Western University  
Department of Chemistry  

Chemistry 3320B – Polymer Chemistry (Winter 2018 Course Outline)

Instructor: Dr. Joe B. Gilroy  
Office: MSA 3201  
E-mail: joe.gilroy@uwo.ca

E-mail correspondence will only be considered if it is sent from your @uwo.ca address. Please also include Chem 3320B in your e-mail subject line. I would prefer to discuss chemistry face to face and ask that you contact me by e-mail for administrative reasons only.

Lectures: M-W-F 11:30–12:20; ChB 9  
Tutorials: Scheduled as needed.

Office Hours: W 12:30–1:30 or by appointment; MSA 3201

Laboratory: All laboratories will be held in ChB 080/084 (Monday or Friday - 1:30–5:20). You will work in pairs in the lab. The lab schedule is included in your laboratory manual and will be finalized the first week of classes. The Friday lab section begins on Jan. 12 and the Monday section begins on Jan. 15.

The laboratory TA are Benjamin Hisey and Jasveer Dhindsa. Please contact Ben (bhisey@uwo.ca) before contacting Prof. Gilroy about laboratory issues to allow us to ensure consistency across the entire course.

The laboratory topics are listed below. A schedule is supplied in the introductory pages of the lab manual along with lab report guidelines. You will be required to submit both hard and electronic copies of your lab reports for Chem 3320B.

Lab A: Polystyrene  
Lab B: Styrene/Isoprene Copolymer  
Lab C: Plexiglass  
Lab D: Styrofoam  
Lab E: Poly(3-hexylthiophene)  
Lab F: Molecular Weight Distributions of Polystyrene/Plexiglass

Read the introductory pages in the Lab Manual – they have been included for a reason. Be on time, there is no provision for making the lab period last longer. Being able to finish the required experiment in the allotted time is part of the challenge and your evaluation.
Laboratory Manual: The Lab Manual and Prelab Notes for Chem 3320B will be available through the UWO book store.

Laboratory Notebook: Please purchase a Hayden McNeil, Organic Chemistry Spiral Bound 100 page Notebook from the bookstore. An identical notebook from a different (but not concurrent) chemistry laboratory, if only partially used, will be suitable.

Laboratory Safety: This is our number one priority. 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

Safety Glasses and Lab Coats: Safety glasses are required at all times when working in the laboratory. Students who normally wear prescription glasses must wear safety glasses or goggles over their regular glasses. A lab coat, closed toe shoes, and full length pants are also required when working in the laboratory.

NOTE: Contact lenses are NOT allowed.

Course Webpage: Accessible through UWO OWL Sakai - CHEM 3320B 001 FW17

NOTE: You will need to be registered in the course and have a UWO computer account to access this site.

Important Dates: Midterm test scheduled for Tue. Feb. 13, 7:00–9:00 pm, SSC 3026
Classes are cancelled the week of Feb. 19–23 (Reading Week)

Details on Student Accessibility
Please contact the course instructor if you require material in an alternate format or if you require any other arrangements to make this course more accessible to you. You may also wish to contact Services for Students with Disabilities (SSD) at 519-661-2111 (ext. 82147) for any specific questions regarding an accommodation.

Electronic Devices
As a courtesy to your fellow classmates, please leave mobile devices at home or switch them to silent mode before lectures begin. The use of electronic devices (other than a basic scientific calculator) is prohibited during quizzes, tests, and exams.

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

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

Upon completion of Chem 3320B, 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.

Course Content:

<table>
<thead>
<tr>
<th>Topic</th>
<th>Number of Lectures (Approximate)</th>
</tr>
</thead>
<tbody>
<tr>
<td>General introduction and physical properties of polymers</td>
<td>5</td>
</tr>
<tr>
<td>Addition polymerization of alkenes including radical, ionic, and transition metal</td>
<td>5</td>
</tr>
<tr>
<td>NMR spectra of polymers</td>
<td>2</td>
</tr>
<tr>
<td>Condensation polymerizations</td>
<td>1</td>
</tr>
<tr>
<td>Synthesis of $\pi$-conjugated polymers</td>
<td>2</td>
</tr>
<tr>
<td>Ring-opening polymerization</td>
<td>2</td>
</tr>
<tr>
<td>Inorganic polymers: silicones and polyphosphazenes</td>
<td>2</td>
</tr>
<tr>
<td>Molecular weight and its determination</td>
<td>3</td>
</tr>
<tr>
<td>Thermal analysis of polymers</td>
<td>2</td>
</tr>
<tr>
<td>Structure and properties of polymers, crosslinking</td>
<td>3</td>
</tr>
<tr>
<td>Copolymers and self-assembly</td>
<td>5</td>
</tr>
<tr>
<td>Inorganic alkene analogs</td>
<td>2</td>
</tr>
</tbody>
</table>
**Prerequisite(s):** Either Chemistry 2273A and 2283G or Chemistry 2213A/B, either Chemistry 2214A/B or 2384B or the former 2284B.

*A Mandatory Notice from the Registrar:* Unless you have either the prerequisites for this course or written special permission from your Dean to enroll in it, you will 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.

