DEPARTMENT OF CHEMISTRY UNIVERSITY OF TORONTO MISSISSAUGA

CHM110H5S LEC6101 Chemical Principles 1 Course Outline - Winter 2022

Class Location & Time Tue, 01:00 PM - 02:00 PM IB 120

> Thu, 01:00 PM - 02:00 PM IB 120 Fri. 01:00 PM - 02:00 PM IB 120

Thottackad Radhakrishnan

CCIT 4118 **Office Location**

Office Hours Monday, Wednesday 11:00 -12 noon -1:00 pm

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Course Description

Instructor

Matter and its transformations are studied at the macroscopic level. Topics include stoichiometry, phases of matter, equilibria, thermodynamics and electrochemistry.

Prerequisite: Grade 12 Chemistry (SCH4U) (minimum grade of 70) and Grade 12 Advanced Functions (MHF4U0) (minimum

grade of 70) and Grade 12 Calculus and Vectors (MCV4U) highly recommended

Corequisite: Recommended Corequisite: (MAT132H5 and MAT134H5) or (MAT135H5 and MAT136H5) or (MAT134Y5 or MAT135Y5 or MAT137Y5 or MAT157Y5); this recommended corequisite is a prerequisite for all 200 level CHM courses.

Exclusion: CHM135H1 or CHM151Y1 or CHM140Y5 or CHMA11H3 (SCI)

Distribution Requirement: SCI

Course Learning Outcomes

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- describe how molecules are formed from atoms and the laws governing the chemical combination.
- differentiate between pure substances and mixtures and how mixtures can be separated.
- Describe the methods of analysis of compounds both qualitatively and quantitatively.
- define the various methods of solution concentrations(M, m, N, X, %) and know how to prepare solutions and when to use various solution concentrations: M, m, N, X, %
- classify reactions by type and balance redox reactions.
- describe ideal gas law and its applications and know how and when to use the ideal gas law
- explain deviations from ideal gas behavior and how it can be accounted
- define the equilibrium state and the effect of T, P, concentration, and solvent on the extent of reaction
- apply equilibrium principles to reactions in the gas and solution phases
- calculate equilibrium constants and equilibrium concentrations using the simultaneous equations method for acid base reactions and buffer systems.
- define a state function and distinguish between thermodynamic and kinetic principles
- explain the first law of thermodynamics, distinguishing between heat and work
- use heat capacities to determine internal energy and enthalpy changes
- use Hess' Law to calculate enthalpy changes for reactions and bond energies
- define enthalpy and entropy changes for physical and chemical processes
- define free energy changes in terms of enthalpy and entropy changes (second law)
- derive and use the relationship between standard free energy change and equilibrium constant
- explain spontaneity of reactions
- derive and use the relationship between standard electrochemical cell potential and equilibrium constant
- draw and label the parts of a galvanic cell and an electrolytic cell and distinguish between them
- apply Nernst equation to calculate the EMF of galvanic cells.
- explaining reactivity of metals and dissolution in acids based on its reduction potential

- understand the fundamental chemical principles in chemistry and apply these principles to problems. perform chemical experiments based on standard procedures, analyze the data, and understand the theory behind the experiments.
- work independently and collaboratively.
- identify the source of errors in chemical experiments, evaluate the errors and find the methods to alleviate these errors.
- develop writing skills through the creation of organized and scientific reports.

Textbooks and Other Materials

Your required resource for this course is *Chemical Principles*, 8th edition by Zumdahl and DeCoste. There are a few buying options available to you and etexts is the most economical. Here is a webpage that includes all the details you need to make your purchase. Please read all the instructions found here: https://www.cengage.com/coursepages/UoT_W22_CHM1101. You can purchase from Cengage.ca here: <a href="https://www.cengage.ca/c/e-pack-etextbook-chemical-principles-student-solutions-manual-ebook-for-zumdahl-decoste-s-chemical-principles-44-8th-edition-8e-zumdahl-decoste/9780357909737/ or from your campus bookstore. You can also purchase print from the UT bookstore. Print bundle of textbook and print solution manual ISBN: 9781337881647.

Get 10% off when you purchase from Cengage.ca by Feb 28, 2022. Coupon code:CengageW22592

Assessment and Grading

Type	Description	Due Date	Weight
Lab	5 Experiments; 4% each (as per schedule), on-line virtual	On-going	20%
Quiz	5 Quizzes; 2.0% each (as per schedule), on-line	On-going	10%
Term Test	Term Test-1,in-person, 50 minutes in length and will take place during regularly scheduled lecture period, starting at precisely 1:10 pm	2022-02-15	15%
Term Test	Term Test-2,in-person, 50 minutes in length and will take place during regularly scheduled lecture period, starting at precisely 1:10 pm	2022-03-22	15%
Other	6 laboratory simulations, 1.5% each (as per schedule)	On-going	9%
Final Exam	Final Exam (in-person), timed (3 hours)	TBA	31%
		Tota	l 100%

Midterm Tests

The midterm tests will be 50 minutes in length(in-person) and will take place during regularly scheduled lecture periods, starting at precisely 1:10 pm.

