

CHM2103H (quarter course)
Chemical Glycobiology

Instructor: Mark Nitz (mark.nitz@utoronto.ca)

Office: Lash Miller room 459

Web Site: On Quercus

Course description :

This course will cover the basic topics of how glycans are synthesized, hydrolyzed and bound by proteins, focusing on the mechanisms of the enzymes and interactions of these polar biomolecules. We will then show how these enzymes function in the pathways that lead to the N-linked and O-linked glycans present on over 60% of the human proteome. Finally we will discuss how metabolic engineering and bioorthogonal chemistry is used to understand these systems.

Learning objectives:

At the end of the course a student will be able to explain the important mechanistic features of glycosyl hydrolases, glycosyltransferase, and carbohydrate recognition. A strong understanding of how the N-linked glycans are important in the secretory pathway and how the complexity of glycan structures arise. Finally, examples of how bioorthogonal chemistry can be used to study the glycome should be understood.

Schedule: Wednesdays, 10 am - 12 pm starting Oct, 4th, 2023

Each topic will have an ~90 minute lecture followed by discussion of assigned papers.

Oct 4th	Carbohydrate active enzymes
Oct 11th	Carbohydrate protein interactions
Oct 18th	Secretory pathway
Oct 25th	Chemical glycobiology
Nov 1th	Class Presentations
Nov 8st	Class presentations
Nov 15th	Exam

Note: Classes will be in person. Exam location will be posted on Quercus.

Reading: Items will be posted on the course web site

Recommended reference text

Essentials of Glycobiology [Internet]. 3rd edition. Free online

Marking Scheme (section 1)

Exam	40%
Oral Presentation	30%
Assignments	25%
Participation	5%

Exam: Exam will focus on the principles covered in class lectures and ideas from assigned readings. Example questions will be covered in the lecture leading up to the exam. Exam will be 90 minutes in length.

Oral Presentation: Students will be assigned a paper to present to the class related to the class material and will be expected to answer questions about the research related to and presented in the paper. Tentative timing based on enrollment: 15 min presentation 10 minutes of questions and discussion.

Assignments: Short assignments will focus on content presented in lecture material related to recent publications. Students are expected to work independently on these assignments.

Due Dates Oct 18th
 Oct 25th
 Nov 1st

Participation: Students will be required to submit questions about assigned papers prior to each class. These questions will be posted and students will be expected to engage in discussion of the questions.

Due Dates Oct 9th
 Oct 16th
 Oct 31st

Student hours: One hour after class or send an email to schedule an appointment.

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 (CHM2103H) 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 SUPPORTS

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/).

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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.

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 sources 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.

**Presentation
Guidelines
CHM1059**

Grades	A	B	C	D	F
Content	Exceptional effort evident in preparation, design and content. Highly knowledgeable about the project & background literature.	Thorough preparation, design and content. Knowledgeable about project & background literature.	Good preparation, design and content. Somewhat knowledgeable about project & background literature.	Satisfactory preparation, design and content. Limited knowledge about project & background literature.	Limited investment of time in preparation, design and content. Weak knowledge about project & background
Presentation	Media is employed in a highly effective manner to enrich the content of the presentation.	Effective use of media to enhance key concepts of presentation.	Appropriate use of media to present key concepts.	Limited use of media to support content.	No or inappropriate use of media to support content.
	Exceptional time management	Finished within allotted time.	Exceeded time allotment minimally.	Exceeded time allotment noticeably.	Unaware of the time and how to manage it.
	Highly organized and structured, excellent use of voice, engaged audience throughout the presentation	Organized and structured, good use of voice, engaged audience much of the time.	Fairly organized and structured, reasonable use of voice, attempted to engage audience throughout the	Somewhat organized, satisfactory use of voice, limited audience engagement.	Disorganized, poor use of voice, audience disengaged.
Question and answer, knowledge and thoughtfulness about the project.	Highly professional presentation that generates Q&A with audience, thoughtful answers to questions.	Professional presentation promoting Q&A with audience, good answers to questions.	Satisfactory presentation generating Q&A with audience, satisfactory answers to questions.	Somewhat satisfactory presentation generating limited Q&A with audience, limited answers to questions.	Weak presentation generating limited Q&A with audience, weak answers to questions.

ACADEMIC INTEGRITY

It is your responsibility as a student at the University of Toronto to familiarize yourself with, and adhere to, both the Code of Student Conduct and the Code of Behaviour on Academic Matters. Please review the materials available at <https://www.academicintegrity.utoronto.ca> for more information.