



CHM 247H: INTRODUCTORY ORGANIC CHEMISTRY II

Winter 2022 Course Syllabus

note: all times are listed as Eastern Time (ET)

I TEACHING TEAM



COURSE COORDINATOR & INSTRUCTOR (Weeks 1 - 6)

Name: Professor Andrew P. Dicks

Email: andrew.dicks@utoronto.ca

Research: chemistry.utoronto.ca/people/directories/all-faculty/andrew-p-dicks

Online student hours during Weeks 1 - 3: directly after each class and TR from 8-9 p.m., starting on Tuesday 11th January through Zoom:

<https://utoronto.zoom.us/j/2312545655>; Passcode: chm247h. Additionally available by email appointment



INSTRUCTOR (Weeks 7 - 12)

Name: Professor Mitch A. Winnik

Email: m.winnik@utoronto.ca

Research: <https://sites.chem.utoronto.ca/chemistry/staff/MAW>

Student hours: to be announced on Quercus



LABORATORY COORDINATOR

Name: Dr. Mima G. Staikova

Email: mima.staikova@utoronto.ca

January online student hours: to be announced on Quercus



TUTOR (T5, starting the week of Monday 17th January)

Name: Karolina Rabeda

Research: <https://sites.chem.utoronto.ca/chemistry/staff/DSONG/members.html>

January online student hours: held through Zoom directly after each tutorial



TUTOR (W5, starting the week of Monday 17th January)

Name: Michael West

Research: <https://sites.chem.utoronto.ca/rousseau/people/current>

January online student hours: held through Zoom directly after each tutorial



TUTOR (F2, starting the week of Monday 17th January)

Name: Azalea Uva

Research: <https://helen-t.com/members>

January online student hours: held through Zoom directly after each tutorial

II COURSE OVERVIEW

Welcome to the University of Toronto's second introductory organic chemistry course which is primarily designed for life science and health science students! CHM 247H focuses on many fundamental principles of the discipline, with particular attention paid to the major reactions of organic compounds and their applications. The course will feature a significant amount of problem-solving: both during and outside formal classroom, tutorial, and laboratory time. The central concepts of organic reaction mechanisms, synthesis, and structure elucidation via spectroscopic methodologies will be covered in detail. This will build extensively on material discussed in prerequisite courses (CHM 135H + CHM 136H, or CHM 151Y), and **a thorough understanding of first-year concepts covered in these courses is essential for success.** CHM 247H is recommended for students enrolled in any science program that involves a small amount of chemistry. *Students taking any Chemistry specialist program (including Biological Chemistry) or who will be including a substantial amount of chemistry in their degree (such as those following a Chemistry major program) are either required to or strongly encouraged to take CHM 249H (Organic Chemistry) instead.* The specific 200-level courses and how they are connected to each Chemistry program are listed here: chemistry.utoronto.ca/current-students/second-year-chemistry-course-requirements.

We sincerely hope that CHM 247H will exceed your expectations: we are all here to support your learning and are very invested in your success! We would appreciate your comments and suggestions so that we can make the course as helpful and interesting as possible: do feel free to discuss any matters with the instructors, laboratory coordinator, tutors, and laboratory teaching assistants (TAs).

STUDENT LEARNING OUTCOMES:

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

- demonstrate an understanding of and apply the structural elucidation techniques of infra-red spectroscopy and nuclear magnetic resonance spectroscopy *in order to* determine the atom connectivity of unknown molecules
- recognize important classes of functional groups and use knowledge of their reactivity patterns to predict the products of organic transformations
- demonstrate an understanding of the fundamental principles underlying the behavior of organic compounds as nucleophiles and electrophiles
- formulate fundamental organic reaction mechanisms by appropriately describing electron flow *in order to* write reasonable mechanisms for new reactions
- apply organic reactions and their conditions *in order to* propose synthetic pathways for given target compounds of interest

