Teaching format: Virtual via Zoom, MWF, 11-11:50 am

Web page: Compass/Blackboard

Primary Textbook: Polymer Chemistry, 2nd Edition, Hiemenz and Lodge
Optional Textbooks
1) Polymer Chemistry, 3rd Edition, Stevens

Office Hours, TA, and instructor information
Instructor: Prof. Hua Wang, huawang3@illinois.edu, 217-419-9013, 202 MSEB
Office hours: TBD (either Tuesday or Thursday)
TAs: Grant Sheridan (grants2@illinois.edu, Primary contact)
    Bhaskar Soman (bsoman2@illinois.edu, assistance with grading)
TA Office hours: TBD (either Thursday or Tuesday)

Grading
Homework 15% (~10 homeworks): HWs will be uploaded to Compass. If you don’t do the homework, you will likely have difficulties on the exams. Over the course of the semester, you are allowed to drop 1 HW for any reason. Late HWs will not be accepted. HWs 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.

Mid-term exams (2 in total): 25% each for 3-credit option, and 20% each for 4-credit option. Exam questions will be posted online at the start of the exam, and students will write answers on paper. At the end of the exam, students will take a photo, convert it to PDF, and send to huawang3@illinois.edu (or TA’s email, will confirm when the exam time approaches). The whole exam will be held via zoom.

Final exam: 35% for 3-credit option and 25% for 4-credit option. Exams will be in-class no open notes or books. Exam questions will be posted online at the start of the exam, and students will write answers on paper. At the end of the exam, students will take a photo, convert it to PDF, and send to huawang3@illinois.edu (or TA’s email, will confirm when the exam time approaches). The whole exam will be held via zoom.

Research proposal on a current topic in Polymer Chemistry for 4-credit option (20%): This proposal will include Introduction and Research Challenge, Hypothesis, Approach, and Expected Outcome. More details will be provided later in the semester.

Attendance: Given the current situation, I do not want to bring additional burden to international students who may have time conflicts. However, attendance is encouraged from all of you.
Course Outline and corresponding book chapter(s) (Hiemenz and Lodge)

Week 1 (8/24, 8/26, 8/28): Chemical structure, molecular weight, architectures, classifications (Ch. 1-2)

Week 2 (8/31, 9/4): Organic Chem brief review, functional groups, basic reactions, intro to step growth (SG)

Week 3 (9/7, 9/9, 9/11): SG polymers, branching and network formation, probabilistic approach to molecular weight, SG kinetics (Ch. 2)

Week 4 (9/14, 9/16, 9/18): SG Copolymers, Bulk, solvent, and interfacial polymerizations, Cyclization

Week 5 (9/21, 9/23): Polyesters, amides, carbonates, imides, peptides, ureas, urethanes, sulfides, sulfones, aromatic polyethers, formaldehyde polymers, acetics, ketals, epoxides (Midterm 1, 9/25)

Week 6 (9/28, 9/30, 10/2): Dendrimers, Protection/deprotection, Peptides

Week 7 (10/5, 10/7, 10/9): Initiators, chain transfer, kinetics, molecular weight distributions (Ch.3)

Week 8 (10/12, 10/14, 10/16): “Living” radical methods (ATRP, NMCRP, RAFT), Copolymerization (Ch.4.6, Ch 5)

Week 9 (10/19, 10/21, 10/23): Emulsion polymerization

Week 10 (10/26, 10/28/ 10/30): Cationic polymerization/kinetics, block copolymers (Ch. 4.5)

Week 11 (11/2, 11/4): Anionic polymerization/kinetics, group transfer polymerization (Midterm 2, 11/6)

Week 12 (11/9, 11/11, 11/13): Characterization of polymers (Ch. 5.6, 7.4, 8, 9.3, 9.6, 9.8, 12.3)

Week 13 (11/16, 11/18, 11/20): Zeigler Natta, metallocenes, metathesis (ROMP), catalytic (Ch. 5.10-5.12)


Week 15 (11/30, 12/2, 12/4): Reactions on polymers, post functionalization, click chemistry

Week 16 (12/7, 12/9): Assorted current and emerging topics in polymer science (conductive polymers, solid state synthesis, sequence specific polymers, covalent organic frameworks)

Final Exam: TBD