CHM 446/1304 SYLLABUS (Winter 2021)

Organic Materials Chemistry

INSTRUCTOR:

Prof. Helen Tran
Email: tran@utoronto.ca
Office: Lash Miller Laboratories 514
Online student hours: Wednesday, 9 am ET; or by appointment
Student hours are designated times to clarify concepts, review course aims, discuss ideas, or just chat with Helen (about fellowships, careers, etc.)!

COURSE MEETING: Thursday, 1-3 pm ET

PREREQUISITES: CHM247H/249H; CHM220H/222H/225Y
Recommended: CHM325H; CHM342H/343H

TEXTBOOKS: There is no dedicated text for this course.
Articles will be made available to complement lecture notes.

OVERVIEW: Welcome to Organic Materials Chemistry! In the framework of a dry lab, students will analyze and interpret characterization data, extending their existing knowledge of chemical fundamentals and experimental techniques to polymeric systems. Through a combination of lectures, case studies, dynamic virtual collaborations, and self-paced assignments, students will actively engage with peers to understand course materials (including published literature), explore how polymer innovations are commercialized, and develop a toolkit for leveraging instrumentation to investigate hypotheses in research. Students will prepare a pitch for a polymer start-up as part of the course. At the end of the course, students will be able to link their knowledge of analytical techniques learning in the context of small molecules to polymers, identify an opportunity where polymer research may be translated for commercial applications, and analyze the efficacy of science literature to the general public. Important course materials will be regularly delivered on Quercus.

HONOR CODE: Students are expected to contribute to a mutually respectful learning environment though intellectual honesty, dynamic discussions, and openness for peers, course assistants, and the instructor. Details are outlined at the end of the syllabus.

GRADING: Online group participation and discussion – 5%
Online assignments and quizzes – 40%
Journal club – 15%
Start-up Pitch – 40%

The start-up pitch involves preparing a 1-2 page executive summary and slide deck presentation, which will be presented to the class. Examples of online assignments are rewriting the abstract of a paper, reviewing a peer's proposal, and preparing a Scientific Spotlight. Late assignments will be given credit up to 60%.

COURSE SCHEDULE:

Module	Dates	Topics
1	Jan. 12	Synchronous lecture: Course introduction + mini design thinking workshop Synchronous lecture: Notable polymer start-ups / companies *Online group discussion: Introduce yourself* *Assignment: Scientific Spotlight* *Assignment: Identify a company with polymer innovation*
2	Jan. 19	Synchronous lecture: Purification and molecular weight characterization Synchronous dry lab: Polymer NMR (e.g. degree of polymerization) Synchronous dry lab: GPC and MALDI interpretation *Asynchronous lecture: Overview of polymerization techniques* *Assignment: Calculate conditions for polymer synthesis by RAFT, ATRP, etc.*
3	Jan. 26	Synchronous lecture: Sequence-specific polymers Synchronous dry lab: Decipher peptide sequence by MS/MS
4	Feb. 2	Synchronous lecture: Science communication *Asynchronous collaboration: Pair with a colleague to create an updated title, rewrite the abstract in layman's terms, and prepare a 5 minute literature review for an assigned journal article.* *Assignment: Submit collaborative title, abstract, and presentation.*
5	Feb. 9	Synchronous peer presentations: 5 min literature review *Assignment: Submit an idea for a proposal/pitch*
6	Feb. 23	Synchronous lecture: Imaging Synchronous dry lab: Birefringence calculation Synchronous dry lab: Dichroic ratio calculation (UV-Vis) Synchronous dry lab: FFT for AFM and TEM images *Assignment: Submit abstract for a pitch*
7	Mar. 2	Synchronous lecture: X-Ray scattering Synchronous dry lab: Self-assembled block copolymers (GISAXS) Synchronous dry lab: Conjugated polymers (GIWAXS) *Assignment: Calculate conditions for conjugated polymer synthesis*
8	Mar. 9	Synchronous lecture: Electron conducting polymers Synchronous dry lab: TFT mobility calculations *Assignment: TFT architecture correlation to GIWAXS pattern*
9	Mar. 16	Synchronous dry lab: Thermal properties (TGA / DSC) Synchronous dry lab: Tensile strain *Assignment: Submit draft for proposal/pitch*
10	Mar. 23	Synchronous lecture: Recycling of plastics Synchronous case study: Downcycling of plastics *Optional movie: Plastic China* *Online group discussion: Reflect on challenges of recycling*
11	Mar. 30	Synchronous lecture: Hydrogels and crosslinked networks Synchronous dry lab: Rheology, liquid-solid transition Synchronous case study: Fluorinated polymers for 3D printing *Assignment: Submit final pitch*
12	Apr. 6	Synchronous peer presentations: VC pitch competition Synchronous lecture: Specialty polymers (e.g. stretchable, self-healing, mechanoresponsive, shape memory) *Assignment: Peer-review a colleague's pitch (anonymous)* *Extra Credit: make a TikTok on polymers #chemclout; 3D print an object.*

MORE INFORMATION:

Course policies:
Each week on Tuesday, a new module will be released on Quercus and you are expected to watch the videos, read the case studies, participate in class discussions and submit any assignments according to the deadlines. Announcements will be made on Quercus, so please check the website regularly for updates. All course content presented synchronously will be uploaded to Quercus for asynchronous learning. Notably, important engagement from group work from synchronous learning enhances the students understanding of the course material; it is recommended student attend all course meetings, if possible. Students will need to collaborate (either asynchronously or preferably synchronously) on certain assignments, and will be expected to complete an online presentation (different time zones will be accommodated). Students are encouraged to additionally attend the student hours, which may rotate times to accommodate students in different time zones. If the student is unable to attend the designated times by the instructor or course assistants, please email to schedule an appointment.

On academic integrity:
Academic integrity is essential to the pursuit of learning and scholarship in a university, and to ensuring that a degree from the University of Toronto is a strong signal of each student's individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto's Code of Behaviour on Academic Matters outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Read about it here. All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. Read more about academic integrity here.

Use of Turnitin:
Normally, students will be required to submit their course essays to Turnitin.com for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their essays to be included as source documents in the Turnitin.com reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of the Turnitin.com service are described on the Turnitin.com web site.

Technology Requirements:
Specific guidance from the U of T Vice-Provost, Students regarding student technology requirements is available here. Advice for students more broadly regarding online learning is available here. This course requires the use of computers. Computer viruses, crashed hard drives, lost or corrupted files, incompatible file formats, and similar mishaps are common issues when using technology, and are not acceptable grounds for a deadline extension.

Copyright:
If a student wishes to copy or reproduce course content provided by instructors, the instructor's written consent must be obtained beforehand. Otherwise all such reproduction is an infringement of copyright and is absolutely prohibited. More information regarding this is available here.

Accessibility Needs
Students with diverse learning styles and needs are welcome in this course. The University of Toronto is committed to accessibility: if you require accommodations for a disability, or have any other accessibility concerns about the course, please contact Accessibility Services as soon as possible.