There will be a switch to online test writing in the event that a term test is to be written at a time when online course delivery is mandated. Detailed instructions on how to access and complete online term tests will follow *via* the course Quercus site.

Procedures and Rules

Missed Term Work and Tests, Late Penalties and Absence Declarations

--- BEGIN SECTION ---

Penalties for all term work missed or otherwise submitted late is as described in the text that follows unless valid and documented reasons exist for special consideration. Students may submit a request for special consideration **within one week** of the due date of the missed item of term work or date of the missed test. Requests for special consideration may be made by e-mail to the Course Instructor, from a valid University of Toronto (UofT) e-mail account. Students must also successfully complete an online absence declaration via ACORN and provide the Course Instructor with a confirmation of this declaration (e.g. a screenshot) in their petition for special consideration, which contains their student name, student number, absence dates and confirmation number. Note that ACORN absence declarations must be recorded for each day that you are absent - as soon as it begins up until the day you return to your classes or other activities. The ACORN absence declaration tool lets you record absences for up to 14 consecutive days, one of which must be the day you access the tool (if you are still absent) or the day prior (if you have returned). If you need to record an absence outside of this range, please contact the Office of the Registrar. More information about Absence Declarations can be found here. The Course Instructor will inform the student by e-mail (as per the communication policy above) whether special consideration is granted following due diligence on the documentation provided.

If a student misses a midterm test, a mark of **zero** (0%) will be assigned unless a request for special consideration is made and granted by the Course Instructor. There will be no make-up tests and the mark value of the test will be re-assigned to the final exam (i.e. the final exam will be worth an additional 15% of the total mark for the course, e.g. 46% from 31%).

The penalty for late submission of term work (e.g. laboratory reports, assignments, etc.) is a **3% deduction in the final mark per day** that the work is late. A late penalty may be waived provided that a request for special consideration is made and granted as described above.

If a student misses a laboratory session/quiz, a mark of **zero (0%)** will be assigned for that experiment and associated term work/quiz unless a request for special consideration is made and granted as described above. There will be no make-up laboratory sessions/quiz and the mark value of the laboratory or discussion/quiz will be re-assigned to the final exam in the case that special consideration is granted.

Re-evaluation Requests

Requests for re-evaluation of an article of term work (e.g. test, assignment, laboratory report, etc.) must be made in writingwithin 1 month of the return of the article of term work and include a brief explanation as to why the request is being made. Term work submissions can be written in pencil; however, re-marking of term work written in pencil is not permitted. Similarly, articles of term work on which correction media has been used will be exempt from re-evaluation. Re-evaluation requests must be made to the same person that did the initial grading of the article of term work (normally, this is a Teaching Assistant). Note that the final mark assigned to a re-evaluated article of term-work may go up or down based on the outcomes of re-evaluation (in whole or in part, at the discretion of the marker). Disputes in grading subsequent to re-evaluation by the original marker may be brought forward to the Course Instructor for final adjudication. You, as a UTM student, have the right to appeal a mark beyond the Course Instructor only if the term work in question is worth at least 20% of the course mark.

Missed Final Exam

Students who cannot complete their final examination due to illness or other serious causes must file an <u>online petition</u> within 72 hours of the missed examination. Late petitions will NOT be considered. Students must also record their absence on ACORN on the day of the missed exam or by the day after at the latest. Upon approval of a deferred exam request, a non-refundable fee of \$70 is required for each examination approved.

Communications Policy

Students are welcome and encouraged to meet with the Course Instructor during the posted virtual office hour(s). Note that virtual office hour visits will not be recorded. Visits outside of the regularly scheduled office hour(s) can be made by appointment. Correspondence by e-mail is also acceptable. In all e-mail correspondence regarding this course, please note the following:

- 1. Please send e-mail only from your @utoronto.ca or @mail.utoronto.ca account.
- 2. In the Subject line of your message, please include the course code and a brief description of the topic, e.g. "[Course code] Request for an appointment regarding potentiometry".
- 3. Please include your full name and student number in all correspondence.
- 4. Please consult the course syllabus and course website before sending questions by e-mail
- 5. Send all course related correspondence to the course email (CHM110@utoronto.ca) and not to the instructor's personal email address.
- 6. Emails sent through the quercus inbox will not be read or responded to.

I will endeavour to respond to e-mail within two workdays at the latest. Students are responsible for all information posted to the course <u>Quercus site</u> and e-mails sent by the Course Instructor, Laboratory Technicians and Teaching Assistants.

