

# Metal Processes 1

## Course Outcome Summary

### Course Information

Organization	Madison Area Technical College
Developers	Neil Ragatz
Development Date	1/1/2000
Revised Date	2/7/2006
Course Number	32-420-330
Instructional Level	Associate Degree
Potential Hours of Instruction	72
Total Credits	2

### Description

Instruction in metalworking processes. Includes safety, layout and measuring, machining, oxy-acetylene welding, brazing and cutting, arc welding and properties of metals.

### Types of Instruction

Instruction Type	Contact Hours	Credits
Classroom	36	2
On-Campus Lab	36	

### Textbooks

John R. Walker. *Modern Metal Working*. Goodheart Wilcox.

### Learner Supplies

Safety Glasses.  
Miller Welding Calculator.  
6" Pocket Steel Ruler.  
Welding Gloves.  
Calculator.  
Welding Helmet.  
Oxy-Fuel Welding Glasses.  
Steel Toed Shoes.

### Exit Learning Outcomes

#### Core Abilities

- Critical thinking
- Mathematics
- Self-management

### Program Outcomes

- A. Demonstrate professional ethics: honesty, respect, teamwork, reliability, initiative when dealing with coworkers and supervisors
- B. Perform accurate measurements to insure parts meet specifications in the production of precision components
- C. Display organizational skills in set up and safe operation of basic machine tools
- D. Demonstrate fiscal responsibility, accountability, and efficiency to contribute to a productive and profitable business operation
- E. Apply technical knowledge to read and interpret blueprints; solve math problems; and use appropriate metal and processes for component production

## ***Competencies***

### **A. Perform shop safety**

**You will demonstrate your competence:**

A.1. in lab performance

**Your performance will be successful when:**

A.1. you use required eye protection for welding and machine shop

A.2. you dress appropriately

A.3. you demonstrate welding safety procedures

A.4. you use the grinder and drill press safety

A.5. you protect tools, equipment and manuals

A.6. you maintain clean and organized work areas

A.7. you demonstrate conservative use of shop supplies

### **B. Perform measurement**

**You will demonstrate your competence:**

B.1. on a written evaluation

B.2. in the lab during a project layout procedure

**Your performance will be successful when:**

B.1. you measure with a steel rule to within the print specifications

B.2. you measure with a micrometer - English and Metric to within the print specifications

B.3. you measure with a dial caliper to within the print specifications

B.4. you measure with a dial indicator to within the print specifications

B.5. you use a digital readout (DRO) per print specifications

B.6. you layout projects to within tolerance specified on print handout

### **C. Perform grinding**

**You will demonstrate your competence:**

D.1. in lab performance

**Your performance will be successful when:**

D.1. you grind a drill bit with appropriate angles

D.2. you grind a lathe bit with appropriate angles

D.3. you grind the appropriate angles for a chisel, center punch and/or prick punch

### **D. Operate drill press**

**You will demonstrate your competence:**

E.1. in lab performance

**Your performance will be successful when:**

- E.1. you select proper drill bit per application including using a tap drill chart
- E.2. you calculate the RPM and set the drill press speed
- E.3. you set up and drill stock per print
- E.4. you ream stock per print
- E.5. you counterbore stock per print
- E.6. you countersink stock per print

**E. Operate lathe**

**You will demonstrate your competence:**

- F.1. in lab performance
- F.2. on a written evaluation

**Your performance will be successful when:**

- F.1. you set up and face stock in a 3-jaw chuck, 4-jaw chuck, collet, and/or turn between centers to print specifications
- F.2. you perform a threading or parting operation to print specifications
- F.3. you perform a drilling and/or reaming procedure on the lathe to print specifications
- F.4. you identify lathe components
- F.5. you identify lathe component functions

**F. Perform threading**

**You will demonstrate your competence:**

- G.1. on a written evaluation
- G.2. in lab performance

**Your performance will be successful when:**

- G.1. you identify thread sizes
- G.2. you tap stock per print
- G.3. you identify parts of a thread
- G.4. you use threading terminology
- G.5. you identify tap drill size per tap
- G.6. you perform a threading operation to print specifications

**G. Perform filing**

**You will demonstrate your competence:**

- H.1. in lab performance
- H.2. on a written evaluation

**Your performance will be successful when:**

- H.1. you draw file stock per print specifications
- H.2. you file corner radii per print specifications
- H.3. you use proper filing technique
- H.4. you use file terminology

**H. Perform oxy-acetylene welding**

**You will demonstrate your competence:**

- I.1. in lab performance
- I.2. on a written evaluation

**Your performance will be successful when:**

- I.1. you select tip size for application
- I.2. you select oxygen and acetylene line pressures for tip size

- I.3. you perform puddling in the flat position
- I.4. you perform a corner weld in the flat position
- I.5. you perform a puddle bead in the flat position
- I.6. you perform a lap weld in the flat position
- I.7. you perform a butt weld in the flat position
- I.8. you perform an edge weld in the flat position
- I.9. you perform a stringer weld with filler in the flat position
- I.10. weld passes a root bend test
- I.11. you use welding terminology

**I. Perform oxy-acetylene cutting**

**You will demonstrate your competence:**

- J.1. in lab performance
- J.2. on a written evaluation

**Your performance will be successful when:**

- J.1. you select correct tip size for application
- J.2. you select correct oxygen and acetylene line pressure for tip size
- J.3. you perform cutting
- J.4. you use welding terminology

**J. Perform oxy-acetylene brazing**

**You will demonstrate your competence:**

- K.1. in lab performance
- K.2. on a written evaluation

**Your performance will be successful when:**

- K.1. you select correct tip size for application
- K.2. you select correct oxygen and acetylene line pressure for the tip size
- K.3. you perform a butt braze in the flat position
- K.4. you perform a lap braze in the flat position
- K.5. you perform a braze stringer in the flat position
- K.6. you use welding terminology

**K. Perform Shielded Metal Arc Welding**

**You will demonstrate your competence:**

- L.1. in lab performance
- L.2. on a written evaluation

**Your performance will be successful when:**

- L.1. you set up power source
- L.2. welding is appropriate width
- L.3. welding is appropriate height
- L.4. welding has appropriate amount of spatter for selected electrode
- L.5. welding is performed on specified metal
- L.6. you perform flat position stringer beads using a E6013
- L.7. you perform flat position stringer beads using a E6010
- L.8. you perform flat position stringer beads using a E7014
- L.9. you perform flat position stringer beads using a E7018
- L.10. you perform flat position stringer beads using a E6011

- L.11. you perform flat position fillet welds using a E6013
- L.12. you perform flat position fillet welds using a E6010
- L.13. you perform flat position fillet welds using a E7014
- L.14. you perform flat position fillet welds using a E7018
- L.15. weld passes a face bend test on butt welds
- L.16. you identify characteristics of power supply set-up
- L.17. you identify manipulation techniques for electrodes
- L.18. you use welding terminology