Introductory Chemistry II – CHMA11 Winter 2024
University of Toronto Scarborough

Welcome to **Introductory Chemistry II**! Chemistry is a fascinating subject with far-reaching applications in countless disciplines (biology, medicine, geology, environmental science, materials science, food science, neuroscience, forensics (just to name a few). If CHMA10 sparked your interest, get ready for CHMA11—we're diving even deeper. In this course, we will quantitatively examine reactions and equilibria in chemical systems with an emphasis on thermodynamic properties and chemical kinetics. We begin with a close examination of solutions followed by dynamic equilibrium. This leads directly to acid/base and solubility equilibria and thermochemistry. We conclude with thermodynamics, kinetics, and electrochemistry with a strong emphasis on how these are connected to Gibbs Free Energy. This course includes a three-hour laboratory every other week.

Take a moment to explore this document, packed with essential information and tools to ensure you succeed in the course.

Lecture Professors:

Prof. Frank Wania, EV448 (weeks 1–6)
Email: frank.wania@utoronto.ca
Office Hours: TBA

Prof. Ruby Sullan, EV566 (weeks 7–12)
Email: ruby.sullan@utoronto.ca
Office Hours: TB

Lab Professor:

Prof. Nirusha Thavarajah, SW155
Email: nirusha.thavarajah@utoronto.ca
Office Hours: Monday & Wednesday
11:00-12:30 pm

Lab Coordinator:

Ms. Veronica Cavallari, SW 155A
email: veronica.cavallari@utoronto.ca

Required Textbook

CHEMISTRY: A Molecular Approach, 3rd Canadian Edition, by Nivaldo J. Tro, Travis D. Fridgen, Lawton E. Shaw, Pearson Canada Inc.

LECTURE SCHEDULE

LEC01: Monday, Wednesday, Friday in AC223, 12:00–13:00
LEC02: Monday, Wednesday, Friday in AC223, 13:00–14:00

EVALUATION

Your final course grade will be calculated according to the grading scheme below:

Course Component	Percentage
Laboratory*	25%
Writing Assignment	15%
Problem Set	5%
Term Test 1**	8%
Term Test 2**	12%
Final Exam	35%

*To pass the course, **you must pass the laboratory and either the term test or the final exam** (and receive a final grade of 50+, of course!)
**The test with the higher mark will be taken for 12%

COURSE SCHEDULE

Week	Dates	Topic(s)	Suggested Reading
1	Jan 8–12	Solutions	12.1–12.7
2	Jan 15–19	Chemical Equilibrium	14.1–14.8
3	Jan 22–26	Acids and Bases	15.1–15.6
4	Jan 29–Feb 2	Acids and Bases cont.	15.7–15.11
5	Feb 5–9	Aqueous Ionic Equilibria	16.1–16.4
6	Feb 12–16	Aqueous Ionic Equilibria cont.	16.5–16.8
7	Feb 19–23	**Reading Week**	N/A
8	Feb 26–Mar 1	Gibbs Energy and Thermodynamics	17.1–17.5
9	Mar 4–8	Gibbs Energy and Thermodynamics cont.	17.6–17.9
10	Mar 11–15	Electrochemistry	18.1–18.4
11	Mar 18–22	Electrochemistry cont.	18.5–18.8
12	Mar 25–Mar 29	Chemical Kinetics	13.1–13.4
13	Apr 1–Apr 5	Chemical Kinetics	13.5–13.7
14	Apr 9–11	**Study Break**	
15	Apr 12–25	**Final Exam Period**	

WEBSITE

Check Quercus (https://q.utoronto.ca) for important announcements, updates to readings, assignment topics, requirements, and evaluation, etc. Students are responsible for checking the course website regularly. Make sure that your ".utoronto" emails can accept the course announcements.

EXAMINATIONS

Midterm: There will be two 90-minute mid-term tests written outside of class time. The exact dates, times and locations will be announced as soon as they are available. If you miss the mid-term due to a legitimate reason, you must submit appropriate documentation within one week of your absence, then, **the weight of the midterm mark would be transferred to the final exam**. If the reason is medical, an official UTSC medical form should be downloaded from the Registrar's website: http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf and completed and signed by your physician. Students will not be permitted to write a make-up exam. If no acceptable documentation is received, you will receive a grade of zero for that test.

Final Examination: There will be a 3-hour, cumulative exam written during the end of semester exam period. The exact date, time and location 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. E.g., for a missed April Final Exam, the make-up Exam is in August. Your documentation is crucial for a successful petition and must be submitted by the last day of the exam period. Check the UTSC Calendar for instructions and deadlines.

LABORATORY

The primary goal of the CHMA11H3 laboratory program is to teach the applications of knowledge from the lecture component of the course. Therefore, the experiments are carefully designed to reflect the lecture content, and pre-lab readings are assigned to relate the relevant theory to each experiment.

The first-year chemistry laboratories are located in the basement level of the Science Wing in Rooms SW153 and SW159. The **laboratory check-ins** will begin on the hour for the first 10 minutes, and the lab demonstration talk will take place 10 minutes past the hour. Therefore, please arrive on time to have your pre-lab work checked.

