

**Course Objectives/Course Outline
Spokane Community College**

Course Title: Materials, Processes, and References

Prefix and Course Number: IMMA 222

Course Learning Outcomes:

By the end of this course, a student should:

- Demonstrate the ability to utilize Machinery’s Handbook as a reference for information about metallurgy, materials, and processes
- Describe the material composition and characteristics of the five basic metals: steel, stainless steel, cast iron, aluminum, and brass (copper)
- Describe processes commonly used to manipulate metals, including shot peening, forging, casting, and other processes
- Explain how alloys influence the characteristics of metals
- Describe the chemical transformation of metals caused by various processes
- Describe applications of physical and chemical surface treatments and coatings to metals
- Apply heat treatment processes to metals and analyze the results
- Apply Rockwell hardness testing to metals
- Apply nondestructive (NDT) techniques to various materials and analyze the results
- Identify material samples based on physical characteristics and test results
- Demonstrate proper safety procedures when handling and treating materials
- Describe standards and their applications to materials and processes
- Describe the composition and characteristics of composites, plastics, and ceramics
- Demonstrate professionalism, critical thinking, and teamwork during in-class discussions, presentations, and hands-on activities

Course Outline:

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

<p>Week 1: Introduction to Materials and Processes Safety Overview Basic Processes Machinery’s Handbook</p>	<p>Week 7: Nonferrous Metals Copper – Bronze, Brass Magnesium, Titanium, Nickel Lab: Annealing – Copper Bracelet</p>
<p>Week 2: Material Properties and Hardness Testing Material Properties Rockwell Hardness Testing Lab: Material Sample Identification</p>	<p>Week 8: Nonmetal Materials, Nondestructive Testing Plastics, Ceramics, Composites Molding and casting processes Nondestructive Testing Lab: Cuttlefish Bone Casting</p>
<p>Week 3: Steel and Aluminum Steel Nonferrous metals; Aluminum Lab: Material Sample Identification, continued</p>	<p>Week 9: MTU: Microscope and NDT Lab: Microscope, Nondestructive Testing, Conductivity Testing</p>

<p>Week 4: Material Treatments Heat Treating and Annealing Swaging Shot Peening Lab: Heat Treating and Work Hardening</p>	<p>Week 10: Field Trip (Class will meet at the field trip site. Bring a pen, notebook, safety glasses.) Field Trip – Outside Processing Plant Date, time, location TBD.</p>
<p>Week 5: Case Hardening, Ream/Hone, Press Fits Case Hardening Reaming, honing, press fit assembly, and heat treatment Lab: Case-Hardening Steel</p>	<p>Week 11: Coatings Passivation, Anodizing Paints and Sealants MIL standards</p>
<p>Week 6: Midterm Exam Midterm Exam covers skills learned in Weeks 1 thru 5 Open Lab</p>	<p>Week 12: Final Exam Final Exam covers skills learned in Weeks 1 thru 11 Open Lab</p>