



Introductory Chemistry II (CHMA11H3) Summer 2019 University of Toronto at Scarborough

Welcome to Introductory Chemistry II: Reactions and Mechanisms! Chemistry is an exciting subject with far-reaching applications in countless disciplines (biology, medicine, geology, environmental science, neuroscience, forensics, food science – the list goes on!). CHMA10 might have given you a taste of this, but in CHMA11 we're going to take things even further. We'll be continuing to teach you the fundamentals of the subject, but our hope is that this course will also give you an appreciation for the depth and importance of this discipline. By the end of the semester, you should be thoroughly convinced that chemistry is indeed *all around you!* Before we get started, please read through this syllabus. It contains important information, which will help make sure you have all the tools you need to succeed in this course.

Course Instructor and Lab Coordinator:

Dr. Nirusha Thavarajah

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Office Hours: Monday 11:00-12:00 (ESCB544) & Wednesday 1:30-3:30 pm SW 155

Email Policy:

- Use UTSC 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 CHMA11 in the subject line followed by the reason for the email.
- 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 36 hours (M-F) provided that the above protocol is used.

Required Text Book: Chemistry: A Molecular Approach, 2nd Canadian Edition, by Nivaldo J. Tro, Travis D. Fridgen, Lawton E. Shaw, Pearson Canada Inc.

Lectures: LEC01 – Mondays 2:00-4:00 pm & Wednesday 10:00-12:00 at SY110

*I strongly encourage all of you to attend all the lectures to engage in the participatory lessons! Lecture casting of each lecture will be available for **one week** from the day of the lecture.*

Website: CHMA11H3 maintains a Quercus web space, which archives a variety of course related information including: grades, class announcements, lectures and lab materials. 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 CHMA11 link.

Announcements: Official announcements regarding test locations, material covered for each test and other important announcements will be posted on the CHMA11H3 course web site. It is **absolutely 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, the classroom or course materials, please contact us and or the Accessibility Services as soon as possible: SW 302, (416) 287-7560 or ability@utsc.utoronto.ca

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. CHMA11 is supported by FSGs. These weekly study sessions are open to everyone in the class. Attendance is voluntary, but students who attend regularly often earn higher grades. 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 <http://ctl.utsc.utoronto.ca/home/fsg>.

Grade Calculation:

Graded Work	Weight (%)
Laboratory	25
Mastering Chemistry Assignments	5
Mid-Term Test	30
Final Exam	40
Pre & Post Module Quizzes (Bonus)	2
Peer-Scholar Assignment (Bonus)	1

**** Course Policy:** 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+ (this excludes counting in the bonus points), of course!

Midterm and Exam Policy:

Midterm: There will be 90 minutes mid-term test written outside of class either just before or just after the Reading Week. The exact date, time and location will be announced as soon as they are available. If you miss the midterm due to legitimate reasons, you must submit the official supporting document within one week of your absence to be considered to write the make-up test. 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 completed and signed by your physician. **If no acceptable documentation is received, you will receive a 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 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. Check the UTSC Calendar for instructions and deadlines.

Allowed Aid: Only non-programmable, non-communicating calculators are allowed in tests and

exams for this course (both lecture and lab). Students **must** bring their own calculators.

Laboratory:

The laboratory component of CHMA11 is compulsory. In order to pass the course, you must also pass the lab component.

Lab Schedule:

Laboratory periods are three hours in length and run every other week. Laboratory Section Schedule:

Week 1 lab students: Students assigned to practical sections ending in odd numbers will begin their labs on the week of May 13th 2019

Week 2 lab students: Students assigned to practical sections ending in even numbers will begin their labs on the week of May 20th 2019.

Lab Manual and Notebook:

A lab manual must be purchased from the UTSC Bookstore before your first lab. You may not use a lab manual from a previous semester: the experiments and course requirements will be different.

DO NOT wait to purchase your lab manual as it contains a host of important information:

- Lab Schedules and other important dates
- Late and absence policies
- Rules regarding safety
- Appropriate attire for the labs
- Marking schemes
- Guidelines on how to properly prepare for the lab

The bookstore **DOES NOT** stock enough lab manuals for everyone. If they run out, you **MUST** pre-order a copy through the bookstore – this takes time. Failure to adhere to the rules and policies outlined within the lab manual will adversely affect your lab mark – in some instances the impact will be severe.

In addition, students will be required to purchase their own lab notebook. The book must be hard-cover, permanently bound (not spiral or loose leaf) with the approximate dimensions 8.25” x 10.5” inches. They can be purchased at the UTSC bookstore; however students are free to purchase their books at a merchant of their choice (so long as they meet the above requirements). **Students are allowed to reuse their lab notebook from previous courses** (*just make sure that your table contents reflects the fact that the book contains material from multiple courses*).

Lab Safety:

Safety in the laboratory is an extremely important element in the chemistry program at this University. Failure to follow safe practices can cause laboratory accidents which may result in the loss of time, damage to clothing, and other property, and most importantly personal injury. By following suitable precautions, you can anticipate and prevent situations that would otherwise lead to accidents. Students registered in CHMA11H3S will be automatically enrolled into the course which should appear in your “My Courses” window of your blackboard home page.

As part of this course, students will be expected to watch a video (approximately 30 minutes long) and take a multiple choice quiz on the material you just learned (**the quiz is different than the previous term**). Students must obtain 80% on the quiz to pass the WHMIS course. **In addition, students will be**

required to print off their quiz results and present them to your TA before you will be allowed to enter the lab.

