MSE 457/CHEM 480
"Polymer Chemistry"
Instructor: Prof. Yuecheng Peter Zhou
Fall Semester 2024
M,W,F 11:00 – 11:50 am, 2310 Everitt Hall

Primary Textbook
Polymer Chemistry, 3rd Edition, Hiemenz and Lodge

Optional Textbooks (Do not need to buy. Stevens has more breadth, and Odian has more depth)
1) *Polymer Chemistry, 3rd Edition*, M. Stevens
2) *Principles of Polymerization, 4th Edition*, G. Odian

Office Hours, TA, and instructor information
Instructor: Prof. Zhou, zhou62@illinois.edu, (217) 300-0792
Office hours: Monday, 1:30-2:30 pm
TA: Montse Solis, msolis27@illinois.edu
TA Office hours: TBA
All office hours location: TBA

Grading

1. **Homework (20%)**:
    - ~10 homework and will be submitted on **Gradescope (Entry Code BK37GY)**. If you don't do the homework, you will likely have serious difficulties on the exams.
    - Over the course of the semester, you are allowed to drop 1 HW for any reason. *Late homework will be accepted with a reduction of 10% per hour late*.
    - Although you are encouraged to talk about the problems with your classmates, you must submit an original homework. **Homework which exhibits copying or plagiarism will receive zero points**.
    - **All homework due on Wednesday**

2. **Exams (70%)**:
    - Midterm 1 (20%): Friday, September 27, 11:00 – 11:50 am
    - Midterm 2 (20%): Friday, November 8, 11:00 – 11:50 am
    - Final Exam (30%): Wednesday, December 18, 8:00 – 11:00 am

3. **Quizzes (10%):**
    - There will be pop quizzes in class over the course of the semester.

Regrade requests:
You have **2 weeks to ask for a regrade on all HW and exams**. Students must first look at the posted solutions before requesting a regrade. Requests made on the same day that an assignment is handed back will not be accepted.

4-credit option

The four credit option for this class requires both a written proposal and oral presentation on a topic covered in the course. More details will be given later in the semester.

Course outline and corresponding book chapters (Hiemenz and Lodge)

Module 1 (3 Lectures): Introduction and nomenclature, Molecular weight definition, Organic Chemistry Review (*Chapter 1 of H&L*)

Module 2 (11 Lectures): Step growth polymers, branching and network formation, kinetics, interfacial polymerization, dendrimers (*Chapter 2 of H&L*)

Module 3 (6 Lectures): Chain growth polymerization, free radical polymerization, initiation, emulsions *(Chapter 3 of H&L, Chapter 4 of Odian for emulsions)*

Module 4 (4 Lectures): "Living" radical methods (ATRP, NMCRP, RAFT), Anionic and Cationic polymerization, ring opening polymerization (*Chapter 4 of H&L*),

Module 5 (4 Lectures): Copolymers, microstructure, characterization, catalytic and stereo-controlled polymerization (*Chapter 5 of H&L)*

Module 6 (3 Lectures): Assorted current and emerging topics in polymer science (conductive polymers, solid state synthesis, sequence specific polymers, dynamic polymer networks, frontal polymerization)