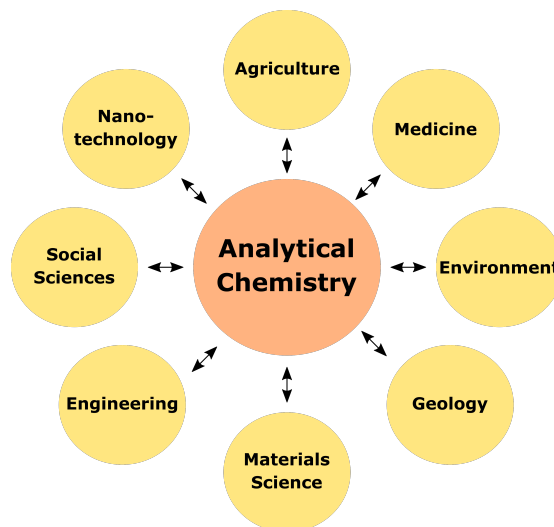


Techniques in Analytical Chemistry

CHMB16H3 Fall 2022

Welcome to **CHMB16**—Techniques in Analytical Chemistry! We hope that everyone is excited for a safe in-person return to campus!

Analytical Chemistry is an exciting field with far-reaching applications; from medicine to forensics, from agriculture to environment, from engineering to space exploration! In this course, you will *think like* and *act like* a chemist. We will cover both the fundamental and practical aspects of the methodologies and instrumentation—classical and modern—widely used in the field. We have prepared a suite of laboratory experiments that will give you ample opportunities to act like an **analytical** chemist. In addition, you will have another opportunity to apply the different concepts you learned in the course to a real-world problem by working with an industry partner, in our community engaged learning project. We hope is that this course will develop in you a greater appreciation for the depth and impact of Analytical Chemistry.



Analytical Chemistry is central to other branches of Chemistry as well as other sciences.

For any concerns or questions as we move through the course together, we can be reached via email (ruby.sullan@utoronto.ca, kris.kim@utoronto.ca).

Looking forward to the semester ahead,

Ruby Sullan

Lecture Instructor

Office Hours: online, Mondays, 14:00–16:00

email: ruby.sullan@utoronto.ca

Kris Kim

Lab Coordinator

Office Hours: Mondays, 9:00–11:00

& 14:00–15:00, email: kris.kim@utoronto.ca

REQUIRED TEXTBOOK

- **Quantitative Chemical Analysis**, 10th Edition, Daniel A. Harris and Charles C. Lucy, Publisher: MacMillan Learning (you're welcome to use a previous version)
- Achieve (optional, but recommended for preparing for midterm/final)

Follow this link to learn more on how to get access to Achieve problems: <https://sites.google.com/macmillan.com/achievestudentchecklist-ss/home?authuser=1>

METHOD OF EVALUATION

Course Component	Percentage
Laboratory component*	40%
Community-engaged project	12%
Midterm Exam	15%
Final Exam	33%
Total	100%

To pass the course, **you have to pass the Laboratory component.*

QUERCUS:

CHMB16 maintains a Quercus web space, which archives a variety of course related information including class announcements, lectures, lab materials, details on the community-engaged learning project, and grades. 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 CHMB16H3 link.

Official announcements regarding test logistics, material covered for each test, and other important announcements will be posted on the CHMB16H3 Quercus site. Please check these postings regularly for important announcements.

EMAIL POLICY:

As part of your training to pursue post-graduate studies or a job/career after your time here at UTSC, we want to ensure you're best prepared to communicate effectively in a professional environment. Professional communication includes emails. Please use the following guidelines when sending emails:

- Use your UofT account for all your correspondences. If other accounts (Yahoo, Gmail, Hotmail, etc.) are used, your email will be filtered out as spam and may not be received.
- Put "CHMB16" in the subject line followed by the reason for the email and use professional language with a formal greeting.
- 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 48 hours (M–F) provided that the above protocol is used.

LECTURES:

Lectures (**in-person**): Mondays 9:00–12:00, **SW 143**

LABS:

Please note that these are just some of the key details related to the labs this term. A more comprehensive overview of the labs (and expectations) can be found on Quercus. The laboratory component of CHMB16 is compulsory. **In order to pass the course, you must also pass the lab component.** Throughout this semester, we will (tentatively) cover 10 experiments (all in-person). An overview of the schedule of experiments is provided below (you can find a more detailed breakdown of who your TAs are in addition other details on Quercus).