Safety Equipment:

Students will be required to purchase approved indirect vented chemical splash safety goggles, and a lab coat before attending their first lab. These items can be purchased through the bookstore. All safety eyewear must meet either ANSI Z87+ or CSA Z94.3 Standard for high impact protection (if you see one of those standards stamped on your eyewear somewhere then they meet that particular standard).

Labs coats must be 100% cotton – no exceptions.

Further information regarding appropriate attire please see the guidelines outlined in your lab manual.

Note that students not wearing approved safety gear will not be allowed to participate in the lab.

Ancillary Fees

Students taking CHMA11 will be assessed a \$25.00 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>

Absence: If you miss a significant period of class work through illness or a related reason, you should request consideration by submitting a completed University of Toronto Student Medical Certificate which is available on the following web site:

http://www.utsc.utoronto.ca/~registrar/resources/pdf_general/UTSCmedicalcertificate.pdf.

The document must be presented within one week of the date of absence. However, you should notify the course instructors the day of your absence (see your lab manual regarding absences from the lab). Only serious illness (or equivalent reasons) will be accepted as justification for absence (note: the U of T Medical Certificate, filled out by your doctor, stating that you saw him/her on a given day is not adequate. Your doctor must certify that *you were too sick to attend the test*, etc.). The form of consideration extended for a particular item of missed term work will be explained to you when you submit the certificate.

MasteringChemistry homework: Several on-line assignments will be administered through MasteringChemistry, which allows you to practice at your own pace, receive meaningful feedback and use additional learning resources. To sign up for MasteringChemistry, please refer to the posted instructions on Quercus. For questions related to MasteringChemistry, contact Pearson 24/7 support:

<https://support.pearson.com/getsupport>

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.

According to Section B of the University of Toronto's Code of Behavior 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.

CHMA11H3 Lecture Schedule (*Tentative)

Week	Topic(s)	Suggested Reading
1	Solutions	12.1–12.7
2	Dynamic Equilibrium	14.1–14.8
3	Acid-Base Equilibria in Aqueous Solution	15.1–15.6
4	Acid-Base Equilibria in Aqueous Solution Cont.	15.7–15.11
5	Aqueous Ionic Equilibria	16.1–16.4
6	Aqueous Ionic Equilibria cont.	16.5–16.8
February 16 th -22 nd	READING WEEK	
8	Thermochemistry	Selected sections (TBA)
9	Gibbs Energy and Thermodynamics	17.1–17.4
10	Gibbs Energy and Thermodynamics Cont.	17.5–17.9
11	Chemical Kinetics	13.1–13.7
12	Electrochemistry	18.1–18.8
	Study Break (TBA)	
	Final Exam Period (TBA)	

University Closures: TBA

Lecture Topics and Learning Outcomes:*Topic 1: Solutions (Chapter 12)*

- i) Apply prior knowledge of intermolecular forces and thermochemistry to solution formation.
- ii) Understand colligative properties (i.e. vapor pressure, freezing point depression, etc.)
- iii) Apply Henry's Law to problems involving solubility of gases.

Topic 2: Dynamic Chemical Equilibrium (Chapter 14)

- i) Understand equilibrium constant expressions and perform related calculations.
- ii) Explain the concept of reaction quotient and apply it to predict the direction of change.
- iii) Predict how a system at equilibrium responds to disturbances based on Le Chatelier's principle.

Topic 3: Acid-Base Equilibria in Aqueous Solution (Chapter 15)

- i) Apply the concept of acid ionization constant (K_a), base ionization constant (K_b) and the ion product constant for water (K_w).
- ii) Calculate the pH of weak acids and bases.
- iii) Understand the relationship between strength of acids and bases and molecular structure.

Topic 4: Aqueous Ionic Equilibria (Chapter 16)

- i) Predict the effectiveness of a buffer and calculate the pH of buffers using Henderson-Hasselbalch equation.
- ii) Learn about the applications of qualitative chemical analysis.
- iii) Understand solubility equilibria and solubility product constant (K_{sp}).

Topic 5: Gibbs Energy and Thermodynamics (Chapter 17)

- i) Students will develop an understanding for spontaneous and nonspontaneous process and the application of second law of thermodynamics.
- ii) Calculate the change in Gibbs energy for a reaction under standard and nonstandard conditions
- iii) Understand and apply the relationship between Gibbs Energy and equilibrium constant.

Topic 6: Chemical Kinetics (Chapter 13)

- i) Understand the concept of chemical reaction rate.
- ii) Express rate law and determine the order and rate constant of a reaction.
- iii) Propose reaction mechanisms based on chemical kinetics.

Topic 7: Electrochemistry (Chapter 18)

- i) Understand the relationship between cell potential, Gibbs energy and the equilibrium constant.
- ii) Calculate cell potential and Gibbs energy under standard and nonstandard conditions.
- iii) Students will develop an understanding for driving nonspontaneous chemical reactions with electricity and its application in real life.

Topic 8: Biochemistry (Chapter 22)

- i) Students will be introduced to the basic structure and function of the four macromolecules: lipids, carbohydrates, proteins, and nucleic acids.
- ii) Students will be able to establish the significance of the macromolecules in (i) real life scenarios and applications.