MACH 61.1 Course Outline as of Spring 2011

CATALOG INFORMATION

Dept and Nbr: MACH 61.1 Title: FERROUS METALLURGY
Full Title: Ferrous 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	6	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 61A

Catalog Description:
Study of ferrous metals including alloying, heat treating, testing and applications in industry.

Prerequisites/Corequisites:

Recommended Preparation:
Eligibility for ENGL 100 or ESL 100

Limits on Enrollment:

Schedule of Classes Information:
Description: Study of ferrous metals including alloying, heat treating, testing and applications in industry. (Grade Only)
Prerequisites/Corequisites:
Recommended: Eligibility for ENGL 100 or ESL 100
Limits on Enrollment:
Transfer Credit: CSU;
Repeatability: Two Repeats if Grade was D, F, NC, or NP

ARTICULATION, MAJOR, and CERTIFICATION INFORMATION:

AS Degree:	**Area**	Effective:	Inactive:
CSU GE:	**Transfer Area**	Effective:	Inactive:
IGETC:	**Transfer Area**	Effective:	Inactive:

CSU Transfer:	Transferable	Effective:	Fall 1981	Inactive:	Fall 2018
UC Transfer:		Effective:		Inactive:	

CID:

Certificate/Major Applicable:
Both Certificate and Major Applicable

COURSE CONTENT

Outcomes and Objectives:
Upon completion of this course, students will be able to:
1. Describe the basic properties of all ferrous 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:

1. Introduction to metallurgy
2. History of elements
3. Iron and steel refining
4. Identifying ferrous metals
5. Crystal structure systems
6. Tensile test
7. Heat treatment techniques
8. Quenching medias
9. Hardness testers
10. Physical and chemical metallurgy
11. Grain structure and patterns
12. 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]
13. Density measurements
14. Surface hardening methods

Assignment:

1. Reading (approximately 10 - 15 pages per week)
2. Complete assignments in each chapter
3. Chapter quizzes
4. 7 to 10 laboratory assignments to be completed during the lab sessions
5. 1 to 2 mid-term exams
6. A semester group (or individual) project to be presented electronically 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
7. Final exam

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	Writing 20 - 25%

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

Lab assignments, chapter assignments	Problem solving 15 - 25%

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

None	Skill Demonstrations 0 - 0%

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

Exams: multiple choice, true/false, matching items, completion	Exams 55 - 60%

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

None	Other Category 0 - 0%

Representative Textbooks and Materials:
Metallurgy Fundamental by Brandt/Warner, 5th ed. The Goodheart-Wilcox Company, Inc., 2009.
Instructor prepared materials