Lab Schedule:

Dates	Experiment	
September 6 – 9	NO Labs	
September 12 – 16	Intro to volumetric techniques	Together
September 19 – 23	Stats, sampling, and errors	
September 26 – 30	Collection of field samples at the UTSC Farm	
October 3 – 7	Analysis of iron in creek water	Rotation 1
October 10 – 14	Reading Week	
October 17 – 20	Vitamin C Analysis	
October 24 – 28	Lead Analysis of UTSC Farm	
October 31– Nov 4	Potentiometric titration of cola	Rotation 2
November 7 – 11	Fluorescence analysis of quinine	
November 14 – 18	HPLC analysis of nucleotides in milk products	
November 21 – 25	Sodium analysis in potato chips	Together

Lab Manual and Notebook:

Relevant lab procedures will be made available to you through Quercus. You **DO NOT** need to purchase a lab manual. You **DO** need a lab notebook to keep record of all your virtual experiment. Further details as to how to prepare your notebook and what to include will be made available on Quercus.

You are required to use a **HARD-COVER** and **BOUND** (stitched, not spiral bound) notebook with approximate dimensions of 8.25" × 10.5" inches. Notebooks can be purchased at the

UTSC bookstore; however, given the circumstances, students are free to purchase their books at a merchant of their choice (so long as they meet the above requirements). If you have a lab notebook from a previous course and it has plenty of blank pages remaining, you're welcome to repurpose that, as well.

ABSENCE OR MISSED DEADLINES:

For missed term work (labs, assignments, and term tests) 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.utoronto.ca/registrar/missing-examination>
- Instructors cannot accept term 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.utoronto.ca/registrar/term-work>

Accommodations for Illness, Emergency, or Religious Conflicts

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

1. Complete the **Request for Missed Term Work Form** and **Self-declaration Absence Form**.
2. **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 term work due to an ACADEMIC CONFLICT (i.e. two quizzes or tests scheduled at the same time), 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 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. Note that in the case of a missed make-up test, an opportunity to write a second make-up test may not be provided.

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 an 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.

(E.g.) If you miss a make-up midterm, you would need to submit another Request for Missed Term Work Accommodations form.

MIDTERMS AND EXAM POLICY:

Midterms

There will be 1 × 90-minute midterm in this course. The midterm will take place online on Quercus (date and time will be announced). **If no acceptable documentation is received (outlined above), you will receive a grade of zero for that test.**

Final Exam

There will be a 3-hour, **cumulative** exam written during the end of semester exam period. The exact date, time, and further logistics will be announced as soon as they are available. Please note that if you miss the Final Exam, you must petition the Registrar's Office to write a make-up exam in the next formal exam period. Check the UTSC Calendar for instructions and deadlines.

Allowed Aids

With more assessments moved into an online format, we trust that you will uphold academic integrity when taking assessments (more details regarding academic integrity below). Details regarding allowable aids for each assessment will be provided on Quercus.

Policy on Missed Tests

Please note that in the UTSC Calendar it states: "You cannot petition to withdraw from a course on the grounds that no work was returned to you before the last day to withdraw without academic penalty if this is the result of your having been given an extension to complete your work for reasons relating to you and not the rest of your class."

MENTAL HEALTH RESOURCES:

University life is tough and the pandemic has only introduced even further challenges. If you feel that you need to seek help for yourself or someone you care about, you may wish to contact the Toronto Distress Centre (416-408-4357), Good2Talk (866-925-5454), or [UTSC Health and Wellness Centre](#). UTSC Health and Wellness is currently offering same day appointments, which can be booked by either calling 416-287-7065 or emailing at health-services@utsc.utoronto.ca.

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, the online classroom, or course materials, please contact us and or the Accessibility Services as soon as possible: (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: <http://www.artsci.utoronto.ca/osai/students> 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.

There are other offences covered under the Code, but these are by far the most common. 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](#).

Tentative Course Schedule

Week	Date	Topic	Chapter
0		Reading Assignment: Chemical Measurements	1
1	Sep 12	The Analytical Process, Tools of the Trade	2
2	Sep 19	Errors, Statistics	3, 4
3	Sep 26	Quality Assurance and Calibration Methods	5
4	Oct 3	Titrations Part 1	7-12
5	Oct 10	Thanksgiving Day/Reading Week	
6	Oct 17	Titrations Part 2	7-12
7	Oct 24	Electrochemistry, Potentiometry	14-16
8	Oct 31	Electroanalytical Techniques	17
9	Nov 7	Fundamentals of Spectrophotometry	18
10	Nov 14	Applications of Spectrophotometry	19
11	Nov 21	Atomic Spectroscopy, Mass Spectrometry	21-22
12	Nov 28	Analytical Separations	23
13	Dec 5	Chromatography	24-26
14	Dec 6–7	Study Break	
15	Dec 8–20	Final Exam Period	