

# MSE 520/ Advanced Mechanical Behavior

## Course Outline

Textbook: Mechanical Behavior of Materials, Second Edition  
By T. H. Courtney  
Waveland Press, Inc. 2005  
ISBN 1-57766-425-6

### Subject

Class 1 (Jan 9)– Introduction, Overview, Basic Concepts

Class 2 (Jan 14) Basics: Chapter 1  
Permanent Deformation  
Ductility  
Constitutive Models  
Multiaxial Stress States and Yielding Criteria

Class 3 (Jan 16) Chapter 2  
Elastic Behavior  
Elastic Anisotropy

Class 4 (Jan 21) Comsol FEA Overview and Hands On  
**NOTE: ROOM Beyster 1620**  
Proposed ICME project prospectus due  
Homework 1 Due

Class 5 (Jan 23) Finite Element Analysis

Class 6 (Jan 28)- Chapter 3  
Dislocation 1  
HW 2 Due  
Project team choices due

Class 7 (Jan 30) – Chapter 3  
Dislocations 2

Class 8 (Feb 4) – Chapter 3  
Dislocations 3

Class 9 (Feb 6): - Chapter 3  
Dislocations 4  
HW 3 Due

Class 10 (Feb 11) Chapter 4  
Plastic Deformation in Single Crystals and CRSS

Class 11 (Feb 13): EXAM REVIEW  
Revised Team Proposal Due

Class 12 (Feb 18) No Class (TMS) - Work on Project

Class 13 (Feb 20): No Class (TMS) - Work on Project

Class 14 (Feb 25): Exam 1 (Chapters 1-3) DOW Room 1017

Class 15 (Feb 27): Chapter 4  
Single Crystals  
Polycrystals

### **Winter Break**

Class 16 (Mar 11) Chapter 5  
Strengthening Mechanisms 1  
HW 4 Due

Class 17 (Mar 13) Chapter 5  
Strengthening Mechanisms 2

Class 18 (Mar 18) Chapter 5 and 7  
Strengthening Mechanisms and  
High Temperature Deformation  
Interim Team Project Report Due  
HW 5 Due

Class 19 (Mar 20) Chapter 7  
High Temperature Deformation 2

Class 20 (Mar 25) Chapter 7 and 9  
Hot Deformation and Fracture Mechanics 1  
HW 6 Due

Class 21 (March 27) Chapter 9  
Fracture Mechanics 2

Class 22 (Apr 1): Chapter 9 & 12  
Fracture Mechanics Fatigue

Class 23 (April 3): Chapter 12  
Fatigue

Class 24 (April 8): Chapter 12

Fatigue Crack Propagation  
HW 7 Due

Class 25 (April 10): Fatigue Crack Propagation  
Final Project Report Due

Class 26 (April 15): Project Reviews  
Confidential Peer Evaluations Due

Class 27 (April 17): Final Review

Exam 2 April 22 4:30-6PM Dow Room 1017

Grading

Homework - 25%

Exam 1 - 25%

Project - 25 %

Exam 2 - 25%

Homework - will be assigned, at least 6 assignments

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Class Time: T-Th 4:30-6pm

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