e-CHM1301H1s2020: Syllabus

An e-course for summer 2020.

CHM1301H Organic and Synthetic Polymer Chemistry

Synthetic polymers have dramatically changed the world around us over the last 60 years and these materials are expected to play an increasingly crucial role in determining technological progress in the future. The aim of this course is to provide an overview of the methods used to synthesize macromolecules and how synthetic methodology allows their material properties to be controlled. The learning objectives focus on key aspects of polymer synthesis, and characterization and application of polymeric materials.

Instructors:

Prof. D. S. Seferos (Professor, Department of Chemistry)
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Prof T. P. Bender (Professor, Department of Chemical Engineering and Applied Chemistry)
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Prof M. Winnik (Professor, Department of Chemistry)
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Prof G. Walker (Professor, Department of Chemistry)
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Prof Oleksandr Voznyy (Assistant Professor, UTSC, Department of Physical & Environmental Sciences)
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Class:

Tuesday 2 - 4 pm (on Zoom, link(s) to be provided)

Thursday 2 – 4 pm (on Zoom, link(s) to be provided)

Office Hours:

- None.
- Email sent prior to 4 pm will be answered before 9 am the following day unless otherwise stated or due to pandemic a personal disruption.
- Alternatively – preferred – send notes on Quercus using the "Inbox" – using the same idea, send prior to 4pm and will be answered before 9am the following day unless otherwise stated or due to pandemic a personal disruption.

Evaluation:

Class paragraph summary write-ups: 20%. Details below.

Midterm examination: 20%. Details below.

Original research proposal: 30%. Details below.

Proposal pitch: 30%. Details below.

Learning Objectives:

1. Understand key aspects of polymer synthesis.
2. Understand how to evaluate polymeric materials, their application and their reported significance.
3. Be able to evaluate the secondary and primary literature and judge work in the context of the literature.
4. Be able to propose novel synthetic methods and/or polymer materials.
5. Develop discussion leading ability.
6. Develop oral 'pitch' of research project.

Learning objectives will be achieved through in class discussions, projects, and presentations. Details below.

Class outline (subject to change):

Week	Date	2 hr/day, 2-4 pm	Instructor
1	2020-05-19	Olefin polymerization	Seferos
	2020-05-21	Conjugated polymers	Seferos
2	2020-05-26	Adaptable polymers, vitrimers, etc.	Seferos
	2020-05-28	Biopolymers	Bender
3	2020-06-02	Dendrimers	Bender
	2020-06-04	Progress in controlled radical polymerization	Bender
		Midterm	
4	2020-06-09	ROMP: ring opening metathesis polymerization	Winnik
	2020-06-11	Emulsion polymerization	Winnik
5	2020-06-16	Thermodynamic principles of self-assembly	Walker
	2020-06-18	Polymeric nanoparticles for drug delivery	Walker
6	2020-06-23	Self-assembled monolayers	Vozny
	2020-06-25	Polymer-based optoelectronic devices	Vozny
	TBD	Research proposal to be submitted	Bender
	TBD	Research proposal online pitch	Bender

The class paragraph summary write-ups.

A selected set of instructors will be delivering key aspects of polymer chemistry, their physical properties, their characterization and their end point application. After each online/e-class each student is required to write a 1-paragraph summary of the topic(s) covered in the class. Summary must exceed 250 words in total. Summary can include drawn chemical structures placed into a Figure. Words in or associated with the figures does not count towards the 250 words. Each summary must be uploaded to Quercus within 24 hours. The summary must be submitted/uploaded as a word document. For each class an assignment will be formed on Quercus and that is where upload will occur. Each summary will be evaluated and a binary mark will be assigned, either a 1 or a 0, on evaluation of the summary document. Comments will be shared.

The midterm.

You will be given a paper to review as a peer. You will have (TBD) hours to write a critical review of that paper pointing out the strengths and weaknesses, novelty, impact (citing appropriate literature references, etc.) and ultimately provide your recommendation (publish y/n). (and yes even though it was published should it have been published? Are the gaps? Questions to be addressed?)

More details to follow. Exact date will also be clarified.

The project:

For the project, you will develop an original research proposal (i.e. one for NSERC) outlining a new project in polymer chemistry *with (a) synthesis component/components*. This proposal must be outside of your current research and may also not be close to any research that is carried out in your current graduate studies group (past or present). While the ideas must be your own, you should approach Prof Bender first with the proposed title and topic and get approval. Approach to be through a note in Quercus and response will happen in a timely fashion.

The written proposal will due TBD. Report will be uploaded to Quercus through an assignment section in PDF format. Late proposals will not be accepted.

More details to follow.

The pitch:

As you craft your proposal you will work on a short “Dragon’s Den” style pitch of the project. These *not* traditional proposals/thesis defences.

More details to follow.

Absences and late assignments:

Because the learning objectives require e-class participation, absences are not ideal. However all classes will be captured and posted on Quercus. Therefore classes can be watched again/multiple times if of interest or needed. Class captures/video files will be held within the University of Toronto, downloads will not be available nor allowed.

Meeting a deadline is a critical skill for any profession. Thus, late reports, assignments, etc. will not be accepted and will likely result in a failing grade for the course. If there is some need for accommodation, a note needs to be sent to Prof Bender well in advance of the deadline for discussion. This can include personal health issues and things related to the global pandemic.