

CHEM/ CHBE/MSE 6750
Molecular Sciences & Engineering Room 1224

**Preparation and Reactions of Polymers
(Alias Polymer Synthesis)**

Professor John R. Reynolds
MoSE 2120B, Reynolds@chemistry.gatech.edu

Spring 2024

T/Th 12:30 p.m. to 1:45 p.m.

Text:

Principles of Polymerization by George Odian (4th Edition)

Mode:

This course is taught in person to give students the opportunity to engage with the instructor. Lectures will be live streamed using Microsoft Teams and recorded for later re-reviewing. Permission by the instructor is required for a student to attend a specific lecture via live stream, otherwise, in class attendance is expected. You can find the link to the Teams meeting for each lecture in Canvas: navigate to the Microsoft Teams Meeting Tab on Canvas and follow the link. We will use that same link for each lecture throughout the semester.

Canvas:

The Canvas site will include all course information, including the living schedule of topics, homework assignments, practice exams, lecture notes, and answer keys. Students are required to monitor the course Canvas site for all announcements and materials: this is the official source of information for the class. Students are required to receive Canvas Announcements via email as this will be our main mode of communication.

Lectures:

This course will present the fundamentals of synthetic polymerization chemistry via step-growth and chain-growth (radical/ionic) mechanisms. Topics will include polymerization reactions for most common classes of polymers, along with the thermodynamics and kinetics of polymerization. Lectures will, in general, follow the text with exclusion of specific portions. Supplemental material will be added to provide perspective in more recent developments and applications of polymers.

Topics:

Introduction to Polymers
Step Polymerization
Radical Chain Polymerization with Living Radical Polymerization
Emulsion Polymerization
Ionic Chain Polymerization
Chain Copolymerization
Ring-Opening Polymerization
Stereochemistry and Coordination Polymerization
Reactions of Polymers and Polymer Post-Functionalization

Readings:

Assignments made for reading specific portions of the text will be posted on the Canvas page, along with some extra material from outside sources. This information will be "fair game" on exams.

- Homework:** Specific problem sets will be assigned during the course. These will not be collected or graded. Problem solving will be an important part of the exams and the assigned problems will provide necessary exposure. These problems will be representative of the style and content found on the exams.
- Grading:** Grading will be based on a total point system with points accumulated from two mid-terms, one final exam and one Technical Position paper. Each is worth 25% of the grade. Grade standing during the course will be presented in class and can be obtained by private discussion with the instructor.
- Exams:** Exams will be worth 100 points each. Dates for the exams are:
- Exam 1 - Thursday, February 8
Exam 2 - Thursday, March 14
- Final Exam Thursday, May 2 11:20 AM - 2:10 PM
- (The final will be comprehensive but will still be worth 100 points.)*
- Regrades:** Regrade requests for exams must be submitted within one week after the graded exam is returned. To request a regrade, please write a summary of what you want regraded (question number) and an explanation of why your answer is correct. Attach this page to the front of the assignment and turn the request in to Dr. Reynolds. No regrade requests will be accepted more than one week after the assignment was returned.
- Make-up Exams:** Make-up exams will only be given when arrangements have been made prior to the exam that must be missed because of a scheduled Institute or by illness that is documented and communicated to the faculty.
- Position Paper:** A Technical Position paper (*ca.* 4-8 pages) will be required for this course and will be worth 100 points. Topic assignments will be made in late January and the paper will be due by Tuesday, April 2. A penalty of 10 points per class period will be assessed for late papers. It is expected that students will use primary journals, such as *J. Am. Chem. Soc.*, *Macromolecules* and *Journal of Polymer Science*, in researching their topics.
- Office Hours:** Thursdays, 2:30 p.m. – 3:30 p.m. in MoSE 2120B and by appointment. Contact via e-mail at Reynolds@chemistry.gatech.edu. Be sure to put “Polymer Synthesis 6750” in the subject line of all emails.
- Expectations:** At Georgia Tech we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. See <https://catalog.gatech.edu/rules/21/> for an articulation of some basic expectation that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek.
- Academic Honesty:** Students are expected to adhere to the Georgia Tech honor code in all aspects of this course (see <https://policylibrary.gatech.edu/student-life/academic-honor-code> for details).

Special Needs: It is the responsibility of any student with a learning disability to request special accommodation if desired, and s/he must provide a letter of documentation from the Office of Disability Services verification purposes. Such requests should be made well in advance of the time that the accommodation is required.

Inclusivity: As a member of the Georgia Tech community, I am committed to creating a learning environment in which all my students feel safe and included. Because we are individuals with varying needs, I rely on your feedback to achieve this goal. To that end, I invite you to enter into dialogue with me about the things I can stop, start, and continue doing to make my classroom an environment in which every student feels valued and can engage actively in our learning community.

Georgia Tech Resources:

- The Office of the Dean of Students <https://studentlife.gatech.edu/>;
<https://studentlife.gatech.edu/about/dean-students>
- Counseling Center; <https://mentalhealth.gatech.edu/>; 404-894-2575; Suite 238, Smithgall Student Services Building
- Stamps Health Services: <https://health.gatech.edu/>; 404-894-1420
 - Primary care, pharmacy, women's health, psychiatry, immunization and allergy, health promotion, and nutrition
- Women's Resource Center: <https://womenscenter.gatech.edu/>; 404-385-0230
- LGBTQIA Resource Center: <https://lgbtqia.gatech.edu/>; 404-385-4780
- Veteran's Resource Center: <https://veterans.gatech.edu/>; 404-385-2067
- Georgia Tech Police: <https://police.gatech.edu/>; 404-894-2500