- appreciate the pivotal roles that organic chemistry principles play in the life and health sciences by understanding their connections to biologically- and industrially important substances
- use problem solving and critical thinking skills to combine their theoretical knowledge with laboratory results in order to solve scientific problems

PREREQUISITE COURSES:

This course assumes you have a fundamental and thorough understanding of content presented in CHM 135H (Chemistry: Physical Principles) and especially CHM 136H (Introductory Organic Chemistry I). CHM 151Y (Chemistry: The Molecular Science) is a suitable alternative prerequisite course. CHM 247H may be counted towards certain Chemistry programs of study, although as noted above it is either required or highly recommended that students enrolled in such programs take CHM 249H instead.

REFERENCE MATERIAL:

The *required* textbook for CHM 247H is "Organic Chemistry", 9th edition by J. McMurry plus the optional accompanying Study Guide & Solutions Manual. This is the same textbook as required in CHM 136H and CHM 151Y: you may purchase a digital copy of the textbook/study guide [here](#). The 8th edition of McMurry can also be used with information posted at the CHM 247H Quercus LEC section website that gives the translation of the numbering of problems at the end of the chapters. A molecular model kit will be very useful for most of the course. The "Molecular Visions" kit by Darling Models is recommended for this, as well as other undergraduate organic chemistry courses at U of T, although other model kits are helpful too. Models may be used as an aid in all online and in-person assessments.

III HOW THE COURSE IS ORGANIZED

OVERVIEW:

CHM 247H has three instructional components to it: classes, tutorials, and laboratories, as well as a course discussion board. All instruction will be delivered online through Zoom from Monday 10th – Friday 28th January inclusive, in keeping with guidance provided by the University (<https://people.utoronto.ca/memos/limiting-the-spread-of-covid-19-omicron-variant-immediate-steps>). As of Monday 31st January, all instruction *may* continue online if it is deemed this is the best course of action. Whether in-person or online, please come prepared by having done any assigned reading (getting an overview of what will be discussed in class ahead of time is highly recommended!) and having printed out the class notes posted on Quercus in advance.

CLASSES:

From Monday 10th – Friday 28th January inclusive, classes will be live-streamed on MWF from 1–2 p.m. ET and on MTR from 4–5 p.m. through Zoom, and additionally recorded for students who are unable to attend live for whatever reason. Please note that reading the posted class notes and/or textbook is not a substitute for attending classes! It is essential that you attend the live classes in order to solidify your understanding of the fundamental course material (proposed class content is described on p. 5).

Please note that you MUST ONLY ATTEND THE LIVE CLASSES FOR THE SECTION YOU ARE ENROLLED IN (LEC0101: MWF from 1–2 p.m.; LEC0201: MTR from 4–5 p.m.). Zoom connection information for all classes will be made available at the CHM 247H Quercus LEC section website in early January.

TUTORIALS:

Tutorials begin the week of Monday 17th January and will also be live-streamed through Zoom from Monday 10th – Friday 28th January inclusive. **The tutorials are an integral part of the CHM 247H instruction and are VERY HIGHLY RECOMMENDED.** They are run by experienced graduate student

teaching assistants and have a problem-solving format. Questions will be posted on Wednesdays throughout the semester (starting on 12th January) which will form the primary basis of each tutorial session. **Active student participation in problem-solving through completion of tutorial questions is linked to success in learning organic chemistry:** these questions, as well as the assigned textbook problems, will provide you with an important opportunity for self-assessment, help you make sure you are keeping up with the course materials, and are essential preparation for tutorials. Please be aware that the “model” answers to tutorial questions will NOT be posted, so that you are encouraged to problem-solve and to attend each tutorial where you may ask questions or seek clarification of fundamental concepts. You are welcome to attend any of the three tutorial sections that fit your schedule as follows: T5–6 p.m. (directly following class); W5–6 p.m.; F2–3 p.m. (directly following class).

