ME/MSE 521: Mechanical Behavior and Manufacturing of Polymers and Composites

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Tuesday and Thursday: 9:30 – 10:50 am
Howe 1324

OFFICE HOURS:
Tuesday 3:30 pm to 5:00 pm, or by appointment

PREREQUISITES: ME 324 or MAT E 272 and EM 324

COURSE DESCRIPTION:

RECOMMENDED TEXTBOOK AND READING MATERIALS:

TENTATIVE COURSE TOPICS:
1. Introduction: stress and strain analysis
2. Properties of polymers: mechanical properties of polymers, relaxation and creep behavior
3. Viscoelastic models for polymers: linear models, phenomenological models, and differential constitutive equations
4. Time and temperature behavior of polymers
5. Non-linear viscoelasticity
6. Yielding of polymers: viscoplasticity in polymers
7. Polymer failure
8. Polymer composite analysis

**GRADING:**

- Exam 1 20%
- Exam 2 20%
- Project 25%
  - Topic selection (5%)
  - Final presentation (20%)
- Journal article critique 15%
- Homework (4-6 sets) 20%

**Homework assignments:** Homework will be assigned on WebCT page and due in class on the assigned date.

**Course Project:** The grade for the course project will be in the form of a research project that will require review of contemporary literature and research articles. Students will have the opportunity to determine the exact nature of the project in consultation with the instructor so as to maximize student motivation and allow ties to their ongoing research projects outside of the course.

**Journal Article Critique:** The student will select a journal article that contains viscoelastic modeling of a polymer. The student will provide a critique of the article by applying knowledge learned in class. Both qualitative reasoning and quantitative analysis are expected.

**COURSE POLICIES**

**WebCT course webpage**

- The course will be administered through WebCT.
- All the lecture slides, handouts, homework solutions and grades will be posted on the course webpage on WebCT.
- No printed handouts will be distributed during the class.

**Note:** Please discuss any special needs or special accommodations with me at the beginning of the semester or as soon as you become aware of your needs. Those seeking accommodations based on disabilities should obtain a Student Academic Accommodation Request (SAAR) form from the Disability Resources (DR) office (515-294-7220). DR is located on the main floor of the Student Services Building, Room 1076.