# TECH PREP/MTAG CURRICULUM

## Shop Skills

## Lesson Plan

| | |
|---|---|
| Time Allotment: | 32 hours |
| Prepared By: | Tom Murray, Fred Schuneman, John Imre, Mark Turner, Jason VanderHoek, John King |
| Contact: | John King (jtking@u.washington.edu) |

### MODULE DESCRIPTION

This module provides instruction in the safety procedures and work processes for hand and machine tools used in a metal machine shop. Specific skills include sawing, drilling, boring, grinding, lathing, and milling.

### MODULE OBJECTIVE

After completing this module, students should be able to demonstrate proficiency in these skills through a variety of shop projects and in a final exercise that uses a combination of these skills.

### MTAG COMPETENCIES INTRODUCED

C5.1 Inspect equipment for defects and report malfunctions to appropriate personnel
F2.1 Possess basic mechanical skills
F2.2 Possess standard machine tool operating skills
F4.1 Follow established safety procedures when using machine tools
F6.1 Operate hand tools in a safe, prescribed manner
F7.1 Lay out a part for cutting and drilling
E2.2 Identify item number symbols

### MANUFACTURING SKILL STANDARDS INTRODUCTED (MSSC)

P1 Production Tools and Equipment, E: Skill in operating production equipment.
P3. Personal Safety, C: Knowledge of housekeeping needed to maintain a safe work environment.
P3 Personal Safety, D: Skill in determining if all safety guards are in place prior to machine operation.

**PERFORMANCE CRITERIA**

- Before starting a machining operation, the student will be able to determine the safety and fitness of tools and materials and report defects and malfunctions to appropriate personnel.
- The student will be able to safely operate, use, and maintain the tool and perform the tasks according to manufacturer's guidelines.
- The student will be able to demonstrate the operation, use, and maintenance according to manufacturer's guidelines.
- The student will be able to state and demonstrate both the manufacturer's safety procedures and the shop's safety procedures with 100% accuracy.
- The student will be able to state and demonstrate safe movement and the use of personal protective equipment such as safety shoes, goggles, and hard hats, and the shop's safety procedures with 100% accuracy and consistency.
- The student will be able to identify all safety features of the machine, discuss characteristic tool wear and failure, and state how this information can protect the user and others in the shop.
- The student will be able to identify the safety features and demonstrate the safe use of all available shop hand tools according to manufacturers' guidelines.
- The student will be able to lay out a part to within ±. .015" of drawing specifications.
- Given an assembly drawing, the student will be able to use number symbols to match part descriptions on the parts list with the detail of that part on the drawing.

**SEQUENCING**

**Introduction**

Basic rules for the shop
Tour of the shop

**Hand Tools**

Basic shop hand tools
Layout skills
Hand tool project

**Machine Tools**

Introduction to the bandsaw
Power saw project
Drills and drill motors
Project using the bandsaw and drill press
Using grinders in the machine shop
Project using the pedestal grinder
The engine lathe
Project using the engine lathe
The milling machine
Project using the milling machine
Skill check on the machine shop
Conclusion of the module

## SUPPLIES NEEDED

This module assumes the school has a metalworking shop. At a minimum, it requires a metal shop with workbenches for hand tools, vises, hacksaws, files.

Machine tools: bandsaw, drill press, grinder, engine lathe, milling machine.

## INDEX OF INSTRUCTIONAL MATERIALS



## RECOMMENDED STUDENT PREREQUISITES

Completed the following modules:

Safety in Manufacturing

Applied Math

Interpreting Technical Drawing