During January, each tutor will hold online student hours for as long as there are questions immediately following each tutorial session. You should however refrain from emailing course content questions to tutors (such questions should be posted on the course discussion board, see p.4). Zoom connection information for all tutorials will be made available at the CHM 247H Quercus LEC section website in mid-January.

LABORATORIES:

The laboratories are a mandatory component of CHM 247H. If you have not yet registered for a practical section on ACORN, please get in contact with the laboratory instructor (Dr. Mima Staikova) by email (see information on p. 1). The purpose of the laboratory activities is to introduce you to some fundamental techniques in the context of organic reactions that you will learn about in the classroom component of CHM 247H. The laboratories in this course include four “wet” organic experiments and one introductory online exercise based upon provided computational data. The schedule of the laboratories will be posted at your CHM 247H Quercus PRA section website during January.

The initial online exercise pertaining to safety considerations and supplied computational data (“Study of Dibenzalacetone Stability and Safety Activity”) will be made available to students at the beginning of the semester and does not have a synchronous TA session associated with it. The report for this activity is due by the end of Friday 28th January. Following this, the four “wet” laboratories will involve a combination of (a) technique videos, and (b) written materials (such as background readings and experimental procedures). In advance of each laboratory, we expect you to read all assigned materials, watch the relevant videos, and complete a quiz. After each laboratory, you will submit a written report. **All laboratory materials and reports will be handled within your CHM 247H Quercus PRA section website.** If you have any questions or concerns about any aspect of the laboratory activities, please email Dr. Staikova (see information on p. 1).

COURSE DISCUSSION BOARD:

In addition to instructor/tutor student hours, we will be using the Ed discussion board platform that facilitates online questions and answers. Information about the platform will be made available as an announcement at the CHM 247H Quercus LEC section website. You are strongly encouraged to ask your content questions on this discussion board where all students can benefit. **The teaching team will be monitoring the discussion board and providing input as needed, although we expect students to be helping each other as much as possible.** Please note that posting assessment/laboratory report questions and/or sharing solutions to these questions is in violation of the University of Toronto’s Code of Behaviour on Academic Matters (see the Academic Integrity section of the syllabus for more details).

OTHER AVAILABLE SUPPORTS:

CHM 249H is supported by the Victoria College Peer Tutoring program (www.vic.utoronto.ca/current-students/registrars-office/tutor) which is offered through Zoom during the 2021/22 academic year. If you would like further support in a small-group online environment, you are also highly encouraged to investigate the Recognized Study Group (RSG) Program (<https://sidneysmithcommons.artsci.utoronto.ca/recognized-study-groups/join>). These are small, student-led study groups of up to eight classmates enrolled in the same course within the Faculty of Arts & Science. RSGs meet online through Quercus or Zoom each week: more information will be announced during mid-January about this initiative.

PROPOSED CLASS CONTENT* & SEMESTER ASSESSMENT SCHEDULE:

