

# CURRICULUM

## Technology Education

### POWER MECHANICS I

(Elective Course)

#### **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 Instructional Council  
6/10/08

**STUDENT LEARNING OBJECTIVES**  
**Power Mechanics I**

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

GOAL: District Goal #1 (State Standard #1) <b>The Nature &amp; Evolution of Technology</b>	
Understand the nature of technology, how it has evolved and its influence on its own evolution	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<i>Students will know how to:</i>	<i>Students will be able to:</i>
1.1 Critically analyze a given technology against a perceived need or want	a. Design and construct functional projects related to transportation needs in land, air, sea and space
1.2 Research how, social, economic, and political forces influence innovation, invention and adaptation	a. Compare and contrast in written form industrial/societal needs versus environmental needs such as fuel efficiency designs b. Discuss the benefits of recycling oil
1.3 Describe the transformation and conservation of kinetic and potential energy in mechanical, chemical and electrical systems.	a. Describe how kinetic/potential energy is used to power transportation vehicles
1.4 Explore and describe how electricity is generated, transferred and used in modern technologies.	a. Wire a simple motor, apply electricity and describe the effects
1.5 Use the systems model to analyze a complex technological system;	a. Identify and discuss the sub-systems of technological systems such as internal combustion engines, rocketry, hover crafts, ship/boat designs and aircraft
1.6 Investigate the universal characteristics of systems and sub-systems;	a. Identify the universal characteristics of the systems and sub-systems in transportation vehicles

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**STUDENT LEARNING OBJECTIVES**  
**Power Mechanics I**

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

GOAL: District Goal #2 (State Standard #2) <b>The Impacts of Technology</b>	
Understand the impact that technology has on the personal, social, cultural, economic, political and environmental aspects of their lives.	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<i>Students will know how to:</i>	<i>Students will be able to:</i>
2.1 Analyze technologies based on their positive and negative impacts	<ul style="list-style-type: none"> <li>a. Compare and contrast the pros and cons of technologies used in transportation vehicles</li> <li>b. Explain how an internal engine functions by completely tearing down and rebuilding the parts</li> </ul>
2.2 Describe the evolution of a technological system and its influence on the economy, culture, society and environment;	<ul style="list-style-type: none"> <li>a. Describe how recycled materials influence our environment and economy</li> <li>b. Describe the evolution of transportation systems</li> </ul>
2.3 Demonstrate an understanding of local, state and national regulatory agencies in home and workplace safety	<ul style="list-style-type: none"> <li>a. Demonstrate an understanding of the role government safety agencies such as OSHA (Occupational, Safety and Health Administration) and NIOSH (National Institute of Occupational Safety and Health) play in the workplace</li> <li>b. Recognize and use the information contained on material safety sheets</li> </ul>
2.4 Select and demonstrate ethical solutions to technological problems;	<ul style="list-style-type: none"> <li>a. Demonstrate an understanding of the negative and positive impacts of fossil fuels and other fuel sources</li> </ul>
2.5 Identify and explore career opportunities in the areas of technology;	<ul style="list-style-type: none"> <li>a. Identify career opportunities that could be pursued in transportation industries</li> </ul>
2.6 Describe and evaluate how society's expectations drive technological development;	<ul style="list-style-type: none"> <li>a. Describe the impact of societal safety expectations on transportation vehicle design</li> <li>b. Discuss the impact of societal economic expectations resulting in outsourcing and planned obsolescence</li> </ul>

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**STUDENT LEARNING OBJECTIVES**  
**Power Mechanics I**

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

GOAL: District Goal #3 (State Standard #3) <b>The Research, Design &amp; Engineering</b>	
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.	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<i>Students will know how to:</i>	<i>Students will be able to:</i>
<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>a. Utilize internet information to facilitate product design such as hover craft, aircraft, boats and rockets</p> <p>a. Identify appropriate materials and manufacturing processes to create transportation models</p> <p>a. Create functioning transportation models from design sketches</p> <p>a. Create a set of design drawings to facilitate the manufacturing of a model</p> <p>a. Design and build various transportation models and/or prototypes utilizing appropriate technical processes</p>

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**STUDENT LEARNING OBJECTIVES**  
**Power Mechanics 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>	
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.	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
<i>Students will know how to:</i>	<i>Students will be able to:</i>
4.1 Compare the techniques used to extract raw materials	a. Demonstrate an understanding of how fossil fuels are extracted and converted into usable energy forms
4.2 Process materials based on their properties;	a. Identify the characteristics of materials used to create models and/or prototypes and process them based on these characteristics
4.3 Experiment with the alteration of material characteristics;	a. Explore a variety of ways to alter materials used in transportation vehicles
4.4 Create a product demonstrating the application of technological processes;	a. Design and build transportation vehicles such as hover crafts, automobiles, aircraft, rockets and boats b. Apply manufacturing skills effectively and safely when working on <u>transportation prototypes</u> .
4.5 Use tools and procedures safely;	a. Demonstrate the ability to safely operate machine tools and shop tools such as drill press, horizontal band saw, jig saw, <u>hand tools and air power tools</u> , b. Recognize unsafe situations in the workplace and decide how to correct them c. Demonstrate the ability to safely use hand tools such as <u>screwdrivers, wrenches, hammers, drills, files, specialized engine assembly tools</u> and by passing written and practical tests d. <u>Use petroleum based products safely.</u> e. Demonstrate and appropriately use the knowledge of personal safety habits such as wearing personal protective equipment and proper dress

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**STUDENT LEARNING OBJECTIVES**  
**Power Mechanics 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
<i>Students will know how to:</i>	<i>Students will be able to:</i>
4.6 Select appropriate tools and procedures for a given task;	a. Utilize problem solving skills to select appropriate tools and procedures to build <u>and test transportation prototypes</u>
	b. Rebuild and/or repair internal combustion engines
4.7 Identify and describe methods used in manufacturing products;	a. Identify appropriate tools, processes, and correct sequential steps needed to fabricate raw materials into <u>transportation prototypes</u> .
4.8 Explore and explain the properties and uses of common synthetic polymers such as polyethylene, polyvinyl chloride, and styrene	a. Select and utilize appropriate <u>glues, and paints to design and fabricate transportation prototypes</u>

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**STUDENT LEARNING OBJECTIVES**  
**Power Mechanics I**

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

<p><b>GOAL:</b> District Goal #5 (State Standard #5) The Future of Technology</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, electromagnetic radiation in communications, bio-related and alternative energy sources) and their potential impacts;</p> <p>5.1 Explore future labor market trends and educational needs</p> <p>5.4 Investigate <u>space industrialization</u></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. <u>Research, organize, synthesize and present findings on alternative powered vehicles.</u></p> <p>a. <u>Research and write a report on related careers of interest and the required skills needed to obtain employment.</u></p> <p>b. <u>Gain first hand knowledge from guest speakers.</u></p> <p>a. <u>Research and design rockets to include payload capacity design.</u></p> <p>a. <u>Research alternative energy sources and their applications.</u></p> <p>a. <u>Discuss ways to minimize energy used</u>, in order to decrease the human footprint on the environment</p> <p>b. Identify and use technologies that are less harmful to the environment</p>

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<#>Describe the use of robotics in manufacturing¶

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