

Polymer Physics

Spring 2015

MSE 597 (1.5 credit hour)

Thursdays, 9:00-10:15 am (ARMS 1103) with Prof. Kendra Erk

Reference textbooks: *Polymer Physics*, by Rubinstein and Colby (2003 edition available online through Purdue Library)

Course purpose: To provide upper-level undergraduate and graduate students with a mechanistic-level understanding of polymeric materials, with a focus on the physical structure-property relationships of the polymer molecule and its impact on the solid/fluid mechanical behavior of bulk polymeric materials.

Topics:

- Overview of polymer length scales, time scales, and basic terminology
- Dynamics of single polymer molecules (ideal vs. real chains)
- Basic thermodynamics of blends and solutions of polymer molecules
- Dynamics of polymer networks (rubbers and gels)
- Dynamics of polymer melts and solutions (entangled and unentangled)
- Measurement methods (light scattering, rheometry, dynamic mechanical analysis)

Structure: one 75-minute lecture a week, led by Prof. Erk; lectures will include in-class activities and assessments, discussion of homework problem sets, and student presentations.

Grading: one 75-minute exam (40%), homework and participation (30%), in-class presentations (30%)

Course Assessment: (1) first lecture survey, to determine baseline knowledge of students and specific topics/areas of interest; (2) mid-semester survey; (3) end-of-semester survey