



CHMD79H3F: Topics in Biological Chemistry Fall 2023 Syllabus (Tentative) University of Toronto Scarborough

Dear Students,

Welcome to CHMD79! For this semester, our selected topics will be focused on the chemical and biological methods for medical diagnosis. We will first briefly discuss the molecular basis of common diseases and introduce the concept of disease biomarkers. A series of laboratory analytical methods for disease detection will be explored in the first half of the semester. During the second half of the semester, we will mainly discuss the chemistry related to medical imaging, which plays an increasingly important role in modern clinic diagnosis. Students will also receive training in literature research, knowledge synthesis and critical/creative thinking skills through the practice of literature review, public presentation, peer-review and research proposal.

Instructor

Prof. Xiao-an Zhang

Office EV550

Email: xiaoan.zhang@utoronto.ca

Office Hours: TBA

Lecture Schedule

Thursday, 14:00-16:00 pm EST

Classroom: HL B108 (in-person)

Course Materials

Lecture notes will serve as the primary course materials, which will be posted on Quercus before each class. There is no main textbook for this course. The following reference book is recommended:

Clinical Chemistry, by David White, Nigel Lawson, Paul Masters and Daniel McLaughlin, CRC Press, an imprint of Garland Science; 2016 (eBook ISBN: 9781315392349). The online version is available through UofT library:

https://librarysearch.library.utoronto.ca/permalink/01UTORONTO_INST/14bjeso/alma991106987891806196

Since literature research and knowledge synthesis are the key components of this course, students are expected to search literature for the assigned project, and the reports will be shared with the whole class, as additional course-related materials.

Website

CHMD79H3F maintains a Quercus web space, which archives a variety of course related information including syllabus, grades, class announcements, lectures notes, assignments, shared student presentations and proposal from the class. Class e-mails will be sent periodically to your “utoronto.ca” e-mail account. **To login**, go to: <https://q.utoronto.ca>. Login using your UTORid username and password. Then click on the CHMD79 link.

Assessment and Grading Policy:

Graded Work	Weight (%)
Literature Report (ppt format)	15
Oral Presentation	10
Research Proposal	25
Peer Review	6
Participation	6
Final Exam	38
FINAL MARK	100

To pass the course, you need to receive a final grade of 50% or above.

- Literature Report: 15%**
A literature review of chemical methods for clinic diagnosis of a selected disease. Detailed instructions will be provided on Quercus. Due date: Oct. 15, 2023.
- Presentation: 10%**
Oral presentation of the above literature review to be given during class time (Oct 19, tentative). Finalized schedule will be announced on Quercus.
- Research Proposal: 25 %**
A 5-page (inclusive of figures without references) research proposal – NSERC style. Topic to be pre-approved by the instructor. Detailed instructions will be posted. Due date: Dec. 03 2023.
- Final Exam: 38 %**
The final exam will consist of answering detailed questions about the lecture topics and student literature reports presented in class.
- Peer Review: 6 %**
The peer-review process is a key component of communicating results and new ideas in the sciences. Students will be asked to apply critical thinking skills to give feedback to fellow classmates on their presentations and proposal. Instructions will be provided.
- Participation: 6 %**
Students are expected to have read, thought about, and be ready to discuss posted materials, including the lecture note and literature reviews, before each class. Participation marks will be assigned based on engagement and performance in the class discussions.

Email Policy

Please use the following guidelines when sending emails:

- i. Use your “utoronto.ca” email account for all your correspondences. If other accounts (Yahoo, Gmail, Hotmail, etc.) are used, your email may be filtered out as spam and thus not be received.
- ii. Put “CHMD79” in the subject line followed by the reason for the email and use professional language with a formal greeting.
- iii. Sign the email with your first and last name. Include your student ID number after your name.

Every effort will be made to respond to student emails within 36 hours (M-F) provided that the above protocol is followed.

Announcements

Official announcements regarding class/assignment schedule, material covered for assignment and other important information will be posted on the CHMD79 course web site. It is your responsibility to check these postings regularly for important announcements.

Accessibility

Students with diverse learning styles and needs are welcome in this course. If you require accommodations for a disability, or have any accessibility concerns about the course or course materials, please contact us and or the Accessibility Services as soon as possible: AA142, (416) 287-7560 or ability.utsc@utoronto.ca.

Academic Integrity

Academic integrity is one of the cornerstones of the University of Toronto. It is critically important both to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you, the students within this community, and the value of the degree towards which you are all working so diligently. Detailed information about how to act with academic integrity, the Code of Behaviour on Academic Matters, and the processes by which allegations of academic misconduct are resolved can be found online:

<https://www.academicintegrity.utoronto.ca/>

According to Section B of the University of Toronto's Code of Behaviour on Academic Matters <http://www.governingcouncil.utoronto.ca/policies/behaveac.htm> which all students are expected to know and respect, it is an offence for students to:

- To use someone else's ideas or words in their own work without acknowledging that those ideas/words are not their own with a citation and quotation marks, i.e. to commit plagiarism.
- To include false, misleading or concocted citations in their work.
- To obtain unauthorized assistance on any assignment.
- To provide unauthorized assistance to another student. This includes showing another student completed work.

- To submit their own work for credit in more than one course without the permission of the instructor.
- To falsify or alter any documentation required by the University. This includes, but is not limited to, doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

Please respect these rules and the values which they protect. Offences against academic integrity will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.

