

MSE 457/CHEM 480
“Polymer Chemistry”
Instructor: Prof. Christopher Evans
Fall Semester 2023
2310 Everitt Hall
web page: Canvas

Primary Textbook:

Polymer Chemistry, 3rd Edition, Heimenz and Lodge

Optional Textbooks (Do not need to buy. Stevens has more breadth, and Odian has more depth)

- 1) *Polymer Chemistry, 3rd Edition*, Stevens
- 2) *Principles of Polymerization, 4th Edition*, G. Odian

Office Hours, TA, and instructor information

Instructor: Prof. Evans, cme365@illinois.edu, 217-300-9949

Office hours: Wednesday, 1:30-2:30 pm

TAs: Peng Lan, Chan Song

TA Office hours: Monday 2-3 pm, and Thursday 4-5 pm

Grading

Homeworks are worth 15% (~10 homeworks) and will be submitted on **Gradescope (Entry Code WV7JV6)**. 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 homeworks 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. **Homeworks which exhibit copying or plagiarism will receive zero points.**

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.

There will be **two midterm exams (20% each) and one final (30%)**. Weekly **quizzes** will be posted online and these will be worth **15%** of the grade.

Midterm 1: Friday, September 22, 11-11:50

Midterm 2: Friday, November 3, 11-11:50

Final Exam: Friday December 10, 1:30-4:30

Quiz Schedule (all on Friday, due 11:59 pm): 9/1, 9/8, 9/15, 9/29, 10/13, 10/20, 10/27, 11/10, 12/1

Homework due dates (all on Wednesday, due 11:59): 8/30, 9/6, 9/13, 9/20, 9/27, 10/4, 10/11, 10/18, 10/25, 11/1, 11/8, 11/15, 11/29

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)