

Chemistry 3320B - Polymer Chemistry (Winter 2023 Course Outline)

1. Course Information

Description: A comprehensive treatment of the preparation and uses of polymers and their chemical and physical properties in the solid state and solution.

Course prerequisite: Either (Chemistry 2273A and Chemistry 2283G) or Chemistry 2213A/B, and either Chemistry 2214A/B or Chemistry 2384B.

Course antirequisite: CBE 4493A/B.

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course, and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites. Please see <http://www.registrar.uwo.ca> for details.

2. Instructor Information

Instructor: Professor Joe B. Gilroy
MSA 3201
joe.gilroy@uwo.ca
(e-mail messages *must* be from your @uwo.ca account)

Office hours: By appointment (via Zoom)

Course Web Page: OWL (<https://owl.uwo.ca/portal>)

Course Schedule: Lectures
M, W, F; ChB 115; 11:30 – 12:20 (in person unless otherwise stated)

Laboratory (one of)
M, F; ChB 080; 1:30 – 5:20,

The schedule for the experiments will be established and distributed during the first week of classes.

3. Course Syllabus, Schedule, Delivery Mode

Course-Based Learning Outcomes:

Upon completion of Chem 3320, students will be able to....

- describe the scientific principles governing polymer synthesis and characterization and apply these principles to problems.
- use their knowledge of polymer chemistry to predict and rationalize properties, mechanisms, and patterns of reactivity.
- apply methodologies in order to conduct polymer synthesis, analyses, or other chemical investigations.
- prepare logical, organized, and concise written reports describing their experimental results in the areas of polymer synthesis and characterization.
- work productively and collaboratively as a team member.

Chemistry 3320B Syllabus Winter 2023:

The topics likely to be covered are outlined in the section below. The order of presentation and the number of lectures devoted to each are approximate.

i. Tentative Course Outline (number of lectures are approximate)

- (a) General introduction and physical properties of polymers (5 lectures)
- (b) Addition polymerization of alkenes including radical, ionic, and transition metal (5 lectures)
- (c) NMR spectra of polymers (2 lectures)
- (d) Condensation polymerization (1 lecture)
- (e) Synthesis of π -conjugated polymers (2 lectures)
- (f) Ring-opening polymerization (2 lectures)
- (g) Inorganic polymers: silicones and polyphosphazenes (2 lectures)
- (h) Molecular weight and its determination (3 lectures)
- (i) Thermal analysis of polymers (2 lectures)
- (j) Structure and properties of polymers, crosslinking (3 lectures)
- (k) Copolymers and self-assembly (5 lectures)
- (l) Inorganic alkene analogs (2 lectures)

ii. Laboratory Experiments

The laboratory component of the course is intended to augment the lecture course by providing experimental examples to illustrate general principles. It is also intended to teach experimental techniques that are commonly used in polymer/synthetic chemistry. Labs begin Jan 20 (Friday Section) or Jan 23 (Monday Section).

A lab report must be submitted via Gradescope for each experiment (details are provided in the Chem 3320B lab manual). This will either be in the form of a formal, written report or data sheet format. You will be given your individual schedule during the first week of classes (not everyone performs the same experiment the same week).

To help you find the hazards/safety information for the reagents that you will be using in the lab the following online resources will help you:

<http://www.uwo.ca/hr/safety/topics/msds.html>

Laboratory Teaching Assistant: Justin Lomax (jlomax5@uwo.ca).

In order to maintain consistency across the entire course, please contact Justin first with lab-related questions prior to contacting Dr. Gilroy. *All correspondence to TAs must be from your @uwo.ca email account.*

iii. Laboratory Schedule and Grading

Individualized laboratory schedules will be circulated via OWL during the first week of classes. A breakdown of laboratory grading can be found on page 30 of the Chem 3320 Lab Manual.

*Note - Formal reports and data sheets must be submitted electronically via Gradescope before the beginning of your lab section the week that they are due.

v. Important Dates

Classes begin: Jan 9, 2023

Reading Week: Feb 20 – 24, 2023

Classes end: April 10, 2023

4. Required Course Materials

Course Text: There is no required textbook for Chem 3320B.

