

CHM2105Q: Medicinal Chemistry from the enzyme's perspective

Course Syllabus

I TEACHING TEAM

INSTRUCTOR

Prof. Haissi Cui (haissi.cui@utoronto.ca). Office hours by appointment. Website will be on Quercus.

II COURSE OVERVIEW

COURSE DESCRIPTION:

In this course, graduate students will learn about why certain biomolecules make better drug targets than others and different strategies towards developing a cure for diseases. We will survey the function of a biomolecule in its systemic and cell biology context followed by a discussion on the mode of action of a drug on a molecular level. Topics will include small molecule inhibitors against aminoacyl-tRNA synthetases, proteasome inhibitors, PROTACs, RNA therapeutics, and antibodies. The course will include the discussion of methods used to assay the activity of enzymes and biological model systems as well as target identification. In addition to lectures, coffee chats with industry representatives and academic researchers associated with the topics discussed in the course will be offered. Presentations and the compilation of a mini review will give students the chance to practise skills that will aid them to succeed in their graduate degree.

STUDENT LEARNING OUTCOMES:

Upon completion of the course students should be able to explain the mechanism and key design of small molecule inhibitors and biologics covered in the course as well as the consequences of their actions. Students will have assessed and compared different compound classes through lecture contents, talks from their peers, as well as a written literature review. Students should gain a better understanding of planning experiments to assess the activity of molecules for biomedical applications as well as design considerations. This course also aims to expose students to scientists from various backgrounds and research fields to foster new connections.

III COURSE ORGANIZATION

COURSE SCHEDULE & RELEVANT SESSIONAL DATES:

The course will be held online over Zoom, 10 am - 12 pm on Thursdays, starting 02.11.23. Classes will not be recorded and must therefore be attended live. Students are encouraged to participate

with video on. Coffee chats will be scheduled depending on the availability of the guest speaker and can take place outside of course hours. The course schedule is subject to change depending on enrollment numbers.

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| 02.11.23 | Overview of course material, scope, and interests Protein synthesis - aminoacyl-tRNA synthetase and ribosome inhibitors |
| 09.11.23 | Student presentations on aminoacyl-tRNA synthetase or ribosome inhibitors RNA therapies |
| 16.11.23 | Student presentations on RNA therapies The ubiquitin system and PROTACs |
| 23.11.23 | Student presentations on PROTACs Protein degradation and proteasome inhibitors |
| 30.11.23 | Student presentations on proteasome inhibitors Therapeutic antibodies and CAR-T |
| 07.12.23 | Student presentations on therapeutic antibodies and engineered proteins Antibody-drug conjugates, multivalent antibodies, or other upcoming topics of interest |

Submission of final report: 14.12.23

IV EVALUATION/GRADING SCHEME

ASSESSMENT DATES & MARK BREAKDOWN:

Grading:

- 40% presentation
- 40% written assignment
- 20% participation

Presentations:

Presentations will focus on a single research publication on a topic related to what has been discussed in the previous class. These can be other examples of the compound class discussed, reports on an alternative compound class, an orthogonal strategy that targets the same pathway/biological process, or a detailed discussion of a method that can be used to assess the mechanism of action. Presentation length will be dependent on enrollment but are tentatively scheduled as 15 min talks (25 %) with 10 min questions (15%).

Written assignment:

The written assignment consists of a review-style article including a graphical abstract and figures with a minimum of 1200 words in the main text (introduction, literature review, outlook). The final submitted assignment should contain all components of a published review (title, author list, abstract (combined 5%), introduction, literature review, outlook (combined 25%), at least one figure and a graphical abstract (5%), and references (5%). The chosen topic should be distinct from the focus of the presentation as well as from the student's own research project. Students should aim to survey the topic from a perspective that has not been covered in the literature yet. Students are expected to work independently on these assignments.

Participation:

Participation will be assessed regarding engagement with content presented by the lecturer (6%), content presented by other students (10 %), and engagement during coffee chats (4%). If students cannot participate in coffee chats due to scheduling conflicts, questions can be submitted in advance, which will count towards engagement.

COURSE POLICIES

Each member of this course is expected to maintain a:

- (i) professional and respectful attitude during all course activities, including classes, laboratories, tutorials, and other online activities.
- (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

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. The CHM2105Q Teaching team will neither condone nor tolerate behaviour that undermines the dignity or self-esteem of any individual in this course and we 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](#).

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](#) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences.

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

If a student wishes to copy or reproduce class presentations, course notes or other similar materials provided by instructors, he or she must obtain the instructor's written consent beforehand. Otherwise, all such reproduction is an infringement of copyright and is absolutely

prohibited. More information regarding this is available here: <https://teaching.utoronto.ca/ed-tech/audio-video/copyrightconsiderations/>

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.

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, tutorial, class or laboratory session. 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:

- School of Graduate Studies' [Policies and Guidelines](#)
- Full library service and resources on conducting online research through University of Toronto Libraries [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.