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