Textbook:
There is no required textbook for this course, but a suggested reference is:

Assignments:
There will be homework most weeks over the course of the semester. Late HW receives 1/2 credit. Graduate students taking the class for 4 credit hours will write a term paper, due on April 21st, 2019.

Exams:
There will be two in-class exams and one final.
**Tentative exam dates:** February 20, March 15, final (TBA, accumulative).

i>clickers:
We will use i>clickers (credit: 100% participation) for in-lecture discussions. The i>clicker remote may be purchased at any of the book stores. You are permitted to have up to **four** i>clicker absences during the semester.

Grading:
**3 credit hours:**
Exam 1 (20%) + Exam 2 (25%) + Final (40%) + Homework (10%) + In-lecture i>clicker (5%)

**4 credit hours:**
Exam 1 (20%) + Exam 2 (20%) + Final (35%) + Homework (10%) + Term Paper (10%) + In-lecture i>clicker (5%)

Teaching Assistant (TA):
Gaurav Singhal, email: gauravs3@illinois.edu

Office hours:
Prof. Qian Chen, Tuesdays 3-4 pm, MRL 102
Gaurav Singhal (TA): Thursdays 5 - 6 pm, MSEB 205

Topics
1. Introduction
What is a polymer? Chain architecture, chemical makeup, physical states. What are typical behavior patterns? viscous liquids, elastomers, fibers, semi-crystalline, liquid crystalline, glassy, conducting.
2. Synthesis and processing
Basic concepts: polymerization methods based on functional units; chains, gels, network, extent of reaction.

Different polymerization methods

3. Mechanical properties
Viscoelastic behaviors: elastic modulus, shear moduli,
Rouse, reptation, T dependence, time-temperature superposition; crazing.

4. Single polymer molecules
Conformations: random walk chain, good solvents.
Molecular weight: Mn, Mw, how to measure molecular weights

5. Characterization methods
Light scattering, fluorescence correlation spectroscopy

6. Thermodynamics of polymers
Mix, Flory-Huggins equation, Phase diagram

7. Applications
How to engineer thermodynamics
Biomaterials; electronic polymers; conducting polymers; biodegradability

Policy on conflicts or emergencies:

(1) For time conflicts with other events (e.g. another scheduled exam), or an official UIUC activity (e.g. varsity athletics, band concert),
Regarding HW, please show official documentation about the conflict at least two weeks before the homework due date. The HW due date will be extended.
Regarding the exam, please show official documentation about the conflict at least three weeks before our exam date. A make-up exam will be scheduled.

(2) If you will not be able to make it to the exam or submit HW on time due to serious illness or other emergent personal crisis (e.g. car accident) that are not described in (1), you must send email to the TA (gauravs3@illinois.edu) and the instructor (qchen20@illinois.edu) at the earliest possible opportunity, and submit a statement from the professionals that are authorized to evaluate your situations (e.g. doctors, police). The statement needs to clearly explain that you are not physically capable of attending the exam or submitting HW on time. The HW due date will be extended for HW, and a make-up exam will be scheduled for exam.

In both of the above two cases, in-lecture i>clicker quizzes will be exempt given notifications with proper documents sent to the instructor and the TA.