Chemistry
UNIVERSITY OF TORONTO

CHM1060H: ADVANCED TOPICS IN SYNTHETIC ORGANIC CHEMISTRY

F2024 Course Syllabus

I TEACHING TEAM

INSTRUCTOR (SECTION I)
Name: Prof. Mark S. Taylor
Email: marks.taylor@utoronto.ca
Research: https://sites.chem.utoronto.ca/mst
Office: Lash Miller, LM 622A
Student hours (online or in person): by appointment

Instructor biography: BSc UofT 2000; PhD Harvard 2005; Postdoc MIT; Prof. at UofT since 2007. Research interests: organic synthesis, catalysis, physical organic chemistry.

INSTRUCTOR (SECTION II)
Name: Prof. Robert A. Batey
Email: rob.batey@utoronto.ca
Research: https://sites.chem.utoronto.ca/bateylab/
Office: LM365 (Davenport)
Student hours (online or in person): TBD

Instructor biography: BA Oxford 1988; PhD Imperial College 1992; Postdoc University of Pennsylvania, Upjohn Company; Research interests: organic synthesis, total synthesis, medicinal chemistry,

II COURSE OVERVIEW

COURSE DESCRIPTION:
The goal of the course is to build your understanding of key concepts in synthetic organic chemistry and to broaden your knowledge of the field through in-depth discussions of advanced topics. Communication skills (written and oral) and analysis of the primary research literature will also be points of emphasis.
The course will consist of two sections.

Section 1: Carbohydrate chemistry (weeks 1–6)
Section 2: Selected Topics in Reactive Intermediates (includes some aspects of Molecular Orbital Theory and Conformational Analysis) (weeks 7–12)

STUDENT LEARNING OUTCOMES:

Upon successful completion of the course, students will be able to:

- recognize and understand the reactivity patterns of important classes of organic compounds;
- be able to propose mechanisms and/or catalytic cycles for complex organic reactions;
- develop skills in problem-solving for organic synthesis and mechanistic analysis;
- improve their ability to communicate concepts and findings related to organic chemistry through visual and oral means;
- improve their ability to research and interpret the primary research literature;
- be familiar with the structures and reactivity patterns of carbohydrate derivatives;
- be familiar with the reactivity patterns of various classes of reactive intermediates;
- devise feasible strategies for the synthesis of complex organic molecules.

PREREQUISITE COURSE(S):
This course assumes you have an advanced understanding of structure, bonding, reactivity and mechanism in organic chemistry. You are expected to be familiar with topics and concepts discussed in CHM342 and CHM440 (consult the instructors of these courses for course syllabi), and to be comfortable reading primary literature articles in the organic synthesis field.

READINGS:
Required: Notes and required readings will be posted on the course website.
Supplemental: It may be useful to refer to advanced organic chemistry textbooks (e.g., *Organic Chemistry* by Clayden, Greeves & Warren; *Advanced Organic Chemistry* by Carey and Sundberg) to refresh your memory or improve your background on concepts/topics related to the course.

III COURSE ORGANIZATION

Lectures will be held in person (see schedule below). You are strongly encouraged to attend and participate in the lectures.
Tuesday lectures (1–3 PM) will be held in Carr Hall 405 (CR405, 100 St. Joseph Street).
Thursday lectures (10 AM–noon) will be held in Room 139, 371 Bloor Street West (FE139).

Course Quercus page: https://q.utoronto.ca/courses/370890

COURSE SCHEDULE & RELEVANT SESSIONAL DATES:

DATE	LOCATION	TOPICS
Sept 5, 10A	FE139	Carbohydrates I
Sept 12, 10A	FE139	Carbohydrates II
Sept 19, 10A	FE139	Carbohydrates III
Sept 26, 10A	FE139	Carbohydrates IV
Oct 3, 10A	FE139	Carbohydrates V
Oct 8, 1P	CR405	Carbohydrates VI

