

Course Objectives/Course Outline

Spokane Community College

Course Title: Materials, Processes, References

Prefix and Course Number: PMF 104

Course Learning Outcomes:

By the end of this course, a student should:

- Describe the materials and processes used in precision metal fabrication and other metalworking industries
- Identify essential metals such as steel alloy, stainless steels, aluminum, and sheet metal
- Describe the principles of basic metallurgy including alloys, metalworking, and heat treatment processes
- Describe physical, chemical, and mechanical properties of metals
- Evaluate metal materials for material properties and hardness using nondestructive and destructive test methods
- Demonstrate the ability to research information materials and processes in the *Machinery's Handbook*
- Describe finishing processes commonly used in metal fabrication and related safety guidelines
- Describe welding and cutting processes commonly used in the metal fabrication industry, including oxyfuel welding and cutting, SMAW, GMAW, GTAW, and resistance spot welding
- Demonstrate safe and proper operation of welding and cutting equipment
- Create workpieces using welding and cutting processes
- Perform heat treatment processes on metals
- Demonstrate safe and proper use of heat treating equipment and processes

Course Outline:

A. *NOTE:* This course schedule is subject to change at the discretion of the instructor.

Week 1: Introduction & Safety

Safety Overview

Introduction to Materials and Processes

Machinery's Handbook

Lab: Material Samples

Safety Tour

Week 2: Material Properties and Hardness Testing

Material Properties

Hardness Testing

Lab: Material Sample Testing

Week 3: Steel and Heat Treatment Principles

Steel – Carbon, Alloy, Tool, Stainless

Heat Treatment

Lab: Heat Treatment and Work Hardening

Week 4: Heat Treatment Processes and Nonferrous Metals

Heat Treatment Processes

Aluminum and Other Nonferrous Metals

Finishing Processes

Lab: Annealing Copper

Week 5: Midterm and Intro to Welding

Midterm Exam

Introduction to Welding

Welding Symbols

Joint Types and Terminology

Lab: Plan Welding Project

Week 6: Optional Field Trip

Field Trip – outside processing facility

Week 7: Gas Metal Arc Welding

GMAW Equipment, Safety, and Practices

Lab: GMAW, Welding Project

Week 8: Oxyfuel Technology

Oxyfuel Welding and Cutting

Equipment, Safety, and Practices

LAB: OFW/OFC, Welding Project

Week 9: Shielded Metal Arc Welding

SMAW Equipment, Safety, and Practices

Lab: SMAW, Welding Project

Week 10: Gas Tungsten Arc Welding

GTAW Equipment, Safety, and Practices

Lab: GTAW, Welding Project

Week 11: Spot Welding, Welding Project

Spot Welding

Lab: Welding Project

Week 12: Final

Review

Final (covers material from Weeks 1 – 11)