

FALL 2009 COURSE SYLLABUS  
ME 378K: MECHANICAL BEHAVIOR OF MATERIALS #18800

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**Lectures:** MWF 11:00–11:50 AM in ETC 7.146

**Office Hours:** Monday: 2:00–3:00 PM

Tuesday: 2:00–3:00 PM

Wednesday: 2:00–3:00 PM

**Required Textbook:** Richard W. Hertzberg. *Deformation and Fracture Mechanics of Engineering Materials, Fourth Edition*. (John Wiley & Sons, Inc.: Hoboken, NJ) 1996.

**Prerequisites:** For engineering majors, Mechanical Engineering 336 and 136L with a grade of at least C in each, and admission to an appropriate major sequence in engineering; for non-engineering majors, upper-division standing and written consent of instructor.

**Course Description:** Elastic deformation; viscoelasticity; yielding, plastic flow, plastic instability, strengthening mechanisms; fracture, fatigue, creep; significance of mechanical properties tests.

**Grading Policy:** Grades will be based on a midterm exam, a final exam and a combination of homework, small projects and class participation, with weights given in the tables below.

| Item                      | Weight | Grade | Minimum Score |
|---------------------------|--------|-------|---------------|
| Midterm exam              | 30%    | A     | 90%           |
| Final exam                | 30%    | B     | 80%           |
| HW/Projects/Participation | 40%    | C     | 70%           |
|                           |        | D     | 60%           |

**Important Dates:** Please make note of the following important dates.

Sep. 11 — Twelfth class day.

Wed., Dec. 9 — **Final Exam**, 7:00 PM–10:00 PM in location assigned by U.T.

**Homework:** Homework problems will be assigned on approximately a weekly or biweekly basis. All students are expected to complete and thoroughly understand the homework assignments. Students are encouraged to discuss the homework problems together, but the final work turned in must be that of the individual student. Homework solutions will be made available on a secure web site. Homework will be checked on the due date and immediately returned to students for correction. Students should then correct their homework using the solutions provided and turn in the corrected homework at the next class meeting.

**Small Projects:** Several small projects will be assigned during the semester. Students are expected to work together in small teams, both during the lecture period and outside of class, to complete the projects. Teams are expected to produce short written reports and to present their results to the class.

**Exams:** The midterm exam will be conducted during the normal lecture period in the assigned classroom on a date to be specified by the instructor. The final exam will be conducted at the time and location scheduled by the University. Students are allowed to prepare one 8.5" × 11" sheet of notes, which may include both sides of the paper, for use during each exam. Each note sheet must be handed in with the exam for which it is used. Exam problems will be based primarily on assigned homework and projects and on materials covered in lecture.

**Attendance:** Attendance and participation in lecture are mandatory and will be considered in grading. The instructor must be given written notice a minimum of two weeks in advance for any absences other than emergencies. If absence is required because of an emergency, the instructor should be notified at the earliest convenient opportunity.

**Regrades:** Errors in grading should be noted *in writing* and provided to the instructor with the graded item for review *no later than one week* after the item is made available to the student. *No regrades will be accepted without a written description* of the grading error, and regrades will only be conducted *in private* by the instructor.

**Honesty:** Any academic dishonesty will be dealt with according to University policy, including the stiffest penalty which the instructor may assess, usually a failing grade in the course. Dishonesty damages the reputation of the University and its students and will not be tolerated.

**Evaluations:** The course and instructor will be evaluated using standard evaluation forms at the end of the course. Students are encouraged to provide continuous feedback to the instructor throughout the course. The most effective way to do this is by visiting the instructor during office hours.

### **Topical Outline**

1. Elasticity: isotropic, anisotropic, non-linear
2. Continuum plasticity theory
3. Dislocations, slip and twinning
4. Strengthening mechanisms
5. High-temperature deformation behaviors
6. Deformation of polymers and viscoelasticity
7. Fracture mechanics
  - (a) Basic theory
  - (b) Influence of material and microstructure
  - (c) Effects of environment
  - (d) Fatigue
  - (e) Analysis of fractures

The University of Texas at Austin provides, upon request, appropriate academic adjustments for qualified students with disabilities. For more information, contact the Office of the Dean of Students at 471-6259. Web-based, password-protected class sites are associated with all academic courses taught at the University. Syllabi, handouts, assignments and other resources are types of information that may be available within these sites. Site activities could include exchanging e-mail, engaging in class discussions and chats, and exchanging files. In addition, electronic class rosters will be a component of the sites. Students who do not want their names included in these electronic class rosters must restrict their directory information in the Office of the Registrar, Main Building, Room 1.