Student Technology Requirements and Connection Tools

Students are expected to review and be in compliance with the University of Toronto's requirements for online learning. Students are also strongly encouraged to familiarize themselves with the resources available on the UTM Library's Learn Anywhere website.

During times when a switch from in-person to online course delivery is mandated, Zoom will be used for course delivery (i.e. lectures, tutorials, and practicals) and office hours. Students are required to register for a UTM Zoom account prior to the first course meeting. Details on how to join your class meetings will be provided on the course Quercus page.

Privacy and Use of Course Materials

This course, including your participation, will be recorded on video and will be available to students in the course for viewing remotely and after each session. Course videos and materials belong to your instructor, the University, and/or other sources depending on the specific facts of each situation, and are protected by copyright. Do not download, copy, or share any course or student materials or videos without the explicit permission of the instructor. For questions about recording and use of videos in

which you appear please contact your instructor

Information Security Risks

If you are a citizen of another country, and/or accessing your courses at the University of Toronto from a jurisdiction outside of Canada, please note that you may be subject to the laws of the country in which you are residing, or any country of which you have citizenship. The University of Toronto has a long-established commitment to freedom of expression, with this right enabled by an environment valuing respect, diversity, and inclusion. In your classes, you may be assigned readings, or discuss topics that are against the law in other jurisdictions. I encourage you to become familiar with any local laws that may apply to you and any potential impact on you if course content and information could be considered illegal, controversial, or politically sensitive. If you have any concerns about these issues, please contact your instructor directly to discuss with them.

Academic Integrity

With regards to remote learning and online courses, UTM wishes to remind students that they are expected to adhere to the <u>Code of Behaviour on Academic Matters</u> regardless of the course delivery method. By offering students the opportunity to learn remotely, UTM expects that students will maintain the same academic honesty and integrity that they would in a classroom setting. Potential academic offences in a digital context include, but are not limited to:

- Accessing unauthorized resources (search engines, chat rooms, Reddit, etc.) for assessments.
- Using technological aids (e.g. software) beyond what is listed as permitted in an assessment.
- Posting test, essay, or exam questions to message boards or social media.
- Creating, accessing, and sharing assessment questions and answers in virtual "course groups."
- Working collaboratively, in-person or online, with others on assessments that are expected to be completed individually.

All suspected cases of academic dishonesty will be investigated following procedures outlined in the Code of Behaviour on Academic Matters. If you have questions or concerns about what constitutes appropriate academic behaviour or appropriate research and citation methods, you are expected to seek out additional information on academic integrity from your instructor or from other institutional resources.

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 essays 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 web site (https://uoft.me/pdt-faq).

Students are permitted opt-out of using the University's plagiarism detection tool and notice of this decision must be delivered to the Course Instructor no later than the end of day on which the first class meeting occurs. This notice should be provided via email, as per the communication policy specified herein. In such a case, you may asked to submit all of your rough work for an assignment and you may be required to have a short meeting with the Course Instructor to discuss your research methodology.

Academic Rights

You, as a student at UTM, have the right to:

- Receive a syllabus by the first day of class.
- Rely upon a syllabus once a course is started. An instructor may only change marks' assignments by following the University Assessment and Grading Practices Policy provision 1.3.
- Refuse to use the University's plagiarism detection tool (you must be offered an alternative form of submission).
- Have access to your Instructor for consultation during a course or follow up with the Department Chair if the Instructor is unavailable.
- Receive at least one significant mark (15% for H courses, 25% for Y courses) before the last day you can drop a course for H courses, and the last day of classes in the first week of January for Y courses taught in the Fall/Winter terms
- Have no assignment worth 100% of your final grade.
- Not have a term test worth 25% or more in the last two weeks of class.
- Retain intellectual property rights to your research.
- Receive all your assignments once graded.
- View your final exams. To see a final exam, you must submit an online Exam Reproduction Request within 6 months of the exam. There is a small non-refundable fee.
- Privacy of your final grades.
- Arrange for representation from Downtown Legal Services (DLS), a representative from the UTM Students' Union (UTMSU), and/or other forms of support if you are charged with an academic offence.

Inclusivity Statement

You belong <u>here</u>. The University of Toronto commits to all students, faculty, and staff that you can learn, work, and create in a welcoming, respectful, and inclusive environment. In this class, we embrace the broadest range of people and encourage their

diverse perspectives. This team environment is how we will innovate and improve our collective academic success. You can read the evidence for this approach here.

