Technology Education
CURRICULUM

METALS II

(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 II

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

GOAL: District Goal #1 (State Standard # 1) **The Nature & Evolution of Technology**	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
Students will know how to:	*Students will be able to:*
1.1 Critically analyze a given technology against a perceived need or want	a. Design and construct advanced projects utilizing newly learned techniques such as Center Punch, Milling Machine, Welding (Gas, MIG and ARC), Lathe, and CNC projects
1.2 Research how social, economic, and political forces influence innovation, invention, and adaptation	a. Identify benefits and causes for the industrial use of mass production
1.3 Describe the transformation and conservation of kinetic and potential energy in mechanical, chemical and electrical systems	a. Describe the transfer of energy in hand tools compared with machine tools
1.4 Explore and describe how electricity is generated, transferred and used in modern technologies	a. Discuss how electricity is safely and efficiently used in the shop/home environment such as when used in welding
1.5 Use the systems model to analyze a complex technological system	a. Demonstrate an understanding of the sub-systems needed to produce a hardened steel product such as a center punch
1.6 Investigate the universal characteristics of systems and sub-systems	a. Identify and/or produce the universal characteristics of the systems, sub-systems and standards needed to produce advanced metal projects utilizing the artisan method

STUDENT LEARNING OBJECTIVES
Metals II

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

GOAL: District Goal #2 (State Standard #2) The **Impacts of Technology** 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
Students will know how to:	*Students will be able to:*
2.1 Analyze technologies based on their positive and negative impacts;	a. Select from a wider variety of methods and technologies the most effective and safe processes needed to perform a task
2.2 Describe the evolution of a technological system and its influence on the economy, culture, society and environment;	a. Describe the evolution of mass production and its impact on the economy and the environment b. Construct artisan made products c. Journalize their experience by keeping a weekly log
2.3 Demonstrate an understanding of local, state and national regulatory agencies in home and workplace safety;	a. Expand their understanding of the role of government safety agencies such as OSHA and NIOSH in the workplace b. Use the information contained on material safety data sheets to facilitate the community collection of hazardous materials
2.5 Identify and explore career opportunities in the areas of technology;	a. Identify and research manufacturing career opportunities that could be pursued using their developed skills b. Experience some related careers through a production situation c. Explore career opportunities through interaction with guest speakers

STUDENT LEARNING OBJECTIVES
Metals II

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

GOAL: District Goal #2 (State Standard #2) The **Impacts of Technology** Continued	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
Students will know how to: 2.6 Describe and evaluate how society's expectations drive technological development	*Students will be able to:* a. Describe the impact of societal safety expectations on technological development such as a lathe chuck guard, personal safety wear, double insolated tools and auto darkening welding helmet b. Discuss societal expectations of the efficient cutting of metal resulting in the development of plasma cutters

STUDENT LEARNING OBJECTIVES
Metals II

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

GOAL: District Goal #3 (State Standard #3) **The Research, Design & Engineering** 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
Students will know how to:	*Students will be able to:*
3.1 Use research techniques to support design development;	a. Utilize print and non-print media sources to enhance product design
3.2 Investigate multiple solutions to a design problem;	a. Select from a wide array of materials and manufacturing processes to design and construct metal products
3.3 Use communication technologies to visualize a design idea;	a. Create multiple part products from self design and/or published design drawings
3.4 Demonstrate knowledge of the legal and ethical principles related to ownership of intellectual properties	a. Discuss patents and their implications
3.5 Document a design to facilitate replication;	a. Create sets of design drawings either by hand or computer generated to facilitate the manufacturing of an artisan made product
3.6 Select appropriate technical processes and fabricate a prototype;	a. Design, build and test an original model of self designed products using appropriate technical processes

STUDENT LEARNING OBJECTIVES
Metals II

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

GOAL: District Goal #4 (State Standard #) 4 **The Creation & Use of Technology**

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
Students will know how to:	*Students will be able to:*
4.2 Process materials based on their properties;	a. Identify metal characteristics such as types, weathering capabilities, aesthetic appeal, strength and weight b. Apply technological processes based on this information
4.3 Experiment with the alteration of material characteristics;	a. Apply a variety of ways to alter metal materials such as milling, turning, grinding, forging, bending and casting
4.4 Create a product demonstrating the application of technological processes;	a. Design and build assigned metal products such as an a self designed product and a milling product b. Apply CNC machine skills independently, effectively and safely when working on products
4.5 Use tools and procedures safely;	a. Demonstrate the ability to safely operate all machine tools used in class projects b. Recognize unsafe situations in the workplace and decide how to correct them c. Demonstrate the ability to safely use all hand tools used in class projects d. Demonstrate and appropriately use the knowledge of personal safety habits in all environments

STUDENT LEARNING OBJECTIVES
Metals II

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

GOAL: District Goal #4 (State Standard #) 4 **The Creation & Use of Technology** Continued	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
Students will know how to:	*Students will be able to:*
4.6 Select appropriate tools and procedures for a given task;	a. Apply independently problem solving skills to select appropriate tools and procedures to build a variety of metal products
4.7 Identify and describe methods used in manufacturing products;	a. Utilize appropriate tools, processes, and correct sequential steps needed to fabricate raw materials into a finished product
4.8 Explore and explain the properties and uses of common synthetic polymers such as polyethylene, polyvinyl chloride, and polystyrene	a. Select and utilize appropriate adhesives and finishes for multi-step tasks/problems

STUDENT LEARNING OBJECTIVES
Metals II

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

GOAL: District Goal #5 (State Standard #5) **The Future of Technology** Demonstrate the ability to take known principles of technological innovation and apply them to hypothetical scenarios effectively.	
LEARNING OBJECTIVES	SAMPLE INDICATORS/ASSESSMENTS OF LEARNING
Students will know how to:	*Students will be able to:*
5.1 Forecast trends in new and emerging technologies (e.g. nanotechnology, electro-magnetic radiation in com-munications, bio-related and alternative energy sources) and their potential impacts;	a. Apply computerized machining and new applicable safety devices b. Research and share trends in metal used in product design and development
5.2 Explore future labor market trends and educational needs	a. Research and share emerging job opportunities in construction/engineering/manufacturing related fields including the educational needs for each job
5.3 Explore the problems and possibilities of construction practices in the alternative environmental settings;	a. Compare and contrast working in a controlled school lab with working in industry
5.5 Identify and explore techno-logical solutions to future global needs and their im-pacts on individuals;	a. Explain how metal is a renewable resource b. Describe the impact and efficiency of alloys in future manufacturing needs
5.6 Explore how human beings use technology to increase the carrying capacity of their environment	a. Use skills developed in the seventeen classroom work stations including vertical milling, horizontal milling, shaping, mig welding, arc welding, tig welding, grinding, tapered turning, knurling, threading, gas cutting, plasma cutting, forging, casting and CNC to increase effective and efficient product output b. Design and build a product where waste/scrape is kept to a minimum and longevity is a key design element