CHEM 2000: General Chemistry II (Spring 2021)

Prerequisite

- CHEM 1000 or equivalent with a mark of C- or higher.
- Math 30-1 is a prerequisite for CHEM 1000. Grade 12 math (or higher) is required to succeed in CHEM 2000.

Logistics

- Section A: MWF 8:00-8:50am (Friday Zoom meeting), Section B: TR 09:00-10:15am (Tuesday Zoom meeting); students in either section may attend either (or both) of the weekly Zoom meetings
- No physical location. Lecture videos will be available asynchronously on Moodle and should be viewed prior to the weekly Zoom meetings.
- In an online learning environment, it is even more important than normal that you check your email on a regular basis so that you don't miss important information. Please ensure that you check your uleth.ca email daily (and the Clutter folder regularly) or set it up to redirect to an email address that you do check daily.

Instructor and Contact Information

- Dr. Marc Roussel (roussel@uleth.ca; section A) and Dr. Paul Hazendonk (paul.hazendonk@uleth.ca; section B) are the instructors. Dr. Susan Findlay (susan.lait@uleth.ca) is the course coordinator.
- John Eng (engj@uleth.ca) is the lab coordinator
- Questions about course content, organization and logistics should be asked on CampusWire so that the whole class can benefit from the answers. Please reserve email for student-specific administrative issues (accommodations approved by the Accommodated Learning Centre, missed tests due to illness. etc).

Online Resources

- http://scholar.ulethbridge.ca/susanfindlay/book/chem-2000 has lecture notes, practice questions, practice tests, answer keys to tests that have been returned, etc.
- https://campuswire.com/c/G59FA7279/feed is for questions, answers, class discussions, etc. Access via a browser on a computer or using the free-to-download app on a phone. We have chosen CampusWire because it allows students the option of posting anonymously, and it allows us to include equations within posts (using a Rich Text Editor on the website or by directly typing LaTeX code on the app). Please see the sign-up link posted on Moodle.
- https://www.saplinglearning.ca/ibiscms/ is where the weekly online assignments are found
- http://moodle.uleth.ca is where you can find a weekly checklist of lecture notes to work through, videos to watch and practice questions to do. You will also access Crowdmark through Moodle (for tests).
- https://www.uleth.ca/ross/accommodated-learning-centre/content/exam-accommodations is the website for the University of Lethbridge's Accommodated Learning Centre

Textbook

- ***Chemistry The Molecular Nature of Matter and Change, Second Canadian Edition*** by Martin S. Silberberg, Patricia Amateis, Sophie Lavieri & Rashmi Venkateswaran (McGraw-Hill Ryerson)
- Students who wish to succeed in this course will want to have access to a good first year chemistry textbook. We have chosen this text as being a good fit with the course content for CHEM 1000 and 2000 and it is the one for which we provide a reading list (hence its status as "recommended"); however, if you have access to an alternative good first year chemistry textbook, that will be fine as long as you are able to use the table of contents and/or index to generate your own reading list.

Academic Integrity

- All students enrolled in this course are expected to behave ethically and act with integrity. **It is your responsibility to behave in the ways that you would want your fellow students to behave.** That is the only way to create an environment that is fair to everyone. Because our students are so important to us, we are passionate about defending your right to a fair learning environment. As such, **any student caught cheating will be reported to the Dean's Office; the minimum penalty will be a grade of 0 on the lab report in question or for their overall Sapling mark; students caught cheating on any test will receive an F in the course**. Under the University's Student Discipline Policy, repeated academic offenses trigger progressively more severe forms of discipline over and above those imposed by the instructor.
- In this course, the following behaviours are allowed (and encouraged):
    - Asking your instructor for clarification. You're writing a test and you think the question is missing an essential piece of data. It's completely acceptable to ask your instructor if you're right about that.
    - Studying in groups. Asking and answering each other's questions. Any course-related discussion that you would be comfortable having in front of your instructor.
    - Using CampusWire to ask questions about the homework/lab/etc. Your instructors aren't going to do your homework/report for you, but we will certainly help you find your way to the answer.
    - Working on homework with friends – provided that you are all contributing ideas for the majority of questions. Explaining a concept is actually one of the best ways to solidify your understanding of it. Teaching is a fantastic way to learn!
- In this course, the following behaviours are forbidden:
    - Collaborating on tests. In this course, tests are individual. You may NOT work with others on them.
    - Using any resource not explicitly listed as "allowed" on a test. For example, if we specified that you were allowed to use your textbook, that would NOT permit you to use Google; it would permit you to use your textbook. Google is NOT a textbook. Wikipedia is NOT a textbook.
    - Sharing information about any test you have already written with any other student who has not yet written it. This includes lab quizzes and exams, and it includes ALL methods of communication.
    - Finding a way to access questions (or answers to questions) before you would normally be able to see them is cheating. This includes finding ways to see the answers to homework questions without having to work through the normal process of figuring out the answers yourself. Doing this also robs you of the learning that is supposed to happen when doing homework and tends to result in significantly lower test scores compared to students who do homework properly.
    - Copying another student's homework/lab report/etc. This is very different from "working on homework with friends" because, here, the learning is lost and all that's "achieved" is an inaccurate mark for the student doing the copying. Please note that, since we have no way of knowing who copied from whom, both students are held equally responsible. ("Working together" should never result in identical answers. "Working together" means discussing concepts and approaches. Students who work together on a lab report should still write the actual lab report independently so that they each express their understanding of the material IN THEIR OWN WORDS.)
    - Submitting work done by somebody else. This is called "contract cheating". It doesn't matter whether the other person is your friend, your roommate, your tutor, a family member or somebody on the internet. It's still cheating if they give you an answer and you copy it. It's still cheating if they give you an answer and you rephrase it.
    - Use of any website that allows students to submit questions to "tutors" who provide worked solutions for a fee. These websites tend to market themselves as "study resources"; they are actually "cheating websites". Given that we'll help you for free on any assignment on which help is permitted, there is no excuse for ever using any cheating website.

