



BAKER COLLEGE
STUDENT LEARNING OUTCOMES

WELD 1310 Metallurgy
3 Semester Hours

Student Learning Outcomes & Enabling Objectives

1. Differentiate between characteristics of various metals
 - a. Identify differences in hardness among various metals
 - b. Identify differences in metal structure among various metals
 - c. Explain how to strengthen metals
 - d. Describe how heat and temperature impact metal
 - e. Identify mechanical properties of metals
 - f. Explain the difference between destructive and non-destructive testing
 - g. Identify types of defects which cause welding failure
 - h. Differentiate between methods used to weld ferrous and nonferrous metals

2. Apply an understanding of various metal characteristics in choosing the proper metal for a specific job
 - a. Use phase diagrams to determine changes brought to metals during the alloy process
 - b. Choose the proper metal based on job specifications

3. Identify various welding specialty processes and the types of jobs they would be used for
 - a. Explain the purpose of:
 - electron beam welding
 - flash butt welding
 - laser beam welding
 - percussion welding
 - plasma arc welding
 - resistance welding
 - stud welding
 - thermal spraying

- ultrasonic welding
 - upset welding
 - submerged arc welding
 - electroslag welding
 - magni-flux non-destructive testing
- b. Explain the use of robots in the welding process
 - c. Describe different welding certifications

Big Ideas and Essential Questions

Big Ideas

1. Mechanical properties of metals
 - Structure of metals
 - Weldability of metals
 - Phase diagrams
 - Hardness of metals
 - Strengthening mechanisms
 - Heat treatments
 - Quality vs. Cost
2. Testing of welds
 - Destructive vs. Non-destructive
 - Defects
 - Testing methods
3. Welding Automation
 - Reduce welder fatigue
 - Increase productivity
 - Reduce welding defects
4. Specialty Welding Processes
 - Electron Beam Welding
 - Flash Welding
 - Laser Beam Welding
 - Percussion Welding
 - Plasma Arc Welding
 - Resistance Welding
 - Stud Welding
 - Thermal Spraying
 - Ultrasonic Welding
 - Upset Welding
 - submerged arc welding
 - electroslag welding
 - magni-flux non-destructive testing

Essential Questions

1. How does understanding the mechanical properties of metals influence the tasks a welder performs?
2. Why is testing of welds important?
3. How does welding automation impact the role of a welder?
4. How do special metal bonding applications influence the type of welding process to be used?

These SLOs are approved for experiential credit.

Effective: Fall 2017