**Antirequisite(s):** CBE 4493A/B, the former CBE 3392A/B.

**Reference Materials:**

- *Polymer Chemistry* by C. E. Carraher 5th ed.: QD 381.S483 2000
- *Principles of Polymer Chemistry* by A. Ravve 3rd ed.: QD 381.R38 2000
- *Spectroscopy of Polymers* by L. Koenig 2nd ed.: QD139.P6K64 1999
- *Polymer Characterization* by D. Campbell 2nd ed.: QD 139.P6C35 2000

**This course is supported by the Science Student Donation Fund.**

If you are a B.Sc. or B.M.Sc. student registered in the Faculty of Science or Schulich School of Medicine and Dentistry, you pay the Science Student Donation Fee. This fee contributes to the Science Student Donation Fund, which is administered by the Science Students’ Council (SSC). One or more grants from the fund have allowed for the purchase of equipment integral to teaching this course. You may opt out of the fee by the end of September of each academic year by completing paperwork in the Faculty of Science Dean’s Office. For further information on the process of awarding grants from the fund or how these grants have benefitted undergraduate education in this course, consult the chair of your department or e-mail the Science Students’ Council: ssc@uwo.ca.

**Evaluation**

- **Term Test** (Tue. Feb. 13, 7:00–9:00 pm, SSC 3026) 25%
- **Assignments** 4 problem sets, 4% each 16%
(Approximate due dates Jan. 26, Feb. 9, Mar. 9, and Mar. 30)
- **Laboratory** 6 reports 24%
- **Final Exam** (Cumulative, date and time to be announced) 35%

**NOTE:** To pass chemistry 3320B it is necessary to obtain a passing grade in the laboratory component (and complete a minimum of 4 laboratory experiments/reports) and the lecture component (term test, assignments, and final examination). If an assignment or midterm test is missed for valid reasons (excluding a term test conflict), the weight will be transferred to the final examination. Outside of direct course conflicts, there are NO alternate assignments/midterm tests.
Message from the Dean of Science and the Chair of Chemistry

*Cheating and Plagiarism*
Students must write their essays and assignments in their own words! Whenever a student (or any scientist) takes an idea or passage from another author, they must acknowledge their debt both by using quotation marks where appropriate and by proper referencing such as footnotes or citations. During tests and examinations, students must not have any unauthorized books, notes, or extraneous materials, unless permitted by the instructor.

Plagiarism and cheating is a serious academic offence and will not be tolerated. Any incidents in this regard will be reported immediately to the Department Chair for consideration of disciplinary action as noted in the Western Academic Calendar under "Scholastic Offences".

All required papers may be subject to submission for textual similarity review to the commercial plagiarism detection software under license to the University for the detection of plagiarism. All papers submitted will be included as source documents in the reference database for the purpose of detecting plagiarism of papers subsequently submitted to the system. Use of the service is subject to the licensing agreement, currently between The University of Western Ontario and Turnitin.com.

*Illness and Missing Course Requirements*
If you are unable to meet a course requirement due to illness or other serious circumstances, you must provide valid medical or other supporting documentation to the Dean's office as soon as possible and contact your instructor immediately. It is the student's responsibility to make alternative arrangements with their instructor once the accommodation has been approved and the instructor has been informed. In the event of a missed final exam, a "Recommendation of Special Examination" form must be obtained from the Dean's Office immediately.

Students seeking academic accommodations based on medical (physical or mental) illness should begin by contacting the Academic Counsellors of their home faculty. Please visit the following link for policy on Accommodation for Illness:

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

*How this applies to Chem 3320B*
It is the policy in Chem 3320B that if you have missed an assignment/test due date, it is your responsibility to contact Prof. Gilroy or the science counselors office within 48 hours AFTER the missed date or before the next lecture period where you are in attendance, otherwise a zero grade will be assigned.
...And about the Chem 3320B late policy
Work will be penalized 20% per day (one day of a weekend will count) that an
assignment/laboratory is late. Due dates/times will always be at the BEGINNING of a
lecture period or laboratory session. The penalty will be applied until either 80% credit has
been lost at which point no credit will be given, or no credit will be given after the material
has been returned to the rest of the class (whichever comes first).

Health and Wellness
As part of a successful student experience at Western, we encourage students to make their
health and wellness a priority. Western provides several on campus health-related services to
help you achieve optimum health and engage in healthy living while pursuing your graduate
degree. For example, to support physical activity, all students, as part of their registration,
receive membership in Western’s Campus Recreation Centre. Numerous cultural events are
offered throughout the year. For example, please check out the Faculty of Music web page
http://www.music.uwo.ca/, and our own McIntosh Gallery http://www.mcintoshgallery.ca/
Information regarding health- and wellness-related services available to students may be found at
http://www.health.uwo.ca/. Students seeking help regarding mental health concerns are advised
to speak to someone they feel comfortable confiding in, such as their faculty supervisor, their
program director (graduate chair), or other relevant administrators in their unit. Campus mental
health resources may be found at http://www.health.uwo.ca/mental_health/resources.html.

Social Media

Twitter
For those who are interested, I encourage you to get involved in the Western Chemistry
community by joining us on Twitter: @westernuchem, @WorkentinChem, @Lagugne,
@GilroyGroup, @RagonnaGroup, @CorriganLab, etc.

Facebook
The department also has a Facebook page, please visit the page to keep up to date with things
happening in and outside of the department: https://www.facebook.com/ChemistryatWestern