Course Overview

CHEM 2000 is the second half of a full year course in general chemistry. As such, it should ideally be taken within one year of completing CHEM 1000. The goal of these courses is to introduce you to university-level chemistry and to give you an appreciation for the diversity of the field. In CHEM 2000, we will continue our study of matter at the atomic level by learning how atoms bond to make molecules. We will then learn how thermochemistry and electrochemistry dictate the conditions under which a reaction can occur. Finally, we will introduce some key concepts from organic chemistry – functional groups, stereochemistry, typical organic reaction types and the role of acid-base chemistry in this discipline.

Topics to Be Covered and Approximate Schedule[§]

Topic		Approx. Week
Bonding: What Holds Atoms Together?	• Molecular Orbital Theory of Diatomic Molecules • LCAO Theory for Molecules Larger than Two Atoms • Multiple Bonds and Electron Delocalization • Spectroscopy as a Tool to Study Bonding (IR and PES) • Band Theory: Conductors, Insulators and Semiconductors • Very Brief Introduction to Valence Bond Theory	1 – 5
Thermochemistry: What Makes Reactions Go?	• Entropy and Free Energy • Free Energy and Equilibrium • Effect of Temperature on Equilibrium • Phase Diagrams • Redox Reactions and Electrochemistry	5 – 9
Introducing Organic Chemistry!	• Drawing Organic Molecules • Functional Groups • Isomers and Stereochemistry • Organic Reactions: Nucleophiles and Electrophiles *(Discussed in the Context of Addition Reactions)* • Organic Acids and Bases	9 – 12

[§] We reserve the right to alter this schedule as required. You will be informed of any major deviations.

Grade Composition

	Dates	Value
Laboratory	*see laboratory schedule*	25%
Assignments[1]	*due each Tuesday night at midnight*[2]	10%
Midterm Tests[3] (2 hours each)	Monday afternoon/evenings: Feb. 8th, Mar. 8th and Mar. 29th	45% (3 @ 15% each)
Final Exam (3 hours)[4]	*scheduled by Registrar's Office after Add/Drop deadline*	20%
	Total	100%

YOU MUST PASS BOTH THE LABORATORY (12.5/25) AND LECTURE (37.5/75) PORTIONS OF THE COURSE SEPARATELY IN ORDER TO PASS THE COURSE.

[1] Online assignments are a required course component. To complete these assignments, register with Sapling Learning (https://www.saplinglearning.ca/ibiscms/). Sapling can be accessed at no cost in Anderson Hall. Students who want to access Sapling from elsewhere can do so for a cost of $42US ($64US/2 courses) or by purchasing an access code from the University of Lethbridge Bookstore (get a 6 month code for a single course; 12 month codes are for pairs of linked courses e.g. CHEM 1000 and 2000). If you purchased a 12 month code for CHEM 1000, you should already have a credit on your Sapling account that will pay for CHEM 2000. If you are in need of a cost-free option, please contact me at susan.lait@uleth.ca before January 15th.

[2] The late penalty for online assignments submitted after the deadline is 20% per day.

[3] Midterms are scheduled for Monday afternoon/evenings. Students are expected to reserve a 2 hour block of time between 3pm and 9pm on the scheduled dates during which they can write the test in a location of their choice. If that is not possible, email Susan at susan.lait@uleth.ca at least a week before the test. Students will be emailed a link to the test on the Crowdmark website at 3pm on the day of the test. Answers must be completed by 9pm and submitted via Crowdmark by 9:30pm on the same day. From 3pm to 9:30pm, every student is considered to be "writing the test" – whether or not they have looked at it yet. **Studying chemistry online or communicating about course content during this window is therefore forbidden.** Answers will be written on paper, scanned/photographed and submitted using Crowdmark (accessed via Moodle or via the link in the email). In the unlikely event that you encounter technical difficulties uploading your work, you MUST inform Susan by 9:15pm so that there is time to resolve the issue. The "timer" feature in Crowdmark will be used to prevent students from giving themselves 6 hours to write the test, so do not access the test in Crowdmark until you are ready to start writing. All times listed in this document refer to the time in Lethbridge, Alberta – which is in the Mountain time zone; if you are in a different time zone, you are expected to convert these times to the corresponding time in your time zone. The following website explains how to upload written work to Crowdmark: http://www.cs.uleth.ca/~fitzpat/crowdmark.html.