University's Plagiarism Detection Tool

Normally, students will be required to submit their course essays 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 writing assignments 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 website (<https://uoft.me/pdt-faq>).

Missed Class Activities and Assessments

For missed class activities and assessments due to illness, emergency, or other mitigating circumstances, please follow the procedures outlined below.

Notes:

- The following reasons are not considered sufficient for missed term work: travel for leisure, weddings, personal commitments, work commitments, human error.
- Missed Final Exams are handled by the Registrar's Office and should be declared on eService: <http://www.utsc.utoronto.ca/registrar/missing-examination>
- Instructor cannot accept assignment work any later than five business days after the last day of class. Beyond this date, you would need to file a petition with the Registrar's Office: <https://www.utsc.utoronto.ca/registrar/term-work>

Accommodations for Illness or Emergency, Religious Conflicts

For missed work due to ILLNESS, EMERGENCY, or RELIGIOUS CONFLICTS please complete the following process:

1. Please follow the [instruction](#) to complete the request for Student Absence Form.
2. Declare your absence on [ACORN](#) (Profile & Settings > Absence Declaration)

Deadline: You must complete the above form **within 5 business days** of the missed work.

Accommodations for Academic Conflicts, Time Zone Conflicts

For missed work due to an ACADEMIC CONFLICT, please complete the following process:

1. Complete the **Request for [Missed Term Work Form](#)** choosing “Other” as your reason for missed work and explaining the conflict in the space provided.

Deadline: You should report the conflict **at least two weeks (10 business days) before the date of the activity**, or as soon as possible if it was not possible to identify the conflict earlier.

Note: Multiple assignments due on the same day are not considered conflicts.

Accommodations may only be possible in the case of quizzes and tests that are both scheduled during the same discrete period. Back-to-back tests/quizzes are not considered conflicts.

Note: Students are responsible for keeping their course timetables conflict-free. Students who choose to register in two synchronous courses with overlapping lecture/tutorial/lab schedules may not necessarily be accommodated.

After submitting your documentation:

You are responsible for checking your Quercus course announcements daily, as accommodations may be time-critical.

You should continue to work on your assignments to the best of your ability, as extension accommodations may be as short as one business day, depending on the nature of the illness/emergency.

If an accommodation has been granted but you are unable to meet the conditions of the accommodation (ex. you need a longer extension, or you missed a make-up test), you will need to repeat the missed term work procedure and submit additional forms to request further accommodation. Completion of this form does not guarantee that accommodations will be made. The course instructor reserves the right to decide what accommodations (if any) will be made. Failure to adhere to any aspect of this policy may result in a denial of your request for accommodation.

Missed Accommodations

If accommodation is granted but a continued illness/emergency prevents you from meeting the requirements of your accommodation, you must repeat the missed term work procedure to request additional accommodations.

Equity, Diversity and Inclusion

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.

Mental Health and Well-Being

As a student, you may experience challenges that can interfere with learning, such as strained relationships, increased anxiety, substance use, feeling down, difficulty concentrating and/or lack

of motivation, financial concerns, family worries and so forth. These factors may affect your academic performance and/or reduce your ability to participate fully in daily activities. Everyone feels stressed now and then – it is a normal part of university life. Some days are better than others, and there is no wrong time to reach out. There are resources for every situation and every level of stress. There are many helpful resources available through your College Registrar or through Student Life (<http://studentlife.utoronto.ca> and <http://www.studentlife.utoronto.ca/feeling-distressed>). An important part of the University experience is learning how and when to ask for help. Please take the time to inform yourself of available resources.

CHMD79 Topics and Schedule (*Tentative):

Week	Topic(s)
1	(1) General course overview. (2) Introduction to disease diagnosis (3) Molecular basis of disease; biomarker
2	General principles of diagnostic chemistry; selectivity, sensitivity, and precision; sampling methods; false-positive and false-negative; types of analytical methods.
3-5	Representative biomarkers of a wide scope of diseases, and the corresponding methods of detections, ranging from elemental biomarkers (micronutrients) to small molecules (sugar, lipids, vitamins etc.) to macro biomolecules (proteins, nucleic acid, enzymes). The advantages and limitations of the current methods will be analyzed and compared systematically.
October 7 th -13 th	READING WEEK
6	Student Oral Presentations
7	Introduction to Medical Imaging
8 -12	Chemistry in different medical imaging modalities: (1) PET/SPECT (2) X-ray/CT (3) Ultrasound (4) MRI (5) Optical Imaging (optional)
December 5 th – 6 th	Study Break
December 7 th -20 th	Final Exam Period

Learning Outcomes

Diagnosis and treatment are complementary elements of medical practices. Chemistry not only plays a key role in therapeutic aspects of medicine (i.e. drug development), but is also an indispensable component of medical diagnosis. As we are entering the new era of personalized medicine, the role of chemistry in diagnosis has become increasingly important, because personalized medicine requires personalized diagnosis. This course is intended to offer a general overview about molecular basis of disease diagnosis, covering two main components of modern diagnostic medicine, namely lab test and medical imaging. Students will systemically explore how analytical chemistry has been applied in medical lab test, and how chemistry can fundamentally improve medical imaging. In addition, the student also receive training in literature research, knowledge synthesis and critical/creative thinking skills through the practice of literature review, public presentation, peer-review and research proposal.

University Land Acknowledgement

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.