Vocabulary:</u>                      component                      composite                      forming                      inventory                      optimization                      pattern                      problem-solving                      process                      prototype                      structured materials                      system                      tension                      profile                      subassembly</p> <p><u>Essential Questions:</u>                      How can a product be produced using safe, research-based, and manufacturing technology?                      What principles of engineering apply to the design of a product?                      How can a design be tested for workability?</p>	<p><b>3.4.12.A2</b> – Describe how management is the process of planning, organizing, and controlling work.  <b>3.4.12.A3</b> – Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM).  <b>3.4.10.A2</b> – Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.  <b>3.4.10.A3</b> – Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.  <b>3.4.10.C1</b> – Apply the components of the technological design process.  <b>3.4.10.C2</b> – Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.  <b>3.4.10.C3</b> – Illustrate the concept that not all problems are technological and not every problem can be solved using technology.  <b>3.4.12.C2</b> – Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.  <b>3.4.10.D1</b> – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.  <b>3.4.10.D2</b> – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Materials Processing and Fabrication	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Designing a Materials List                      B. Machine and Tool Safety                      C. Personal Safety</p> <p><u>Related Vocabulary:</u>                      route                      separating                      shear                      simulation                      constraints                      protective                      dangerous                      hazard                      guidelines                      working drawing</p> <p><u>Essential Questions:</u>                      How can you produce a cut list from your design plans and materials lists?                      Do I know how to safely operate the hand tools and power equipment needed to fabricate my project?                      What are the safety rules for the area that I am working in?</p>	<p><b>3.4.12.C2</b> – Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p><b>3.4.10.D1</b> – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.</p> <p><b>3.4.10.D2</b> – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Product Development and Construction	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Production Timelines                      B. Charts and Work Logs</p> <p><u>Related Vocabulary:</u>                      assembly                      product configuration                      productivity                      strength                      time and place utility                      tooling-up                      universal design                      documentation                      flowchart</p> <p><u>Essential Questions:</u>                      How will I create a production timeline and schedule?                      Why is it important to chart your progress while the project is under construction?                      What are several ways to log your activities?</p>	<p><b>3.4.12.A2</b> ~ Describe how management is the process of planning, organizing, and controlling work.  <b>3.4.12.A3</b> ~ Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM).  <b>3.4.10.A2</b> ~ Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.  <b>3.4.10.A3</b> ~ Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.  <b>3.4.10.C1</b> ~ Apply the components of the technological design process.  <b>3.4.10.C2</b> ~ Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.  <b>3.4.10.C3</b> ~ Illustrate the concept that not all problems are technological and not every problem can be solved using technology.  <b>3.4.12.C2</b> ~ Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.  <b>3.4.10.D1</b> ~ Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.  <b>3.4.10.D2</b> ~ Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Construction and Fabrication - 1	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Project Records                      B. New Materials and Processes</p> <p><u>Related Vocabulary:</u>                      value analysis                      allowances                      cartesian coordinate system                      clearance                      element                      fixture</p> <p><u>Essential Questions:</u>                      How can a work log aid your project's success?                      What safety components do you use when working with new materials?                      What research methods can you use to find the best fabrication process?</p>	<p><b>3.4.12.A2</b> – Describe how management is the process of planning, organizing, and controlling work.  <b>3.4.12.A3</b> – Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM).  <b>3.4.10.C1</b> – Apply the components of the technological design process.  <b>3.4.10.C2</b> – Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.  <b>3.4.10.C3</b> – Illustrate the concept that not all problems are technological and not every problem can be solved using technology.  <b>3.4.12.C2</b> – Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.  <b>3.4.10.D1</b> – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.  <b>3.4.10.D2</b> – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Construction and Fabrication - 2	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Product Research and Design                      B. Construction and Fabrication</p> <p><u>Related Vocabulary:</u>                      bench mark                      proportion                      tolerance                      metallurgy                      scheduling                      unity                      troubleshooting                      brainstorming</p> <p><u>Essential Questions:</u>                      On what components of your project research would you like to expand?                      How can you apply your knowledge of construction and fabrication in completing the Independent Study project?</p>	<p><b>3.4.12.A2</b> – Describe how management is the process of planning, organizing, and controlling work.  <b>3.4.12.A3</b> – Demonstrate how technological progress promotes the advancement of science, technology, engineering, and mathematics (STEM).  <b>3.4.10.A2</b> – Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.  <b>3.4.10.A3</b> – Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.  <b>3.4.10.C1</b> – Apply the components of the technological design process.  <b>3.4.10.C2</b> – Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.  <b>3.4.10.C3</b> – Illustrate the concept that not all problems are technological and not every problem can be solved using technology.  <b>3.4.12.C2</b> – Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.  <b>3.4.10.D1</b> – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.  <b>3.4.10.D2</b> – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Construction and Fabrication - 3	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Fastening Methods</p> <p><u>Related Vocabulary:</u> gage number keyway machine bolt cotter pin carriage bolt lock washer rivet case-harden thread pitch</p> <p><u>Essential Questions:</u> How will fasteners be used in the construction of your project? How can you apply your knowledge of construction and fabrication in completing the Independent Study project?</p>	<p>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.</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.D2 - Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>



Construction and Fabrication - 4	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Product Hardware</p> <p><u>Related Vocabulary:</u> locks knobs cylinder lever countersink hasp</p> <p><u>Essential Questions:</u> What hardware will you need to complete your project? How can you apply your knowledge of construction and fabrication in completing the Independent Study project?</p>	<p><b>3.4.12.C2</b> – Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.</p> <p><b>3.4.10.D1</b> – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.</p> <p><b>3.4.10.D2</b> – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Construction and Fabrication - 5	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Product Finish</p> <p><u>Related Vocabulary:</u>                      surface finish                      buffing                      painting                      grinding                      enameled                      primer                      powder-coating                      electroplating                      contamination                      chemical                      lacquer                      solvent                      corrosion</p> <p><u>Essential Questions:</u>                      What methods of finishing are best suited to your project?                      How can you apply your knowledge of construction and fabrication in completing the Independent Study project?</p>	<p>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.</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.D2 - Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>

Compare, Contrast and, Evaluate the Projects Success	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>A. Research and Construction                      B. Researching Careers                      C. Product Utilization</p> <p><u>Related Vocabulary:</u>                      evaluation                      feedback                      impact                      visualization                      accuracy                      inspection                      apprentice                      journeyman                      technician                      computer                      numerically                      controlled</p> <p><u>Essential Questions:</u>                      What new fabrication processes have you learned through your research and construction?                      What careers are related to what you have learned throughout the project?                      How can you utilize the knowledge that you have gained through the project to continue your lifelong learning?</p>	<p>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.                      3.4.10.D1 – Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.                      3.4.10.D2 – Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.</p>