

# **Technology Education**

## **CURRICULUM**

### **METALS I**

(Elective Course)

#### **Supports Academic Learning Expectation # 2**

Students and graduates of Ledyard High School will speak clearly and communicate ideas accurately in a variety of settings

#### **Supports Academic Learning Expectation # 3**

Students and graduates of Ledyard High School will employ problem-solving skills effectively

#### **Supports Academic Learning Objective # 5**

Students and graduates of Ledyard High School will demonstrate critical thinking skills

**Approved by the Instructional Council  
May 19, 2008**

**STUDENT LEARNING OBJECTIVES**  
**Metals I**

As a result of Technology Education, students independently and collaboratively will be able to:

<p><b>GOAL: District Goal #1 (State Standard #1) The Nature &amp; Evolution of Technology</b></p> <p>Understand the nature of technology, how it has evolved and its influence on its own evolution</p>	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<p><i>Students will know how to:</i></p> <p>1.1 Critically analyze a given technology against a perceived need or want</p> <p>1.2 Research how, social, economic, and political forces influence innovation, invention and adaptation</p> <p>1.3 Describe the transformation and conservation of kinetic and potential energy in mechanical, chemical and electrical systems.</p> <p>1.4 Explore and describe how electricity is generated, transferred and used in modern technologies.</p> <p>1.5 Use the systems model to analyze a complex technological system;</p> <p>1.6 Investigate the universal characteristics of systems and sub-systems;</p>	<p><i>Students will be able to:</i></p> <p>a. Design and construct functional projects based on their own needs or wants utilizing appropriate technology such as casting, forging, sheet metal, and CNC machining</p> <p>a. Compare and contrast in written form industrial/societal needs versus ecological needs such as the impact of raw material mining versus its effect on animal habitats</p> <p>b. Discuss the benefits of recycling</p> <p>a. Describe how kinetic/potential energy is used to form, shape and connect metal products</p> <p>a. Utilize arc welders that convert AC to DC which generates heat to melt metal</p> <p>a. Choose appropriate sub-systems to fabricate a product</p> <p>a. Identify and apply the universal characteristics of the systems and sub-systems such as three-view drawings and measuring needed to produce various metal projects</p>

**STUDENT LEARNING OBJECTIVES**  
**Metals I**

As a result of Technology Education, students independently and collaboratively will be able to:

<p><b>GOAL:</b> District Goal #2 (State Standard #2) The <b>Impacts of Technology</b></p> <p>Understand the impact that technology has on the personal, social, cultural, economic, political and environmental aspects of their lives.</p>	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<p><i>Students will know how to:</i></p> <p>2.1 Analyze technologies based on their positive and negative impacts;</p> <p>2.2 Describe the evolution of a technological system and its influence on the economy, culture, society and environment;</p> <p>2.3 Demonstrate an understanding of local, state and national regulatory agencies in home and workplace safety;</p> <p>2.4 Select and demonstrate ethical solutions to technological problems;</p> <p>2.5 Identify and explore career opportunities in the areas of technology;</p> <p>2.6 Describe and evaluate how society's expectations drive technological development;</p>	<p><i>Students will be able to:</i></p> <p>a. Identify the most effective and safe technology needed to perform a task</p> <p>a. Describe how recycled materials influence our environment and economy</p> <p>b. Describe the evolution of plumbing materials and the impact on the economy and the environment</p> <p>c. Compare and contrast artisan made products versus mass manufactured products</p> <p>a. Demonstrate an understanding of the role government safety agencies such as OSHA and NIOSH play in the workplace</p> <p>b. Read and use the information contained on material safety sheets</p> <p>a. Demonstrate an understanding of the negative impacts of strip-mining</p> <p>a. Identify manufacturing career opportunities that could be pursued using their developed skills</p> <p>a. Describe the impact of societal safety expectations on technological development such as tool development</p> <p>b. Research the impact of societal economic expectations resulting in outsourcing</p>

**STUDENT LEARNING OBJECTIVES**  
**Metals I**

As a result of Technology Education, students independently and collaboratively will be able to:

