

MSE 457/CHEM 480
“Polymer Chemistry”
Instructor: Prof. Yuecheng Peter Zhou
Fall Semester 2026
M,W,F 11:00 – 11:50 am, 2310 Everitt Laboratory

Prerequisite

CHEM 232 *Elementary Organic Chemistry I*, or equivalent.

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) *Principles of Polymerization*, 4th Edition, G. Odian
- 2) *Introduction to Polymers*, 3rd Edition, R. J. Young
- 3) *Polymer Chemistry*, 3rd Edition, M. Stevens

Office Hours, TA, and instructor information

Instructor: Prof. Zhou, zhou62@illinois.edu

Office hours: Monday, 10:00-10:45 am

TA: Ruike Dai, ruikedai@illinois.edu

Xuchen Ren, xuchenr2@illinois.edu

TA Office hours: Monday 1-2 pm, Wednesday 3-4 pm

Review session for midterms (TBA).

Office hours location: TBA

Grading

1. Homework (20%):

- ~10 homework and will be submitted on **Gradescope (Entry Code: 3D428R)**. 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 11:59 pm.**
(Homework extensions may be given in exam weeks)

2. Exams (70%):

Tentative dates:

- Midterm 1 (20%): Monday, September 28, 11:00 – 11:50 am
- Midterm 2 (20%): Monday, November 2, 11:00 – 11:50 am
- Final Exam (30%): TBA

3. Quizzes (10%):

- There will be three 10-minute, in-class quizzes over the course of the semester. One prerequisite quiz, then two short quizzes one week before each midterm exam. Exact dates will be announced over the course of the semester.

Note:

- *Final grades for this course will be curved.*
- *We will grade HW and exams as soon as possible, but please allow ~10 days for HW and exam grades to appear on Canvas.*

Regrade requests:

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. You have **2 weeks to ask for a regrade on all HW and exams**. Please note that your score **may increase or decrease** after regrading.

4-credit option

The four credit option for this class requires both a written proposal and a 5-minute 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, solid state synthesis, analytical techniques (*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 (5 Lectures): “Living” radical methods (ATRP, NMCPR, 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 (2 Lectures): Assorted current and emerging topics in polymer science (*e.g., semiconducting polymers*)