The laboratory periods are three hours in length and run every other week. The lab component of the course is **compulsory,** and students must obtain a passing grade in the lab section to be eligible to pass the course. The lab component is **worth 25%** of your course grade. A more detailed explanation of the evaluation scheme can be found on page 9 of this manual.

Laboratory Section Schedule

Week 1 lab students: Students assigned to practical sections ending in **odd numbers (i.e., P0001, P0003, P0005, P0007)** have their first lab during the **week of January 15th.**
Week 2 lab students: Students assigned to practical sections ending in **even numbers (i.e., P0002, P0004, P0006, P0008)** have their first lab during the **week of January 22rd.**

LABORATORY SCHEDULE

Week of	Week #	Experiment
January 15th January 22nd	1 2	EXP 1: Copper Glycinate Synthesis
January 29th February 5th	1 2	EXP 2: Determination of the Acid Ionization Constant of Acetylsalicylic Acid
February 12th	1	EXP 3: Analysis of Copper Glycinate Monohydrate
February 17th- 23rd Reading Week		
February 26th	2	EXP 3: Analysis of Copper Glycinate Monohydrate
March 4th March 11th	1 2	EXP 4: Determining the Buffer Effectiveness
March 18th March 25th	1 2	EXP 5: A Common Ion Effect on Solubility

ABSENCE FROM THE LABORATORY

<u>Accommodations for Illness or Emergency, Religious Conflicts</u>

For missed labs and lab submissions due to ILLNESS, EMERGENCY, or RELIGIOUS CONFLICTS please complete the following process:

1. Complete the **Request for Missed Term Work Form** (Link is posted under the lab introductory module on course Quercus website)

2. **Declare your absence** on **ACORN** (Profile & Settings > Absence Declaration)

If you provide appropriate reasoning for missing your scheduled lab session, you may be eligible to join a make-up lab session, pending available lab space. If you fail to notify the day of your absence you will **NOT** be eligible to request a make-up lab session.

Deadline: You must complete the above forms within **5 business days** of the missed work to be considered as a late submission.
If a post lab assignment is missed and no reasonable explanation or supporting documentation are provided, there is penalty of 10% per day will be applied.

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.

If a student misses a lab and provides no reasonable explanation or supporting documentation, a mark of zero will be assigned.

Students must attend at least **4 out of the 5** scheduled experiments in order to be eligible to pass the course. If a student misses one experiment, and submits the missed term work form with appropriate documentation (i.e. Verfication of Illness), they will be considered for an excusal. **If a student misses a second experiment, even if they provide appropriate supporting documentation, they will automatically fail the course.**

If you miss a lab when you are required to hand in material for marking (i.e. Report Sheets), the original report sheet or a scanned copy must be submitted to the **Lab Coordinator (Ms. Veronica Cavallari,** veronica.cavallari@utoronto.ca**)** within 48 hours of the missed lab. Standard late penalties **(i.e. 10% per day up to 5 days – material submitted after 5 days will be assessed a grade of zero)** will be applied to material submitted after the 48-hr deadline.

Late Policy

1. If you are late to your lab, but the pre-lab discussion is still underway you will be allowed to participate, given that you have completed all the pre-lab work.
2. If you are more than 30 minutes late for your lab you **WILL NOT BE ALLOWED TO PERFORM THE EXPERIMENT AND A MARK OF ZERO WILL BE ASSIGNED FOR ALL OF THE COMPONENTS ASSOCIATED WITH THAT LAB SESSION.**

3. If you show up to the lab without completing your pre-lab work in your notebook, you **WILL NOT BE ALLOWED TO PERFORM THE EXPERIMENT AND A MARK OF ZERO WILL BE ASSIGNED FOR ALL OF THE COMPONENTS ASSOCIATED WITH THAT LAB SESSION.**

Late Penalties

- Report Sheets
    - -10% of the total (not your grade) per day for 5 days (weekends count as two days unless you email a scanned copy of it to the lab coordinator).
    - After 5 days a grade of zero will be assigned
- Notebooks
    - Your notebook will be graded on a regular basis during lab time; your assessment will include prelab preparation and in-lab performance. Refer to the lab manual for details on lab notebook preparation and assessments in the lab manual introduction.

LABORATORY MARKING SCHEME

The laboratory component is worth 25% of your final grade. The laboratory component is marked out of 100 total marks.