Oct 17, 10A	FE139	Student presentations I
Oct 22, 1P	CR405	Student presentations II
Oct 24, 10A	FE139	Student presentations III
Oct 29, 31	–	***Fall Reading Week***
Nov 5, 1P	CR405	Reactive Intermediates 1
Nov 7, 10A	FE139	**Test (Section I)**
Nov 12, 1P	CR405	alternate date (hold)
Nov 14, 10A	FE139	Reactive Intermediates 2
Nov 19, 1P	CR405	Reactive Intermediates 3
Nov 21, 10A	FE139	Reactive Intermediates 4
Nov 26, 1P	CR405	Reactive Intermediates 5
Nov 28, 10A	FE139	Reactive Intermediates 6
Dec 3, 1P	CR405	alternate date (hold)
Dec, TBD	TBD	**Test (Section II)** During Exam Period

IV EVALUATION/GRADING SCHEME

OVERVIEW:
Student presentations: 20% + 5% participation
Test (Section I): 25%
Student report: 25%
Test (Section II): 25%

ASSESSMENT DATES & MARK BREAKDOWN:

1. Student presentations: held during the regularly scheduled class time on Oct 17, Oct 22, Oct 24.
Students will select a recent paper dealing with carbohydrate chemistry (synthesis, methodology, physical organic chemistry) and summarize the key points in a 15-minute presentation.
Participation grade: Students are expected to read the papers presented by their classmates in advance, and to submit a total of five questions related to the papers prior to the presentations.

2. Section I Test (25%, Thursday Nov 7, 10A, FE139): 120 minutes, to be written during regularly scheduled class time. The test will cover the lecture material on carbohydrate chemistry as well as the papers from the student presentations for this section.

3. Student report. Students will prepare a set of lecture notes (advanced graduate course level) on a topic of relevance to reactive intermediates.

4. Section II Test (25%, Date/Time TBD, during exam period): 120 minutes
(Timing/Location TBD, during exam period)

V COURSE POLICIES

- Each member of this course is expected to maintain a:

(i) professional and respectful attitude during all course activities, including classes, student hours and online activity.
(ii) personal calendar/schedule/organizer to ensure that all course activities are completed, and due dates are met.
(iii) collection of notes recorded independently based on concepts covered in course activities (students registered with Accessibility Services requiring a class note-taker will have access to this accommodation)
(iv) familiarity with the university policy on Academic Integrity (overleaf)

- The University of Toronto is committed to equity, human rights, and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. As a Course Instructor, I will neither condone nor tolerate behaviour that undermines the dignity or self-esteem of any individual in this course and wish to be alerted to any attempt to create an intimidating or hostile environment. It is our collective responsibility to create a space that is inclusive and welcomes discussion. Discrimination, harassment and hate speech will not be tolerated. If you have any questions, comments, or concerns, we encourage you to reach out to the staff in our Equity Offices.

- If you are absent from your studies due to illness or other reasons and unable to complete course work (e.g., a term test or an assignment) then a piece of written documentation is required. The following four items are the recognized forms of documentation:

  1. Absence Declaration via ACORN (please note the circumstances under which an absence declaration can and cannot be submitted)
  2. U of T Verification of Illness or Injury Form
  3. College Registrar's letter
  4. Letter of Academic Accommodation from Accessibility Services

  Students who complete the ACORN Absence Declaration form must additionally contact me to discuss their situation within five business days of the missed piece of work. This is essential action for any consideration to be granted.

  For extended absences and for absences due to non-medical reasons, make sure to contact your College Registrar's Office. They can help you decide between a request for an extension or other types of academic consideration.

If you suspect or know that you have a disability that is affecting your studies, learn about the services and supports available through Accessibility Services. A disability can be physical disability, sensory disability, a learning disability, mental health disorder or a short-term disability like an injury. If you are not sure whether you have a disability, you can confidentially contact Accessibility Services with your questions.

- Use of Generative AI in CHM1060. Students may not use artificial intelligence tools for taking tests or completing course assignments. However, these tools may be useful when gathering information from across sources and assimilating it for understanding. Representing as one's own an idea, or expression of an idea, that was AI-generated may be considered an academic offense in this course.

- Communication with instructors: emails regarding course content or logistics are welcome. Please use your UofT email address, and do not send messages via Quercus. We will respond to emails within 24 hrs. on weekdays whenever possible. **Please only email *ONE* person on the CHM1060 instructional team, depending on the nature of your concern.**

- Privacy and appropriate use of course materials: please see the syllabus "Copyright" section.

