MSE 6xxx

Advanced Metallic Materials and Processing
Spring Semesters (starting SP20)

Course Syllabus

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Catalog Data: A graduate class in design, processing and simulation of advanced metallic materials including alloys (ferrous and non-ferrous) and metal matrix composites.

Prerequisite: graduate standing in MSE or ISE or MAE, or permission by Instructor

Time Distribution: 2.0 hour lectures, 14 weeks

Objectives: To provide students the latest experimental techniques and computational tools to design, manufacture and simulate advanced metallic materials (including alloys and composites) based on Integrated Computational Materials Engineering (ICME) principles.

Textbooks: None required; course notes provided on Carmen.

Lecture Topics:

Part One. Advanced metallic material design
Chapter 1. Advanced ferrous alloys (including advanced high strength steels)
Chapter 2. Advanced non-ferrous alloys (including light alloys and super alloys)
Chapter 3. Emerging and functional alloys (including bio-metals and high-entropy alloys)
Chapter 4. Metal matrix composites

Part Two. Advanced metallic material processing
Chapter 5. Solidification science and solidification-based processes
Chapter 6. Deformation mechanisms and thermomechanical processes
Chapter 7. Advanced processes (including multi-material and additive manufacturing)

Part Three. Integrated Computational Materials Engineering (ICME)
Chapter 8. Thermodynamic and kinetic modeling and experimental techniques
Chapter 9. Solidification modeling and experimental techniques
Chapter 10. Deformation modeling and experimental techniques
Chapter 11. Microstructure modeling and validation
Chapter 12. ICME case studies

Grading:
- Six quizzes (the lowest score drops, no make-up) 20%
- One term paper and presentation on advanced topics 20%
- One simulation project report 20%
• Final design project and research paper (no exam in finals week) 30%
• Attendance and class participation 10%

Academic Integrity, Academic Misconduct

Academic misconduct may be found in any action that tends to distort the accurate assessment of any student’s individual accomplishments that are evaluated for the purpose of grading or conferring academic credit. Note that a student may be guilty of academic misconduct, for example, by cheating, collaborating, plagiarizing, or by allowing another student to cheat, collaborate, or plagiarize. Note also that the distortion applies, for example, to exams, homework assignments, and laboratory work. To the extent that any class activity (for example: attendance or participation) is used for evaluation for the purpose of grading or conferring academic credit, falsifying or distorting such activity, or permitting another student to falsify or distort such activity, represents academic misconduct.

Additional guidance about what represents academic integrity and misconduct, and related university-wide policies and procedures are available at the following locations:

http://oaa.osu.edu/coam/faq.html
http://oaa.osu.edu/coam/ten-suggestions.html

Note: Students should not request nor accept guidance on these matters from a teaching assistant, fellow student, or anyone other than the faculty instructor of record for this course.

Disabilities Statement

The Ohio State University and Department of Materials Science and Engineering affirm the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among all members of our community; and encourages each individual to strive to reach their own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited. Advice on such matters is also available from:

Mark Cooper, Graduate Studies Coordinator, (614) 292-7280, e-mail Mark concerning the MSE graduate studies.