Week #	Dates	Topics & McMurry Chapter References
1	Jan. 10 th – 14 th	Introductory course information Infrared (IR) Spectroscopy (Chapter 12) <i>Start</i> Nuclear Magnetic Resonance (NMR) spectroscopy (Chapter 13)
2	Jan. 17 th – 21 st	Nuclear Magnetic Resonance (NMR) spectroscopy (continued)
3	Jan. 24 th – 28 th	<i>Finish</i> Nuclear Magnetic Resonance (NMR) spectroscopy <i>Start</i> Chemistry of alkynes (Chapter 9)
4	Jan. 31 st – Feb. 4 th	<i>Finish</i> Chemistry of alkynes Concepts of organic synthesis and retrosynthetic analysis
5	Feb. 7 th – 11 th	<i>Start</i> Electrophilic aromatic substitution reactions (Chapter 16)
Quiz 1: Monday 7th February, 9:00 a.m. – 9:00 p.m. (30 minutes)		
6	Feb. 14 th – 18 th	<i>Finish</i> Electrophilic aromatic substitution reactions Nucleophilic aromatic substitution reactions (Chapter 16) <i>Start</i> Chemistry of alcohols and phenols (Chapter 17)
Term Test 1: Wednesday 16th February, starting at 6:10 p.m. Test “Debrief” Session (Online): Friday 18th February, starting at 3 p.m.		
WINTER READING WEEK: Monday 21st – Friday 25th February		
7	Feb. 28 th – Mar. 4 th	<i>Finish</i> Chemistry of alcohols and phenols Chemistry of ethers, epoxides, and thiols (Chapter 18) <i>Start</i> Chemistry of aldehydes and ketones (Chapter 19)
8	Mar. 7 th – 11 th	<i>Finish</i> Chemistry of aldehydes and ketones <i>Start</i> Chemistry of carboxylic acids, nitriles, and derivatives (Chapters 20 & 21)
9	Mar. 14 th – 18 th	<i>Finish</i> Chemistry of carboxylic acids, nitriles, and derivatives
Quiz 2: Monday 14th March, 9:00 a.m. – 9:00 p.m. (30 minutes)		
10	Mar. 21 st – 25 th	Enols, α -substitutions, malonic ester and acetoacetic ester synthesis (Chapter 22) <i>Start</i> Carbonyl condensation reactions (Chapter 23)
Term Test 2: Wednesday 23rd March, starting at 6:10 p.m. Test “Debrief” Session (Online): Friday 25th March, starting at 3 p.m.		
11	Mar. 28 th – Apr. 1 st	<i>Finish</i> Carbonyl condensation reactions
12	Apr. 4 th – Apr. 8 th	Chemistry of amines (Chapter 24) Review prior to final examination (if time permits)

*timings of when specific class content will be taught are approximate

IMPORTANT WINTER 2022 SESSIONAL DATES:

First Day of S classes: Monday 10th January

Family Day: Monday 21st February

Winter Reading Week (no classes): Monday 21st – Friday 25th February

Last Day to Drop S Courses: Monday 14th March

Last Day of S classes: Friday 8th April

April Final Assessment Period: Monday 11th – Friday 29th April

IV EVALUATION/GRADING SCHEME

OVERVIEW:

Quizzes (x2): 10%

Term Tests (x2): 35%

Final Assessment: 30%

Laboratory: 25% (breakdown of grades to be provided on Quercus)

FORMAL ASSESSMENT DATES & MARK BREAKDOWN:

1. Quiz 1 (5%*, Monday 7th February): 30 minutes, to be written online anytime within a 12-hour window between 9 a.m. – 9 p.m.

2. Term Test 1 (20% or 15%** , Wednesday 16th February): starting at 6:10 p.m. Note: *this assessment may be offered in-person or completely online if in-person testing is not possible.* **Online “debrief” session to be held on Friday 18th February starting at 3 p.m.**

3. Quiz 2 (5%*, Monday 14th March): 30 minutes, to be written online anytime within a 12-hour window between 9 a.m. – 9 p.m.

4. Term Test 2 (20% or 15%** , Wednesday 23rd March): starting at 6:10 p.m. Note: *this assessment may be offered in-person or completely online if in-person testing is not possible.* **Online “debrief” session to be held on Friday 25th March starting at 3 p.m.**

5. Final Assessment (30%, April Final Assessment Period: Monday 11th – Friday 29th April): two or three hours. Note: *this assessment may be offered in-person or completely online if in-person testing is not possible.*

*note that if both quizzes are written, the lower grade earned on the two quizzes will be discounted. Each quiz will be multiple-choice in nature.

**note that the highest test grade earned from term Tests 1 and 2 will be weighted at 20%, with the other test weighted at 15%. Each test will not be explicitly cumulative. For students missing one term test for a valid reason, the remaining term test will be worth 20% and the final examination will be worth 45%.

IMPORTANT: if an unexpected technical issue occurs with a university system (e.g., Quercus services, network outage) that affects availability or functionality, it may be necessary to revise the timing or weighting of the online assessments.