- Policy for late assignment submissions: 10% will be deducted daily for course work submitted after the posted due date. Assignments that are more than 10 days overdue will not be accepted. Due to the timing of the in-class presentations, rescheduling will not be possible. Students who miss the in-class presentation for a valid reason will give a makeup presentation to the instructor.

- Assignment submission methods: the computational report is to be submitted electronically (PDF only) via Quercus.

- Process for requesting re-grading of course work: only term tests written in pen will be eligible for re-grading.

VI TECHNOLOGY REQUIREMENTS

- This course requires the use of computers, and technical issues are possible. When working on a piece of academic work, students are responsible for scheduling enough time to allow for reasonable delays due to technical difficulties to be overcome, so such issues will not be acceptable grounds for deadline extension. Particularly, maintaining an up-to-date independent backup copy of your work is strongly recommended to guard against hard-drive failures, corrupted files, lost computers, etc.

VII INSTITUTIONAL POLICIES & SUPPORT

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 (governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In written work:

1. Using someone else's ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.
4. Obtaining or providing unauthorized assistance on any report. **Please note that the use of websites (such as Chegg.com) to post assignment material/questions or to post/access answers to questions is an academic offence under the University of Toronto's Code of Behaviour on Academic Matters. Alleged instances of this nature are forwarded to the Faculty of Arts & Science Student Academic Integrity office.**

On term tests and exams:

1. Using or possessing unauthorized aids. **Please note that the use of websites (such as Chegg.com) to post term test questions or to post/access answers to questions is an academic offence under the University of Toronto's Code of Behaviour on Academic Matters. Alleged instances of this nature are forwarded to the Faculty of Arts & Science Student Academic Integrity office.**
2. Looking at someone else's answers or collaborating/discussing answers during a term test.
3. Misrepresenting your identity.

In general academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources (see www.academicintegrity.utoronto.ca/).

COPYRIGHT

Students who wish to copy or reproduce class presentations, course notes or other similar materials provided by instructors must obtain the instructor's written consent beforehand. Otherwise, all such reproduction is an infringement of copyright and is absolutely prohibited.

Audio from parts of this course will be recorded, and the recordings made available for streaming via Quercus. Students may also create their own recordings of the lecture audio if they wish. Recordings are intended to permit lecture content review to enhance understanding of the topics presented. Audio recordings are not substitutes for attending class.

Students should note that their voice may be recorded as part of the lecture audio. Please speak to the instructor if this is a concern for you.

In accordance with the Accessibility for Ontarians with Disabilities Act, 2005, persons who have special needs will be accommodated.

Students agree to the following terms when creating or using audio recordings of lectures:

- Recordings are not to be distributed without the permission of the instructor via the Internet, using social media such as Facebook, peer-to-peer file sharing such as One Drive or Dropbox, or other distribution channels.
- Recordings are not to be shared with other classmates unless they are to be used in collaborative assignments, or if the instructor permits for other reasons.

Non-compliance with these terms violates an instructor's intellectual property rights and the Canadian Copyright Act. Students violating this agreement will be subject to disciplinary actions under the Code of Student Conduct.

ACCESSIBILITY NEEDS
Students with diverse learning styles and needs are welcome in CHM1060H. 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.

ACCOMMODATIONS FOR RELIGIOUS OBSERVANCES
Following the University's policies, reasonable accommodations will be made for students who observe religious holy days that coincide with the due date/time of an assignment or class. Students must inform the instructor **before** the session/assignment date to arrange accommodations.

ADDITIONAL SERVICES & SUPPORT
The following are some important links to help you with academic and/or technical service and support:

- General student services and resources at Student Life

- Full library service through University of Toronto Libraries
- Resources on conducting online research through University Libraries Research
- Resources on academic support from the Academic Success Centre
- Learner support at the Writing Centre
- Information for Quercus Support

ACKNOWLEDGEMENT OF TRADITIONAL LANDS

We wish to acknowledge this land on which the University of Toronto operates. For thousands of years, it has been the traditional land of the Huron-Wendat, the Seneca and, most recently, the Mississaugas of the Credit River. Today, this meeting place is still the home to many Indigenous people from across Turtle Island and we are grateful to have the opportunity to work on this land.