Assessment Methods	**% of final grade**	**Marks**
Quiz (available online 3 days before your lab)	7.5%	6 marks (x 5)
Post-lab Report Sheets/post-lab quizzes	12.5 %	10 marks (x 5)
Lab Notebooks	5.0%	4 marks (x 5)
Total Marks:	**25 %**	**100**

You must receive a passing grade in the laboratory section to pass the course

Ancillary Fees: You will be assessed a $20.00 ancillary fee which will cover the cost of chemicals, filter paper, Pasteur pipettes and other items consumed over the course of the lab. For more information regarding ancillary fees students are encouraged to visit the following website: http://www.planningandbudget.utoronto.ca/tuition.htm

Peer Facilitator Program: Facilitated Study Group (FSG) is being run through the Centre for Teaching and Learning. These weekly sessions are open to all students taking this course who want to improve their understanding of course material, improve their study techniques, and improve their grade. Attendance is voluntary. In these sessions you will compare notes, discuss important concepts, develop study

strategies, and prepare for exams and assignments on course material. Course material is NOT re-lectured. The FSG's are led by a trained facilitator who has previously taken the course. A survey will be taken during the first week of class to determine the best days and times for most students, and they will begin probably the 2nd or 3rd week of class. Please be sure to fill out the survey in the first week of class to help ensure the study groups are scheduled at optimal times. If you have any questions, please ask your facilitator, or visit the FSG website at https://www.utsc.utoronto.ca/ctl/facilitated-study-groups-program.

Please note that FSGs will NOT give out answers to any lab assignments.

WRITING ASSIGNMENT: Peer Reviewed Mock Journal using PeerScholar

Not only do we want everyone to be comfortable with communicating through emails, but we also want to support your writing skills in the context of chemistry. You will be asked to write an essay with the goal of exploring modern topics in chemistry. You will learn how to utilize both UofT Library resources and Web of Science while also training your writing skills. You will convey your research and learning on your topic in the form of a peer-reviewed 500-word essay.

Several of you may have completed a similar assignment during CHMA10 in Fall 2020 when you were asked to use SciFinder to search for relevant articles. You're more than welcome to continue using SciFinder, but we also encourage you to try searching using Web of Science, as well, as it can be an incredibly helpful database to complement SciFinder. **Please note that you are required to choose a different topic this time around. It is an academic offense to re-submit work from other courses, so please take this as an opportunity to explore another topic that may be of interest to you. **

The peer-review process is the cornerstone of writing and communicating new results and ideas in the sciences. A part of this process heavily depends on you! You will be asked to apply critical thinking skills to give and receive feedback to fellow colleagues. You will experience this process while doing this assignment by using PeerScholar and online learning modules that will guide you throughout the various components of the assignment. The assignment will be worth 15% of your final grade. You can find more details about the writing assignment on the CHMA11 Quercus page.

	Weight	Date Due by:
Online Modules Available for your Reference		January 15th @ 9:00 am

Draft Essay **NOTE: You <u>MUST</u> submit a draft to be able to complete the feedback.**		**<u>Starts</u>**: January 15th @9:00 am EST **<u>Ends</u>**: February 4th @ 12:00 pm EST
Quality and participation in the peer-feedback process	5%	**<u>Starts</u>**: February 5th @ 9:00 am EST **<u>Ends</u>**: February 16th @ 9:00 pm EST
Final essay	10%	**<u>Starts</u>**: February 17th @ 12:00 pm EST **<u>Ends</u>**: March 1st @ 12:00 pm EST
	Total = 15%	

Calculators: Only non-programmable, non-communicating calculators are allowed in tests and exams for this course (both lecture and lab). Invigilators have the authority to check calculators and to confiscate illegal models. Students who have illegal calculators confiscated during a test/exam will be supplied with an allowed calculator but an immediate penalty of 10% will be imposed for that test/exam. Students without a calculator will also be allowed to borrow an allowed model, but at the cost 10% off their mark on that test/exam.

Cell Phones: During lectures and labs please put your cell phones in silent mode to avoid disruption. If circumstances warrant use of your cell phone and you must receive an emergency call, please inform the Course Instructor at the beginning of the session in advance and then excuse yourself from the session to respond to the call outside the lecture hall or laboratory.

Academic Calendar: Further information about academic regulations and course withdrawal deadlines can be found in the UTSC 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.utsc.utoronto.ca/ctl/academic-learning-support

Math & Statistics Learning Centre is now offering help with any sort of questions you may have related to mathematics and statistics. The CHMA11 course involve advanced math skills. If you are having difficulties or need some refresher, you are encouraged to drop in at AC312 and use the available general help hours. The schedule can be viewed at the link: https://www.utsc.utoronto.ca/ctl/math-and-stats-support

Accessibility: 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 us and/or the AccessAbility Services Office as soon as possible, https://www.utsc.utoronto.ca/ability/. We will work with you and AccessAbility Services to ensure you can achieve your learning goals in this course. Enquiries are confidential. The UTSC AccessAbility Services staff (located in AA142) are available by appointment to assess specific needs, provide referrals and arrange appropriate accommodations (416) 287-7560 or ability@utsc.utoronto.ca.

Academic Integrity: Academic integrity is important to maintain our community which honours the values of honesty, trust, respect, fairness and responsibility and to protect you and the value of the degree towards which you are all working so diligently.

It is an offence for students 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
- Include false, misleading or concocted citations in their work.
- Obtain unauthorized assistance on any assignment
- 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. E.g., doctor's notes.
- To use or possess an unauthorized aid in any test or exam.

There are other offences under the Code, but these are the most common. Please respect these rules. Offences will be dealt with according to the procedures outlined in the Code of Behaviour on Academic Matters.