

Metallurgy

Course Outcome Summary

Updated November 2022

Course Information

Total Credits 1

Description

Students learn the metallurgical terms and definitions in an effort to understand the behavior and service of metals in industry. Characteristics during heating, cooling, shaping, forming, and the stress related to their mechanical properties are covered, as well as the theory behind alloys, heat treatment processes and wear resistance.

Exit Learning Outcomes

Program Outcomes

- A. Examine the history of iron and steel and its role in industry
- B. Summarize the production of iron and steel
- C. Summarize the production of non-ferrous metals
- D. Define an Alloy and an alloying element
- E. Demonstrate understanding of metal classification systems
- F. Demonstrate understanding of Heat Treatment processes
- G. Apply safety principles in a work environment to minimize hazards and prevent losses to productivity
- H. Demonstrate employability skills needed to obtain and retain employment in machine tool and related fields

Competencies

1. **Examine the history of iron and steel and its role in industry**
 - Properties**
 - Domain: Cognitive Level: Application
 - Linked Program Outcomes**
 - Manufacture parts from various materials in accordance with specifications from blueprints, electronic drawings, and shop sketches
 - Demonstrate employability skills needed to obtain and retain employment in machine tool and related fields
2. **Summarize the production of non-ferrous metals**
 - Properties**
 - Domain: Cognitive Level: Comprehension
 - Linked Program Outcomes**
 - Solve quality problems using process planning, technical knowledge, teamwork, mathematics, and critical thinking
3. **Summarize the production of iron and steel**
 - Properties**
 - Domain: Cognitive Level: Synthesis
 - Linked Program Outcomes**

Solve quality problems using process planning, technical knowledge, teamwork, mathematics, and critical thinking

4. Differentiate special alloys and special steels

Properties

Domain: Cognitive Level: Analysis

Linked Program Outcomes

Manufacture parts from various materials in accordance with specifications from blueprints, electronic drawings, and shop sketches

Solve quality problems using process planning, technical knowledge, teamwork, mathematics, and critical thinking

5. Investigate metallurgical processes

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Solve quality problems using process planning, technical knowledge, teamwork, mathematics, and critical thinking

6. Anneal materials to specifications

Properties

Domain: Psychomotor Level:

Linked Program Outcomes

Operate machine tool equipment commonly found in industry including manual and computer-controlled lathes, milling machines, drill presses and cutting machines

Manufacture parts from various materials in accordance with specifications from blueprints, electronic drawings, and shop sketches

7. Determine heat treating temperatures

Properties

Domain: Cognitive Level: Application

Linked Program Outcomes

Solve quality problems using process planning, technical knowledge, teamwork, mathematics, and critical thinking

8. Harden material to specifications

Properties

Domain: Psychomotor Level:

Linked Program Outcomes

Operate machine tool equipment commonly found in industry including manual and computer-controlled lathes, milling machines, drill presses and cutting machines

Manufacture parts from various materials in accordance with specifications from blueprints, electronic drawings, and shop sketches