

# Metallurgy

## Course Outcome Summary

### 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. Operate machine tool equipment commonly found in industry including manual and computer controlled lathes, milling machines, drill presses and cutting machines
- B. Manufacture parts from various materials in accordance with specifications from blueprints, electronic drawings and shop sketches
- C. Solve quality problems using process planning, technical knowledge, teamwork, mathematics, and critical thinking
- D. Apply safety principles in a work environment to minimize hazards and prevent losses to productivity
- E. Demonstrate employability skills needed to obtain and retain employment in machine tool and related fields
- F. Use CAD and CAM programs to design parts and program manufacturing machines

### 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