

UNIVERSITY OF TORONTO
DEPARTMENT OF CHEMISTRY

CHM 1060H – Spring 2019

Advanced Topics in Synthetic Organic Chemistry: A) Synthetic Planning for Complex Molecule Synthesis, B) Asymmetric Synthesis, C) Transformations of Heterocycles

Instructors:

Prof. Robert A. Batey (LM151)
E-mail: rob.batey@utoronto.ca
Tel: 416-946-5602

Prof. Sophie Rousseaux (DB475)
E-mail: sophie.rousseau@utoronto.ca
Tel: 416-978-4198

Prof. Andrei Yudin (DB362)
E-mail: andrei.yudin@utoronto.ca
Tel: 416-946-5042

Lectures:

Tuesday and Thursday in LM128 from 2:10–4:00 pm
First class – January 15 2019
Batey Section (Part A) January 15 – February 7
Rousseaux Section (Part B) February 19 – March 14
Yudin Section (Part C) March 26 – April 18

Office Hours: TBA

Course Website: <https://q.utoronto.ca/>

It is important that you check the course website periodically for announcements, lecture notes, etc.

Course Description:

CHM1060 consists of three parts: A) *Synthetic Planning for Complex Molecule Synthesis*, B) *Asymmetric Synthesis* and C) *Heterocycles*.

Part A) Introduction to synthetic planning of complex molecules, including natural products and pharmaceuticals. This section of the course will include the discussion of, and the application of retrosynthetic analysis, and the strategic use of C–C and C–X bond forming reactions. Discussion will primarily focus on total synthesis targets, and will include comparative analyses of various target molecules, and discussion of the impact of stereochemistry, regiochemistry, and chemoselectivity on synthetic planning. Prior familiarity with the basic aspects of standard organic reactions and retrosynthetic analysis is assumed. Students should therefore ensure that they are familiar with material at least up to the level of CHM342, before beginning this section. Access to the complete set of this year's CHM342 notes is provided on request by students.

Part B) Asymmetric Synthesis and Catalysis. This section of the course will focus on topics in asymmetric synthesis and catalysis. Selected topics include asymmetric hydrogenations and oxidations; kinetic resolution, dynamic kinetic resolution and DYKAT; ligand design, etc. Students should be familiar with basic aspects of asymmetric synthesis from CHM342/343 and course notes for review will be posted on Quercus.

Part C) Transformations of Heterocycles. Topics include 1) the concept of spatioenergetic matching, 2) annulation reactions, 3) ring opening reactions of heterocycles, 4) rearrangement of heterocycles, 5) retrocycloadditions, 6) fragmentation reactions associated with heterocycles, 7) ring expansion reactions of heterocycles, 8) ring contraction reactions of heterocycles.

Marking Scheme:

There will be an exam for each part of the course, worth 1/3 of your final grade.

Exam dates: Part A – week of February 11

Part B – week of March 18

Part C – week of April 22

Lecture Notes: If lecture notes have been posted, please print them ahead of class. We would recommend that you *read posted handouts ahead of the associated lectures*.

Required Text: There is no required textbook. The lecture notes and associated readings will form the basis of the course. A good general reference that outlines the basics of organic reactions and reactivity is:

Clayden, J.; Greeves, N.; Warren, S. *Organic Chemistry*, Oxford University Press **2012**. 2nd Edition

Periodically, you will be provided with papers to read and you are expected to study these materials ahead of your next class.

Accessibility: The University of Toronto is committed to accessibility. If you require accommodations for a disability, or have any accessibility concerns about the course, the classroom or course materials, please contact Accessibility Services as soon as possible:

<http://www.accessibility.utoronto.ca>. Please note that all slides presented during the course are available online at <http://portal.utoronto.ca>.

Academic Integrity: The course will follow University of Toronto policies on academic integrity. See: <http://www.artsci.utoronto.ca/osai/>. Academic integrity is fundamental to learning and scholarship at the University of Toronto. Participating honestly, respectfully, responsibly, and fairly in this academic community ensures that the U of T degree that you earn will be valued as a true indication of your individual academic achievement, and will continue to receive the respect and recognition it deserves. Familiarize yourself with the University of Toronto's *Code of Behaviour on Academic Matters* (www.governingcouncil.utoronto.ca/policies/behaveac.htm). It is the rule book for academic behaviour at the U of T, and you are required to know the rules.