<p><b>GOAL: District Goal #3 (State Standard #3) The Research, Design &amp; Engineering</b></p> <p>Recognize that technology is the result of a creative act, and will be able to apply formal problem-solving strategies to enhance invention and innovation.</p>	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<p><i>Students will know how to:</i></p> <p>3.1 Use research techniques to support design development;</p> <p>3.2 Investigate multiple solutions to a design problem;</p> <p>3.3 Use a communication technologies to visualize a design idea;</p> <p>3.5 Document a design to facilitate replication;</p> <p>3.6 Select appropriate technical processes and fabricate a prototype;</p>	<p><i>Students will be able to:</i></p> <p>a. Utilize internet information to facilitate product design</p> <p>a. Identify appropriate materials and manufacturing processes to create specific metal projects</p> <p>a. Create products from design drawings</p> <p>a. Create a set of design drawings to facilitate the manufacturing of a product</p> <p>a. Design and build various prototypes utilizing appropriate technical processes</p>

**STUDENT LEARNING OBJECTIVES**  
**Metals I**

As a result of Technology Education, students independently and collaboratively will be able to:

<p><b>GOAL: District Goal #4 (State Standard #) 4 The Creation &amp; Use of Technology</b></p> <p>Know the origins, properties and processing techniques associated with the material building blocks of technology as demonstrated by effective application of the methods producing usable products and by effectively using those products.</p>	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<p><i>Students will know how to:</i></p> <p>4.1 Compare the techniques used to extract raw materials;</p> <p>4.2 Process materials based on their properties;</p> <p>4.3 Experiment with the alteration of material characteristics;</p> <p>4.4 Create a product demonstrating the application of technological processes;</p> <p>4.5 Use tools and procedures safely;</p>	<p><i>Students will be able to:</i></p> <p>a. Research and describe the various methods used in mining</p> <p>a. Identify metal characteristics such as hardness, corrosion resistance, strength to weight ratio and how these properties affect processing</p> <p>a. Explore a variety of ways to alter metal materials such as casting, forging, welding and bending</p> <p>a. Design and build assigned metal products such as dust pans, castings, forging and plumbing products</p> <p>b. Design and build a self created metal product</p> <p>c. Apply manufacturing skills effectively and safely when working on products</p> <p>a. Demonstrate the ability to safely operate machine tools such as drill press, spot welder, horizontal band saw, vertical band saw, sheet metal brakes and shears by passing written tests followed by application of skills</p> <p>b. Recognize unsafe situations in the workplace and decide how to correct them</p> <p>c. Demonstrate the ability to safely use hand tools such as shears, hammers, drills, sanders, files and various heating tools by passing written tests followed by application of skills</p> <p>d. Demonstrate and appropriately use the knowledge of personal safety habits such as wearing personal protective equipment and proper dress</p>

**STUDENT LEARNING OBJECTIVES**  
**Metals I**

As a result of Technology Education, students independently and collaboratively will be able to:

GOAL: District Goal #4 (State Standard #) 4 <b>The Creation &amp; Use of Technology</b>	
Continued	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<p><i>Students will know how to:</i></p> <p>4.6 Select appropriate tools and procedures for a given task;</p> <p>4.7 Identify and describe methods used in manufacturing products;</p> <p>4.8 Explore and explain the properties and uses of common synthetic polymers such as polyethylene, polyvinyl chloride, and styrene</p>	<p><i>Students will be able to:</i></p> <p>a. Utilize problem solving skills to select appropriate tools and procedures to build specific metal products</p> <p>a. Identify appropriate tools, processes, and correct sequential steps needed to fabricate raw materials into finished products</p> <p>a. Select and utilize appropriate metal epoxies and paints</p>

**STUDENT LEARNING OBJECTIVES**  
**Metals I**

As a result of Technology Education, students independently and collaboratively will be able to:

<p><b>GOAL: District Goal #5 (State Standard #5) The Future of Technology</b></p> <p>Demonstrate the ability to take known principles of technological innovation and apply them to hypothetical scenarios effectively.</p>	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<p><i>Students will know how to:</i></p> <p>5.1 Forecast trends in new and emerging technologies (e.g. nanotechnology, electro-magnetic radiation in communications, bio-related and alternative energy sources) and their potential impacts;</p> <p>5.2 Explore future labor market trends and educational needs</p> <p>5.5 Identify and explore technological solutions to future global needs and their impacts on individuals;</p> <p>5.6 Explore how human beings use technology to increase the carrying capacity of their environment</p>	<p><i>Students will be able to:</i></p> <p>a. Explore the role of computerized machining and new applicable safety devices</p> <p>a. Research and write a report on related careers of interest and the required skills</p> <p>a. Identify how metal is recycled and the advantage of this process b. Describe the use of robotics in manufacturing</p> <p>a. Perform tasks to minimize waste/scrap produced in order to decrease the human footprint on the environment b. Identify and use technologies that are less harmful to the environment</p>