CHM 1057: SELECTED TOPICS IN ORGANIC CHEMISTRY
WINTER 2021

I CONTACTS

INSTRUCTOR/COURSE COORDINATOR
Prof. Mark S. Taylor
Email: marks.taylor@utoronto.ca
Office: LM622B
Online student hours: Wednesdays noon–1 PM or by appointment

B.Sc. (Toronto, 2000), Ph.D. (Harvard, 2005) Postdoc (MIT). Professor at U of T since 2007. Research interests: organic synthesis, catalysis, physical organic chemistry.

CO-INSTRUCTORS

Prof. Marcus Baumann, School of Chemistry, University College Dublin
Email: marcus.baumann@ucd.ie
Student hours: TBA

B.Sc. (Marburg, 2007), Ph.D. (Cambridge, 2011) Postdoc (UC Irvine and Durham University). Professor at University College Dublin since 2017. Research interests: organic synthesis of APIs, flow chemistry, heterocyclic chemistry, photochemistry.

Prof. Liam Ball, School of Chemistry, University of Nottingham
Email: Liam.Ball@nottingham.ac.uk
Student hours: TBA

MSci. (Bristol, 2009), Ph.D. (Bristol, 2014), Postdoc (Edinburgh). Professor at UoN since 2015. Research interests: organic synthesis, catalysis, physical organic 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 and comprehension of the primary research literature will also be points of emphasis.

STUDENT LEARNING OUTCOMES:
By the end of this course, students will:

- 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;
- develop understanding of potential uses of modern synthesis technologies such as continuous flow chemistry.

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: Course notes and recorded lectures will be posted on Quercus. Sections of the course will be based on journal articles that will be posted for you to read.

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 HOW THE COURSE IS ORGANIZED

Course delivery will be through a combination of pre-recorded lectures and 'live' online sessions. When pre-recorded lectures are provided, students are expected to view these prior to the online sessions.
Online sessions will be held on Wednesdays, 10:10 am-–noon, via Zoom. Because some of the content will be delivered asynchronously via pre-recorded lectures, we may not use the full 100 min each week.

TENTATIVE LIST OF TOPICS:

UNIT	TOPICS	Dates
1	***Carbohydrate Chemistry.*** Nomenclature, structure and spectroscopy of sugars. Selection protection of OH groups in carbohydrates. *De novo* synthesis of carbohydrates. Glycosylation reactions and mechanisms. Oligosaccharide synthesis **Poster due** 11:59 PM, Wednesday Feb 3 **Quiz 1 [online]**: Friday Feb 10	Jan 11–Feb 3
2	***Continuous Flow Chemistry.*** Concepts, comparison to batch synthesis, equipment choice and process set-up, reaction optimization, in-line analysis and purification for telescoped sequences, case studies for target	Feb 10, Feb 24–Mar 10

	molecule synthesis. Photochemistry. Reaction scale-up and industrial applications. **Evaluation:** date TBA	
3	***Functionalisation of Pyridines.*** Synthetic methods and mechanisms for regioselective functionalization of pyridines: metalation; electrophilic, nucleophilic and homolytic aromatic substitution; cross coupling; pyridine *N*-oxide chemistry. **Open-book exam:** date TBA	Mar 17–Apr 7

IV EVALUATION/GRADING SCHEME

UNIT 1: POSTER (20%) + QUIZ (13.33%). Posters are to be posted by 11:59 PM on Feb 3; A quiz on the content of the posters will be held on Friday Feb 10.
UNIT 2: EVALUATION DETAILS TBA (33.33%)
UNIT 3: OPEN-BOOK EXAM (33.33%)

MARK BREAKDOWN
Unit 1: Poster (20%) + Quiz (13.33%) = 33.33%
Unit 2: Evaluation TBA: 33.33%
Unit 3: open-book exam = 33.33%

Note: it may be necessary to revise the timing or weighting of the assessments.

FINAL ASSESSMENT
The evaluation for Unit 3 (worth 33.33% of the final grade – see above) will take place during the April assessment period.

V COURSE POLICIES

E-mail: We are happy to respond to course-related e-mail inquiries. Please include the course code CHM1057 in the title of your e-mail, and use your UTOR e-mail account to send the message. Normally, we will get back to you within 24 hours during the week. However, e-mail is not an alternative to participating in virtual student hours, nor is it a mechanism for lengthy discussions or to explain material that was covered in lectures you missed.

Participation: Your participation in the online discussion sessions is highly encouraged, including through audio or by typing in the chat. Please be mindful to communicate in a civil and respectful way so that all students feel comfortable in sharing their questions and ideas. University statement regarding a positive learning environment: "*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. U of T does not condone discrimination or harassment against any persons or communities."

Privacy: This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session.
Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor.
For questions about recording and use of videos in which you appear, please contact your instructors.

Penalties for late work: 10% of the mark per day late. Please follow all instructions regarding acceptable file formats.

VI TECHNOLOGY REQUIREMENTS

Specific guidance from the U of T Vice-Provost, Students regarding student technology requirements is available here: https://www.viceprovoststudents.utoronto.ca/covid-19/tech-requirements-online-learning/

Advice for students more broadly regarding online learning is available here: https://onlinelearning.utoronto.ca/getting-ready-for-online/

This course requires the use of computers, and of course sometimes things can go wrong when using them. You are responsible for ensuring that you maintain regular backup copies of your files, use antivirus software (if using your own computer), and schedule enough time when completing an assignment to allow for delays due to technical difficulties. Computer viruses, crashed hard drives, broken printers, 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.

VII INSTITUTIONAL POLICIES AND SUPPORT

ACADEMIC INTEGRITY

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 (https://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 papers and assignments:

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 assignment.

On tests and exams:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers during an exam or test.
3. Misrepresenting your identity.

In 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 https://www.academicintegrity.utoronto.ca/).

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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.

ADDITIONAL SERVICES and 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 Technical Support/Quercus Support