Lab Manual: Chemistry 3320B Laboratory Manual Winter 2023 Edition. This is required and can be purchased from the UWO Campus Bookstore.

Safety glasses are required at all times when working in the laboratory. The UWO Undergraduate Chemistry Society sells these at the beginning of term should you require a pair. Students who normally wear prescription glasses must wear safety glasses or goggles over their regular glasses. A lab coat is also required.

A **Hayden-McNeil Organic Chemistry Laboratory Notebook with Carbon Copy** is required for recording all data and observations in the laboratory. This can be used for more than one (not concurrent) course.

5. Methods of Evaluation

Term Test 1 (Friday, Feb 17, in class)	12%
Term Test 2 (Friday, Mar 17, in class)	12%
Assignments 4 problem sets, 5% each (Approximate due dates Jan. 27, Feb. 10, Mar. 3, and Mar. 24; due at beginning of class)	20%
Laboratory 4 reports, 2 worksheets	20%
Final Exam (cumulative, date and time to be announced)	36%

By taking this course you agree to abide by the applicable rules and policies detailed below.

Use of electronic devices: Only basic scientific calculators are permitted on all tests and exams. All other electronic devices (cell phones, laptops, tablets, cameras, etc.) are prohibited.

Policy on Late Submissions: Laboratory reports handed in late will receive a penalty of 10% per day, with the weekend counting as two days. Academic considerations will only be given to students who get the required approval from the academic counsellors in the Faculty of Science. Graded reports will be returned no sooner than 7 days after the due date. No late lab report submissions can be accepted after the graded reports have been returned, whether you received a deadline extension or not. If your academic accommodation for a missed lab report extends beyond the date that graded reports are returned, you will have to apply for a grade of INC and submit the missed lab report the next time the course is offered. Alternatively, you may choose to accept a mark of ZERO for the missed work.

Course Attendance: Course attendance is mandatory for Chem 3320B. Information missed during unexcused absences will not be the grounds for academic appeal.

Evaluated Materials: All work submitted for a grade in this course must be your personal work (or yours and a team member as appropriate), use of answers obtained externally is prohibited.

The labs and assignments are essential components of this course. You must attend and complete at least 4 out of the 6 labs, 2 out of the 4 assignments, write at least one of the two midterm tests, and write the final exam to pass this course. In addition, you must achieve a grade of at least 50% for both the laboratory component and the combined marks for the term tests, assignments, and final examination. Students who fail to meet any of these requirements, whether excused or not, will receive a final grade of not greater than 40%, even if the calculated grade is higher. Exception: Students who, for medical or compassionate reasons, have been granted Incomplete Standing (INC grade) by the Dean's Office will be required to complete the missed work the next time the course is offered.

Problem Sets: Several problem sets will be assigned and graded during the term.

6. Missed Work

If you miss ANY component of the evaluation, regardless of its weight, due to illness or other serious circumstances and wish to be excused, you must provide valid medical or supporting documentation to the Academic Counselling Office of your Faculty of Registration as soon as possible. For further information, please consult the University's medical illness policy at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/accommodation_medical.pdf

The Student Medical Certificate is available at

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

In cases where a student registered with Accessible Education misses a piece of work for reasons related to the disability on file with Accessible Education, the student should request accommodation by contacting Accessible Education instead of the Academic Counselling Office.

Assignments and Lab Reports: If an assignment or lab report is missed for valid reasons, the weighting of the assignment or lab report will be transferred to the corresponding portion of the course (*i.e.*, the total for assignments or labs).

Midterm Tests: If a midterm test is missed for valid reasons, the weighting of the test will be transferred to the final examination. For those students who cannot write a midterm test on the date indicated because of religious or class conflicts, please contact Dr. Gilroy immediately to make alternative arrangements.

Final Exam: If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam). You may also be eligible to write the Special Exam if you are in a "Multiple Exam Situation" (*e.g.*, more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

7. Accommodation and Accessibility

Religious Accommodation: When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

<https://multiculturalcalendar.com/ecal/index.php?s=c-univwo>

Accommodation Policies: Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological

and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

8. Academic Policies

The website for Registrarial Services is <http://www.registrar.uwo.ca>

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at his/her official university address is attended to in a timely manner.

Scholastic offences are taken seriously, and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at the Student Development Centre (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.