We expect each of us to take responsibility for the impact that our language, actions and interactions have on others. The Department of Chemical and Physical Sciences (CPS) denounces discrimination, harassment and unwelcoming behaviour in all its forms. You have rights under the Ontario Human Rights Code. If you experience or witness any form of harassment or discrimination, including but not limited to, acts of racism, sexism, Islamophobia, anti- Semitism, homophobia, transphobia, ableism and ageism, please tell someone so that we can intervene. CPS takes these reports extremely seriously. You can talk to anyone you feel comfortable approaching, including your professor, teaching assistant, technician, an academic advisor, our Chairs, members of our Equity, Diversity and Inclusivity Committee, or any staff member at our Equity, Diversity & Inclusion Office

You are not alone. Working together, we can all achieve our full potential.

Course Code of Conduct and Expectations

Each member of this course is expected to maintain a:

- Professional and respectful attitude during all course activities, including lectures, labs, and online activity.
- Personal calendar/schedule/organizer to ensure that all course activities are completed and due dates are met.
- Collection of class notes recorded independently based on concepts covered in lectures and labs (students registered with Accessibility Services requiring a class note-taker will have access to this accommodation).
- Familiarity with the university policy on Academic Integrity.

Equity Statement

The University of Toronto is committed to equity and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect. As a Course Instructor, I will neither condone nor tolerate behaviour that undermines the dignity or self-esteem of any individual in this course and wish to be alerted to any attempt to create an intimidating or hostile environment. It is our collective responsibility to create a space that is inclusive and welcomes discussion. Discrimination, harassment and hate speech will not be tolerated. If you have any questions, comments, or concerns, you may contact the UTM Equity and Diversity officer at edo.utm@utoronto.ca or the University of Toronto Mississauga Students' Union Vice President Equity at vpequity@utmsu.ca.

Accommodations for Learning Needs

The University of Toronto Mississauga supports accommodations for students with diverse learning needs, which may be associated with mental health conditions, learning disabilities, autism spectrum, ADHD, mobility impairments, functional/fine motor impairments, concussion or head injury, blindness and low vision, chronic health conditions, addictions, deafness and hearing loss, communication disorders and/or temporary disabilities, such as fractures and severe sprains, or recovery from an operation.

If you have a learning need requiring an accommodation, we recommend that students register as soon as possible with Accessibility Services.

Phone: 905-569-4699

Email: access.utm@utoronto.ca

Accommodations for Religious Observances

Following the University's policies, reasonable accommodations will be made for students who observe religious holy days that coincide with the due date/time of an assignment, lab session, or lecture. Students must inform the instructor **before** the session/assignment date to arrange accommodations.

Mental Health

As a CPS student, you have an <u>Academic Advisor</u> who can support you by advising on personal matters that impact your academics. Other resources include:

- Accessibility Services
- Health & Wellness (St. George)
- Health & Counselling Centre (UTM)
- My Student Support Program (MySSP)
- Good2Talk Student Helpline
- Nav

If you find yourself feeling distressed and in need of more immediate support resources, consider reaching out to the counsellors at My Student Support Program (MySSP) or visiting the Feeling Distressed webpage.

Acknowledgement of Traditional Lands

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 the Mississaugas of the Credit. 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.

Final Exam Information

Duration: 3 hours

Aids Permitted: Non-Programmable Calculators

Other Information

CHM110H5S Winter 2022-LECTURE SCHEDULE

Starting Date:	No. of Lectures	Chapters	Торіс
Jan 11	1		Introduction to the Course and its Web Site
Jan. 13	9	1 - 4 and 17.1	Matter, Reactions and Solution Stoichiometry Behaviour of Gases
Feb 3	12	6 - 8	Equilibria
March 10	8	9, 10.1, 10.5-10.11 13.8 11.1 - 11.7	Thermodynamics
	5	1101 1107	Electrochemistry

Mid-term Tests: Tuesday, February 15, 1:10 -2:00 pm

Tuesday, March 22, 1:10 - 2:00 pm

CHM110H5S Winter 2022-PRACTICAL/QUIZ SCHEDULE

Jan 10	Lab safety, use of Laboratory Equipment	
Jan 17	Quiz 1	
Jan 24	Exp. 1 The Problem of 9 Unknowns	
Jan 31	Quiz 2	Exp 1
Feb 7	Exp. 2 Behaviour of Gases	
Feb 14	Quiz 3	
Feb 21	READING WEEK	

Feb 28	Exp. 3 Synthesis and Analysis of a Chromium Salt	Exp 2
March 7	Quiz 4	Exp 3
March 14	Exp. 4 Analysis of Antacid Tablets	
March 21	Quiz 5	Exp 4
March 28	Exp. 5 Measurement of the Enthalpy of a Reaction by Calorimetry	
April 4	Review of Quiz 1-5 Topics	Exp 5

Note that lab reports are due in your PRA session in the weeks noted above. There will be a late penalty of 5 marks off the lab report mark per calendar day to a maximum of 7 days, after which a mark of zero will be given.

Last Date to drop course from Academic Record and GPA is March 13, 2022.