

CHMC11HF

Principles of Analytical Instrumentation

FALL 2022 COURSE SYLLABUS

Course Objective:

To describe and introduce the fundamentals of analytical instrumentation. As an introduction to the workings and application of modern analytical instrumentation, a range of modern instrumentation including NMR spectroscopy, Mass Spectrometry, Microscopy, Light Spectroscopy (visible, Ultra Violet, Infrared, Fluorescence, Phosphorescence), X-ray, Chromatography and electrochemical separations will be addressed.

Course Instructor:

Daniel Lysak, e-mail: daniel.lysak@mail.utoronto.ca

Office hours: Thursday 12-2 pm, outside SY324, or by appointment

Course location and time: Thursday 2-5pm in BV260

Optional Textbooks:

To be clear, there is no need to buy any textbook for this course. All of the material on which you will be tested will come from either the slides or what I mention in class, and it is very feasible to achieve an A+ without a textbook. That said, if you wish to do additional reading or deepen your knowledge, I recommend reiterating what was studied in class by reading the relevant sections of either of the following two textbooks:

Principles of Instrumental Analysis, Skoog, Holler and Crouch **6th Edition**.

Quantitative Chemical Analysis, by Harris, **9th** or Harris and Lucy, **10th Edition**

Please download and print the lecture material before you come to each class from blackboard. I will occasionally add additional information which you will want to note down, so bring your printed slides to class!

Evaluation:

The standard evaluation for this course is as follows:

Mid-Term Test = 30%

Final Exam = 70%

However, I understand that a grading scheme of 30% and 70% for the midterm and final can be challenging. As such I am giving you the **choice** of doing an **optional term paper** to lower the weights of the final and midterm (see below). The term paper is due on Nov 10th. If you do not submit by then, you will be evaluated by the standard evaluation. This is a rare opportunity so please make sure to take advantage of it if it better fits your learning style.

Mid-Term Test = 20%

Final Exam = 40%

(Optional) Term Paper = 40%

Course Policies and General Information:

Course Announcements: Announcements, updates to slides, assignment topics, requirements, and evaluation, etc. will be posted on the course Quercus site. Students are responsible for checking the website regularly.

Please, arrange your U of T emails to accept the course announcements.

Office Hours: Students are welcome to ask questions or resolve course-related problems by contacting the Course Instructor either by dropping in during scheduled office hours or by making an appointment. Students are responsible for work missed as a result of absence; the Course Instructors will not re-teach material covered in the lectures and lab sessions.

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Missed Mid-term Test: The exact dates of the mid-term tests are provided in the course topics schedule. Students who miss the term test will be assigned a mark of zero for the test, unless they can document a compelling reason for missing it. Students in that position must submit a written request to the course instructor with appropriate documentation. If a request is accepted for the mid-term test, the weighting of the mid-term will be included to the final exam. There will be no make-up mid-term tests.

Final Examination: The final examination will take place during the UTSC examination period in December following the end of the course. The exact date will be provided when the examination is scheduled.

AccessAbility: Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach me and/or the AccessAbility Services Office as soon as possible. The UTSC AccessAbility Services staff are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations. Their contact information is (416) 287-7560 or ability@utsc.utoronto.ca. The sooner you let us know your needs the faster we can assist you in achieving your learning goals in this course.

Cell Phones: During lectures and tutorials please put your cell phones on silent to avoid disruption of the class. If circumstances warrant use of your cell phone or you must receive an emergency call, please be mindful of other students and excuse yourself from the session to respond to the call outside the lecture hall.

Academic Calendar: Further information about academic regulations and course withdrawal deadlines can be found in the UTSC course calendar. You are encouraged to read this material.

Centre for Teaching and Learning: If you need assistance with effective writing skills, study skills, exam preparation, note taking, or time management, free workshops and advice are available from the Centre for Teaching and Learning, which can be reached at:

<https://www.utoronto.ca/ctl/welcome-centre-teaching-and-learning>

Computer Use: Ethical use of University computers is expected at the University of Toronto Scarborough. Guidelines are set out in the UTSC Calendar. It is expected that the equipment and/or resources accessed in the UTSC Library and the computer labs are to be used for academic research, assignments, and course activities only.

Academic Integrity: Honesty and fairness are considered fundamental to the University's mission, and, as a result, all those who violate those principles are dealt with as if they were damaging the integrity of the University itself. When students are suspected of cheating or a similar academic offence, they are typically surprised at how formally and seriously the matter is dealt with - and how severe the consequences can be if it is determined that cheating did occur. The University of Toronto treats cases of cheating and plagiarism very seriously.

Examples of offences for which you will be penalized include (but are not limited to):

- Using any unauthorized aids on an exam or test (e.g., "cheat sheets")
- Representing someone else's work or words as your own - plagiarism (see web document "How not to plagiarize" available online at <https://advice.writing.utoronto.ca/using-sources/how-not-to-plagiarize/#:~:text=Always%20write%20down%20the%20author,draft%3A%20that's%20asking%20for%20trouble>).
- Falsifying documents or grades
- Purchasing an essay
- Submitting someone else's work as your own
- Submitting the same essay or report in more than one course (without permission)
- Looking at someone else's answers during an exam or test
- Impersonating another person at an exam or test or having someone else impersonate you
- Making up sources or facts for an essay or report.

As a student it is your responsibility to ensure the integrity of your work and to understand what constitutes an academic offence. If you have any concerns that you may be crossing the line, please, read from the website

<https://www.academicintegrity.utoronto.ca/perils-and-pitfalls/>

and always consult your instructor. Your instructor can explain, for example, the nuances of plagiarism and how to use secondary sources appropriately; he or she will also tell you what kinds of aids - calculators, dictionaries, etc. - are permitted in a test or exam. Ignorance of the rules does not excuse cheating or plagiarism. Students agree that by taking this course all required papers may be subject to submission for textual similarity review to **Turnitin.com** for the detection of plagiarism. All submitted papers will be included as source documents in the **Turnitin.com** reference database solely for the purpose of detecting plagiarism of such papers. The terms that apply to the University's use of the **Turnitin.com** service are described on the **Turnitin.com** web site.

This information is taken from the brochure, "Academic Integrity" and website, part of a series of UT publications to help students understand the University's rules and decision making structures. For copies, visit the Office of the Registrar at UTSC. All of the policies and procedures surrounding academic offences are dealt with in one policy: "The Code of Behaviour on Academic Matters". The full text is located in the back of the UTSC Calendar.

CHMC11 Course Overview

Week	Topic	Notes
Sept 8 th	Introduction, UV-Vis, FT-IR	
Sept 15 th	NMR	
Sept 22 nd	NMR (tutorial) (2-5pm)	Main NMR tutorial
Sept 29 th	NMR interactions	Fun NMR Quiz (no grade)
Oct 6 th	NMR applications and examples (recorded)	This session will be recorded and posted online
Oct 13 th	Reading Week – No Class	
Oct 20 th	Mid-Term Exam (2-5pm)	
Oct 27 th	Atomic Absorption, Luminescence	
Nov 3 rd	Microscopy	Building a UV-Vis tutorial
Nov 10 th	Intro to Separations, HPLC	TERM PAPER DUE
Nov 17 th	Gas Chromatography, Capillary Electrophoresis	HPLC Simulator Demo
Nov 24 th	Mass Spectrometry 1	Environmental NMR Centre Tour
Dec 1 st	Mass Spectrometry 2 (+Hyphenation)	
TBA	Final Exam	