MACH 161 Course Outline as of Fall 2018

CATALOG INFORMATION

Dept and Nbr: MACH 161 Title: METALLURGY Full Title: Metallurgy Last Reviewed: 12/12/2023

| Units | | Course Hours per Week | | Nbr of Weeks | Course Hours Total | |
|---------|------|------------------------------|------|--------------|---------------------------|-------|
| Maximum | 3.00 | Lecture Scheduled | 2.00 | 17.5 | Lecture Scheduled | 35.00 |
| Minimum | 3.00 | Lab Scheduled | 3.00 | б | Lab Scheduled | 52.50 |
| | | Contact DHR | 0 | | Contact DHR | 0 |
| | | Contact Total | 5.00 | | Contact Total | 87.50 |
| | | Non-contact DHR | 0 | | Non-contact DHR | 0 |

Total Out of Class Hours: 70.00

Total Student Learning Hours: 157.50

| Title 5 Category: | AA Degree Applicable |
|-------------------|---|
| Grading: | Grade Only |
| Repeatability: | 00 - Two Repeats if Grade was D, F, NC, or NP |
| Also Listed As: | |
| Formerly: | MACH 61.1 |

Catalog Description:

Study of metals including alloying, heat treating, testing and applications in industry.

Prerequisites/Corequisites:

Recommended Preparation:

Eligibility for ENGL 100 or ESL 100 and Course Completion or Concurrent Enrollment in IED 190

Limits on Enrollment:

Schedule of Classes Information:

Description: Study of metals including alloying, heat treating, testing and applications in industry. (Grade Only) Prerequisites/Corequisites: Recommended: Eligibility for ENGL 100 or ESL 100 and Course Completion or Concurrent Enrollment in IED 190 Limits on Enrollment: Transfer Credit:

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

| AS Degree: CSU GE: | Area Transfer Area | Effective: Effective: | Inactive: Inactive: |
|-----------------------|-----------------------|--------------------------|------------------------|
| IGETC: | Transfer Area | Effective: | Inactive: |
| CSU Transfer | : Effective: | Inactive: | |
| UC Transfer: | Effective: | Inactive: | |

CID:

Certificate/Major Applicable:

Both Certificate and Major Applicable

COURSE CONTENT

Student Learning Outcomes:

At the conclusion of this course, the student should be able to:

- 1. Describe the basic classification of metals, crystal structures and various material properties.
- 2. Explain the manufacturing, identification, phase diagram, heat treatment processes and deformation of iron and iron alloys.
- 3. Perform basic lab experiments demonstrating sample preparation and examination methods.

Objectives:

Upon completion of this course, students will be able to:

- 1. Describe the basic properties of all metals.
- 2. Describe the process of mining, extraction and refining of ores to metals.
- 3. Identify metals and alloys using the periodical table of elements or tables of alloys numbering systems.
- 4. Explain various crystal structures.
- 5. Explain heat treatment processes and surface hardening techniques pertinent to steel alloys.
- 6. Use handout materials, text and library materials to do research on metallurgical alloys.
- 7. Perform basic lab experiments including: plotting data, dimensional measurements, heat treatments, tensile loading and metallurgical sample preparation and examination methods.

Topics and Scope:

- I. Introduction to Metallurgy
- II. History of Elements
- III. Iron and Steel Refining
- IV. Identifying Ferrous and Non-Ferrous Metals
- V. Crystal Structure Systems
- VI. Tensile Test
- VII. Heat Treatment Techniques
- VIII. Quenching Medias
- IX. Hardness Testers
- X. Physical and Chemical Metallurgy

- XI. Grain Structure and Patterns
- XII. Iron and Steel Systems
 - A. A.I.S.I. [American Iron and Steel Institute]
 - B. S.A.E. [Society of Automotive Engineers]
 - C. U.S.S. [United States Standard]
 - D. A.W.S. [American Welding Society]
- XIII. Density Measurements
- XIV. Surface Hardening Methods

All topics are covered in both the lecture and lab parts of the course.

Assignment:

Lecture-Related Assignments:

- 1. Reading (approximately 10 15 pages per week)
- 2. Complete assignments in each chapter
- 3. Quizzes (7 15), midterm and final exam
- 4. A semester group (or individual) project followed by an oral presentation to the class; the semester project can be substituted with a mid-term paper, as per instructions by instructor, consisting of library research

Lab-Related Assignments:

1. Laboratory assignments to be completed during the lab sessions (7 - 10)

Methods of Evaluation/Basis of Grade:

Writing: Assessment tools that demonstrate writing skills and/or require students to select, organize and explain ideas in writing.

Semester project

Problem Solving: Assessment tools, other than exams, that demonstrate competence in computational or non-computational problem solving skills.

Lab assignments, chapter assignments

Skill Demonstrations: All skill-based and physical demonstrations used for assessment purposes including skill performance exams.

None

Exams: All forms of formal testing, other than skill performance exams.

Quizzes, midterm and final exam

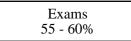
Other: Includes any assessment tools that do not logically fit into the above categories.

| Problem solving | |
|-----------------|--|
| 15 - 25% | |

Writing

0 - 25%

Skill Demonstrations 0 - 0%



Other Category 0 - 25%

Representative Textbooks and Materials: Metallurgy Fundamental. 5th ed. Brandt, Daniel and Warner, J.C. Goodheart-Wilcox Company, Inc. 2009 (classic) Instructor prepared materials