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

Instructor:  John Allison
Office:  2020 Gerstacker Building
Email:  johnea@umich.edu
Phone:  615-5150
Office Hours:  Wed 1:30-2:30 pm (or by prior appointment)
Class Time:  T-Th 4:30-6pm

Grader:  Vir Nirankari
Office:  2024 Gerstacker
Email:  virn@umich.edu
Phone:  443-570-2676