

Foundations of Manufacturing and Engineering (FME)

Little Chute High School
 Technology Education Department
 9-12 Grades, .5 Credits

FME is an introduction to the Manufacturing and Engineering courses available at LCHS. In the Drafting portion of this course students are introduced to Visualization and Technical Sketching techniques used to complete worksheets on graph paper. In the Metals Manufacturing portion of the course; students will be introduced to basic welding, simple cutting processes, and basic fabrication. Students will also produce a small welding project. In the Woodworking portion of this course; students will learn how to safely use tools and equipment to produce an item. Students may also work with drawing software to utilize the Laser Engraver and/or CNC Router.

Scope and Sequence

Timeframe	Unit	Instructional Topics
6 Weeks	Technical Drawing / Sketching / Problem Solving	<ol style="list-style-type: none"> 1. Visualization - 4 Days 2. Measurement - 4 Days 3. Orthographic Dwg - 6 Days 4. Isometric Dwg - 6 Days 5. Problem Solving / Design Project - 10 Days
6 Weeks	Manufacturing with Wood	<ol style="list-style-type: none"> 1. Safety - 4 Days 2. How to Square a Board - 6 Days 3. Woodworking Project - 20 Days
6 Weeks	Welding and Metal Fabrication	<ol style="list-style-type: none"> 1. Safety - 4 Days 2. GMAW - 10 Days 3. Welding Fab Project - 16 Days

Course Details

UNIT: Technical Drawing / Sketching / Problem Solving -- 3 Weeks

Introduction to Technical drawing and problem solving. Develop knowledge in visualization skills, measurement skills, and orthographic and isometric sketching techniques. Students will work on problem solving activities and with teams to enhance their problem solving abilities.

INSTRUCTIONAL TOPIC: Visualization -- 2 Days

Students will work on seeing in their minds, what a part or object looks like and be able to decipher what a drawing means. Students will work on object orientation and the ability to manipulate an object in their minds to answer questions.

Learning Targets

Comparing features on Drawing Types

Ability to find features on multiple drawing Views

ENG4.a.4.m - Demonstrate 2D and 3D representations of the designed solution.

INSTRUCTIONAL TOPIC: Measurement -- 2 Days

Students will learn to read ruler to a precision of 1/16" and how to add and subtract fractional dimensions.

Learning Targets

_____ Read a ruler and apply dimensions to a drawing

_____ Calculate the difference in dimensions

AC1.b.9.m - Demonstrate the use of Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

AC1.b.10 - Add, Subtract, Multiply, and Divide in the Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

INSTRUCTIONAL TOPIC: Orthographic Drawing --3 Days

Sketch orthographic drawings from pictorial drawings with dimensions.

Learning Targets

_____ Create Accurate Orthographic Sketches

_____ ENG4.a.4.m - Demonstrate 2D and 3D representations of the designed solution.

AC1.b.9.m - Demonstrate the use of Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

INSTRUCTIONAL TOPIC: Isometric Drawing -- 3 Days

Sketch isometric drawings from orthographic drawings with dimensions.

Learning Targets

_____ Create accurate isometric sketches

_____ ENG4.a.4.m - Demonstrate 2D and 3D representations of the designed solution.

AC1.b.9.m - Demonstrate the use of Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

INSTRUCTIONAL TOPIC: Design/Problem Solving Project --5 Days

Apply the skills and knowledge learned in the Design and problem solving unit through a hands on project.

Learning Targets

_____ Create Drawing of Solution

_____ Build solution to problem

_____ ENG4.a.4.m - Demonstrate 2D and 3D representations of the designed solution

BB1.b - Analyze and use tools and materials

AC1.b.9.m - Demonstrate the use of Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

UNIT: Manufacturing with Wood -- 3 Weeks

Students will learn how to safely operate woodworking equipment, along with basic wood manufacturing processes.

INSTRUCTIONAL TOPIC: Safety --2 Days

How to properly and safely operate and use woodworking equipment and tools.

Learning Targets

_____ Miter Saw Operation

_____ Jointer Operation

_____ Surfacer Operation

_____ Basic Table Saw Operation

MNF1.a - Identify, select and safely use tools, machines, products and systems for specific tasks

INSTRUCTIONAL TOPIC: How to Square a Board --3 Days

Students will learn the operation process for squaring a rough sawn piece of lumber. This is the most basic and most used skill in the Manufacturing of wood products.

Learning Targets

_____ Proper Procedure

_____ Using Tools and Equipment Properly and Safely

_____ MNF1.a - Identify, select and safely use tools, machines, products and systems for specific tasks

_____ BB1.b - Analyze and use tools and materials

INSTRUCTIONAL TOPIC: Woodworking Project --10 Days

Students will apply the skills and knowledge of wood manufacturing to build a project. Students will also learn how to glue up wood panels, and finish woodworking projects.

Learning Targets

_____ Equipment Operation

_____ Procedure

_____ Fit and Finish

_____ MNF1.a - Identify, select and safely use tools, machines, products and systems for specific tasks

_____ BB1.b - Analyze and use tools and materials

_____ AC1.b.9.m - Demonstrate the use of Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

UNIT: Welding and Metal Fabrication -- 3 Weeks

Students will learn Basic GMAW Techniques, metal cutting equipment operation, and fabrications techniques.

INSTRUCTIONAL TOPIC: Safety --2 Days

Safe operation of welding equipment, cutting equipment, and power and hand tools. There is an emphasis on Personal Protective equipment.(PPE)

Learning Targets

_____ PPE Requirements for Welding

_____ Safety Concerns in Metal Fabrication

_____ MNF.1.g.5.m - Identify the importance of safety and different types of safety equipment needed for different welding processes

INSTRUCTIONAL TOPIC: Gas Metal Arc Welding (GMAW) -- 5 Days

Students will learn how to set up a welding machine and basic GMAW Techniques; How to run a bead, How to weld fillet welds with lap joints and Tee joints.

Learning Targets

_____ Padded Beads

_____ Fillet Weld Lap Joint

_____ Fillet Weld TEE Joint

_____ MNF.1.g.6.m - Demonstrate basic welding joints and processes used to weld them

INSTRUCTIONAL TOPIC: Welding Fabricating Project --8 Days

Students will demonstrate their welding and fabricating skills in a project.

Learning Targets

Welding Joints

Fit and Finish

_____ MNF.1.g.6.m - Demonstrate basic welding joints and processes used to weld them

AC1.b.9.m - Demonstrate the use of Standard Measuring System to 1/16" and Metric Measuring system to Millimeters

MNF1.a - Identify, select and safely use tools, machines, products and systems for specific tasks