V IMPORTANT COURSE POLICIES

- Each member of this course is expected to maintain a:
 - professional and respectful attitude during all course activities, including classes, laboratories and online activity. A face mask is required to be worn for any and all in-person activities: <https://governingcouncil.utoronto.ca/secretariat/policies/face-masks-policy>
 - personal calendar/schedule/organizer to ensure that all course activities are completed, and due dates are met
 - 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)
 - familiarity with the university policy on Academic Integrity (overleaf)
- General CHM 247H LEC course website: q.utoronto.ca (in your Quercus Dashboard, click on “CHM 247H Winter 2022”). You will also need to access your CHM 247H Quercus PRA section website for laboratory information. **Please check the Quercus course websites (LEC & PRA) regularly (daily!) for:**
 - general course information
 - class notes
 - tutorial questions
 - all important announcements related to assessments, laboratories, and tutorials
 - access to the course discussion board
- Email will generally be responded to within 24 hrs. on weekdays. Email will only be accepted if:
(1) You send it from your utoronto.ca account; (2) You identify yourself in the email subject as a student in CHM 247H and include your name and University of Toronto student ID number; (3) No attachments are sent, unless official university correspondence is being forwarded (e.g., a letter detailing academic accommodations); (4) You are aware that organic chemistry can be talked about much more effectively through tutorial sessions, student hours or via the course discussion board rather than by email, and that sending emails is not a substitute for attending classes. The finalized student hours for each instructor will be posted at your CHM 247H Quercus LEC website and they are additionally available by appointment.

Important: be sure to email only ONE person within the CHM 247H instructional team, depending on the nature of your concern. Please do not send emails through the Quercus internal email system (they will not be responded to): the contact information for the course instructors/laboratory coordinator is listed on p. 1.

- 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 members of the course teaching team, we 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.

- Aspects of 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: for questions about recording and use of videos in which you appear please contact your instructor. Students may not create audio or video recordings of classes with the exception of those students requiring an accommodation for a disability, who should contact the instructor prior to beginning to record classes for written permission. Students creating unauthorized audio recording of classes violate 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. Course videos may not be reproduced or posted or shared anywhere other than the official CHM 247H Quercus websites and should only be used by students currently registered in the course.
- Laboratory reports and all online assessment responses are to be submitted through the CHM 247H Quercus websites only. Late laboratory reports will be deducted at 10% per day, and assessment responses will not be accepted at all after the due date/time. Please be aware that completed laboratory reports will not be accepted once graded work has been distributed to the rest of the class.
- **There are no make-up quizzes or term tests in CHM 247H, and there are no make-up laboratory sessions.** Students who are absent from class for any reason (e.g., COVID-19 illness, other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available on ACORN under the "Profile and Settings" menu. **A student who misses a scheduled quiz or term test must additionally contact Professor Dicks (see information on p. 1) WITHIN ONE WEEK to discuss their situation. This is a requirement to receive consideration for the missed quiz or test.**

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 AND 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 laboratory reports:

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 or the Ed course discussion board) to post laboratory report 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 quizzes and term tests:

1. Using or possessing unauthorized aids. **Please note that the use of websites (such as Chegg.com or the course discussion board) to post quiz or other assessment 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 quiz or other assessment.
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/).

PLAGIARISM DETECTION:

Normally, students will be required to submit their course essays and tests to the University's plagiarism detection tool for a review of textual similarity and detection of possible plagiarism. In doing so, students will allow their work to be included as source documents in the tool's reference database, where they will be used solely for the purpose of detecting plagiarism. The terms that apply to the University's use of this tool are described on the Centre for Teaching Support & Innovation web site: <https://uoft.me/pdt-faq>.

ACCESSIBILITY NEEDS:

Students with diverse learning styles and needs are welcome in CHM 247H. 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. If possible, please submit your accessibility letter at the beginning of the course and not right before an assignment is due.

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, class or laboratory session. Students must inform the instructor **before** the 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 [Technical Support/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.