



## Course Outcome Summary

### Course Information: **Machining I**

**Description:** This class introduces students to basic machining practices and the use of hand and power tools, measurement, and layout practices. Skills will then be used in the construction of larger projects; basic math skills will also be stressed. Value is placed on those things a potential employer would consider important in maintaining and keeping a job. We will be learning Blueprint Reading, Material Identification, Measuring Tools, Metal Lathe Operations and Milling Operations.

**Instruction Level:** Grades 9-12

**Total Credits:** 1

**Prerequisites:** Intro technology Education

### Course Standards:

#### *Common Career and Technical Core:*

- Communicate and collaborate with others to accomplish tasks and develop solutions to problems and opportunities.
- Identify and apply employability skills.
- Assess benefits and challenges of working in diverse settings and on diverse teams.
- Apply leadership skills in real-world, family, community and business and industry applications.

#### *Content Standards:*

- Identify safety and health protections and procedures that are critical to worker well-being.
- Select and apply the appropriate units and scales for situations involving measurement.
- Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings.
- Select, use and identify manufacturing processes, such as casting, forming, machining, joining, rapid manufacturing (CNC) and treating/coating.
- Analyze and use metal and manufacturing cutting operations.

#### *ACT Reading and Writing Standards:*

- Show a basic understanding of the persuasive purpose of the task by taking a position on the issue in the prompt.
- Generate reasons for a position
- Maintain a focus on the general topic in the prompt throughout the essay

- Provide a simple organizational structure by logically grouping some ideas
- Present an introduction and conclusion
- Locate and interpret minor or subtly stated details in somewhat challenging passages
- Draw logical conclusions in more challenging passages
- Paraphrase virtually any statement as it is used in somewhat challenging passages
- Order simple sequences of events in somewhat challenging literary narratives
- Understand point of view in somewhat challenging passages

## Unit

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1. **Blueprint reading and Drafting**
2. **Material Selection**
3. **Measurement Tools**
4. **Safety**
5. **Lathe Operations**
6. **Vertical Mill Operations**

## Unit Outlines

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### 1. Drafting and Blueprint reading

#### Standards:

- Select and apply the appropriate units and scales for situations involving measurement.

#### Essential Question:

Students will be able to answer the question:

- How does a blueprint guide the construction of a project?

#### Essential Knowledge:

Students, using previously learned knowledge, will be able to read a blueprint.

- Drawing Exercise #1: Line Types
- Drawing Exercise #2: View Identification
- Drawing Exercise #3: Dimensioning

### 2. Material Identification

#### Standards:

- Select, use and identify manufacturing processes, such as casting, forming, machining, joining, rapid manufacturing (CNC) and treating/coatings.

**Essential Question:**

Students will be able to answer the question:

- How does material selection affect the quality of a part or tool?

**Essential Knowledge:**

Students will be able to identify different materials used in machining and metalworking.

- Material identification presentation
- Material identification lab

**3. Measurement Tools****Standards:**

- Select and apply the appropriate units and scales for situations involving measurement.

**Essential Question:**

Students will be able to answer the question:

- How are measuring tools different?
- Which measuring tool should be used for various situations?

**Essential Knowledge:**

Students will be able to identify, read, and select proper measuring tools to determine the size of a given part.

- Ruler Reading Presentation
- Ruler Reading Worksheet
- Micrometer Reading Presentation
- Micrometer Reading Worksheet
- Dial Caliper Reading Presentation
- Dial Caliper Reading Worksheet
- Measurement Reading Lab
- Measurement Reading Test

**4. Safety****Standards:**

- Identify safety and health protections and procedures that are critical to worker well-being.
- Select, use and identify manufacturing processes, such as casting, forming, machining, joining, rapid manufacturing (CNC) and treating/coating.
- Analyze and use metal and manufacturing cutting operations.

**Essential Question:**

Students will be able to answer the question:

- Why is safety in the workplace important in society?

**Essential Knowledge:**

Students will pass all safety tests so they can work safely and efficiently in the shop.

- General Safety PowerPoint
- Horizontal Bandsaw Presentation
- Drill Press Presentation
- Metal Lathe Presentation
- Vertical Mill Presentation
- Shop/Equipment Safety Test
- Demonstrations of exercises

**5. Lathe Operations****Standards:**

- Identify safety and health protections and procedures that are critical to worker well-being.
- Select and apply the appropriate units and scales for situations involving measurement.
- Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings.
- Select, use and identify manufacturing processes, such as casting, forming, machining, joining, rapid manufacturing (CNC) and treating/coating.
- Analyze and use metal and manufacturing cutting operations.

**Essential Question:**

Students will be able to answer the question:

- What is the process used to take an object from a larger size to a smaller size using a metal lathe?
- How are these processes similar? How are they different?
- How are speeds and feeds calculated?

**Essential Knowledge:**

Students will be able to take “rough” material and make it smaller in size to its “finished” size according to a print using a metal lathe.

- Facing to Size Exercise
- Turning to a Shoulder Exercise
- Drilling Exercise
- Turning Between Centers Exercise
- Boring Exercise
- Taper Turning Exercise 1 – 3
- External Threading Exercise

- Internal Threading Exercise
- Knurling Exercise
- Grooving and Parting Exercise
- Off-Center Turning Exercise

## 6. Vertical Mill Operations

### Standards:

- Identify safety and health protections and procedures that are critical to worker well-being.
- Select and apply the appropriate units and scales for situations involving measurement.
- Recognize characteristics and benefits of teamwork, leadership and citizenship in the school, community and manufacturing settings.
- Select, use and identify manufacturing processes, such as casting, forming, machining, joining, rapid manufacturing (CNC) and treating/coating.
- Analyze and use metal and manufacturing cutting operations.

### Essential Question:

Students will be able to answer the question:

- Why is it important to have all sides parallel when using the mill?
- When can an operator sacrifice accuracy for speed when edge finding?
- How are speeds and feeds calculated?

### Essential Knowledge:

Students will be able to take “rough” material and make it smaller in size to its “finished” size according to a print using a metal lathe.

- Squaring a Block Exercise
- Edge Finding Presentation
- Drilling and Hole Finishing Exercise
- Milling a Pocket/Island Exercise