

## **MME 3321/ MME 5390/ MASE 6390 Engineering Alloys**

**Spring 2023**

**INSTRUCTOR:** Dr. Stephen W. Stafford, P.E.

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**Office Hours:** MW 03:00-04:00pm and every other Friday afternoon starting 01/27/23 or by appointment

**TEXT:** Resource materials are available at the Reserve Desk in the Library and posted on Blackboard.

*Elements of Metallurgy and Engineering Alloys*, ed. by F. C. Campbell, ASM International, Materials Park, 2008 is an option for those requiring a textbook.

**COURSE DESCRIPTION:** The course focuses on the design, manufacturing, selection and specification of engineering alloys for use in industrial applications. Topics related to ferrous (iron and steel) and non-ferrous metals in the cast, wrought, powder and particulate state will be covered. Mill test reports (MTRs) and how to interpret them as well as interpreting compliance with various specification entities to include ASTM, API, ABS, etc. are inherent to the course.

### **TOPICS:**

1. Course Introduction and Overview
2. Fundamentals of Alloy Design
3. Fe/C and Fe/Fe<sub>3</sub>C Systems
4. Heat Treatment of Steel
5. Carbon Steels
6. High-Strength, Low-Alloy Steels (HSLAs)
7. Stainless Steels
8. Cast Irons
9. Tool Steels
10. Al and Al Alloys
11. Ti and Ti Alloys
12. Cu and Cu Alloys
13. Ni and Ni Alloys
14. Co and Co Alloys
15. Miscellaneous Alloy Systems (to include metal matrix composites)

This course will provide the student knowledge of the nature, properties and processing of metallic materials. Coverage of each metal alloy group will include the chemical and structural state; processing and fabrication; properties and performance capabilities. What constitutes alloy design and applications of metallic materials will be emphasized. Interpretation skills of the microstructural features of the various alloy systems is absolutely paramount to the course!

Three exams and a project will provide four major grades. Assignments and quizzes will be given.