Intended Audience: Seniors/graduate students who are enthusiastic about understanding the physics of polymers. Only a basic working knowledge of calculus, probability, chemistry and physics is assumed.

Aim: To develop the fundamental concepts required to understand polymers melts, solutions and gels in terms of both structure and dynamics.

Instructor: Ozge Akbulut – office: FENS 2046; phone: 9968; e-mail: ozgeakbulut@sabanciuniv.edu

Assistant:

Hours: Lecture, Th 2:40–3:30, Fri 2:40–4:30


Evaluation: Grading is based two term exams (25 % each), final (35 %), and assignments (15 %).

COURSE OUTLINE:


Week 2: Basic definitions: Structure, phases, and weight of polymers. Molar mass distributions and measurements (viscosity measurements and osmometry)

Week 3–4: Ideal chains: Definition of chain conformation; chain dimensions and their distributions. Free energy of an ideal chain.


Week 6: Midterm I, Introduction to polymer thermodynamics


Week 8: Polymer solutions: Type of solvents. Osmotic pressure.


Week 10: Networks and gels: Rubber elasticity. Swelling.

Week 11: Viscoelasticity.


Week 13: Dynamics of unentangled polymers: Rouse and Zimm models.

Week 14: Dynamics of entangled polymers. Reptation in melts and semi-dilute solutions.

Course Organization:

- Problem assignments, partial flip-class
- Two midterms and a final exam.