[4] The final exam will be cumulative. Students who are excused from a midterm test due to illness or compassionate reason will have the value of the missed test added to the value of their final exam.

Conversion of Overall Percentage Grade to Letter Grade in CHEM 2000 Spring 2021

The normal overall percentage grade to letter grade conversion will take place according to the following table:

A+	90.00% – 100%
A	85.00% – 89.99%
A-	80.00% – 84.99%
B+	76.67% – 79.99%
B	73.34% – 76.66%
B-	70.00% – 73.33%
C+	66.67% – 69.99%
C	63.34% – 66.66%
C-	60.00% – 63.33%
D+	55.00% – 59.99%
D	50.00% – 54.99%
F	0% – 49.99%

However, it should be noted that the instructor reserves the right to adjust the conversion table when there are multiple students who have overall percentage grades close to one another (*i.e.* when overall percentage grades for students are within 0.33% of each other) and those grades span the intended percentage-to-letter grade cut-off.

For example, if the following overall percentage grades were obtained:

80.97%	78.62%
80.25%	78.45%
80.13%	78.11%
79.89%	
79.75%	

the overall percentage-to-letter grade conversion for the bottom end of A– might be lowered from 80.00% to 79.75%.

Similarly, if the following overall percentage grades were obtained:

71.59%	70.32%
71.28%	70.19%
71.00%	70.01%
	69.73%
	69.55%
	69.42%
	69.16%
	68.91%
	68.65%

the overall percentage-to-letter grade conversion for the bottom end of B– might be raised to 71.00%.

The purpose of maintaining such flexibility in overall percentage grade to letter grade conversion is to provide the instructor with an ability to accommodate for “natural breaks” in overall percentage grade distributions that correspond to a meaningful difference in course performance. In the event that the actual overall percentage grade to letter grade conversion deviates from the provided table, that deviation will be limited to a maximum of +/- 3.00%.

Online Assignments for Chemistry 2000

How to Register for Sapling Online Assignments

1. Go to https://www.saplinglearning.ca/ibiscms/ **NOTE:** Make sure to enter .ca NOT .com

2. If you already have a Sapling Learning account, log in and skip to step 6.*

3. Otherwise, click “Create account” located under the Login box.

4. Choose a username and password, and supply the other requested information. Click "Create my new account".

5. Check your email (and junk/clutter folders) for a confirmation message. Click on the link provided in the email.

6. Go to “Enroll in a New Course”. Find “University of Lethbridge”. CHEM 2000 is under “General Chemistry” then “Semester 2”. Click on the link for “University of Lethbridge - CHEM 2000 - Spring21 - FINDLAY/ROUSSEL/HAZENDONK”. *Courses become visible to students on January 1st.*

7. Until January 23rd, you can click the “Enter this Course for 14 Days Free” button at the far righthand side of the screen. Or, if you already purchased an access code from the bookstore, redeem it using their instructions.**

8. Once you have registered and enrolled, you can log in at any time to complete or review your assignments. Every time you click “check answer” for any question, that updates your score for that assignment.

9. For technical support, contact https://macmillan.force.com/macmillanlearning/s/ or https://macmillan.force.com/macmillanlearning/s/contactsupport. For help with the questions themselves, stop by CampusWire and ask! We won’t do your homework for you, but we’ll get you on the right track. Or, if you prefer, ask at one of the Zoom meetings.

* If you completed Sapling for CHEM 2000 in a previous semester, contact Sapling support (see step 9) to be unenrolled from the old course in exchange for free enrollment in this semester’s course. Old Sapling grades will NOT be reused; you must do THIS semester’s assignments.

** While you can pay directly on the Sapling website, the University Bookstore sells cards with Sapling access codes. Since online prices are in US$, this may be a cheaper option. **Note that you have to follow the instructions that the bookstore gives you on how to “cash in” the code you buy for one that you can use in Sapling.**

*** Sapling can be accessed at no cost in Anderson Hall. Students who want to access Sapling from elsewhere can do so for a cost of $42US ($64US/2 courses) or by purchasing an access code from the University of Lethbridge Bookstore (get a 6 month code for a single course; 12 month codes are for pairs of linked courses e.g. CHEM 1000 and 2000). If you purchased a 12 month code for CHEM 1000, you should already have a credit on your Sapling account that will pay for CHEM 2000. If you are in need of a cost-free option, please contact me at susan.lait@uleth.ca before Jan. 15th.

How to Use Sapling

Once you have registered your account, you can get started using the system. A practice assignment is available to introduce you to the system if you have not used Sapling before. Because most students completed it in CHEM 1000, the practice assignment is not for credit. The remaining assignments are due on Tuesday nights at midnight. Each assignment has been calibrated to take approximately 1 hour for the average student who has already reviewed their notes and worked through the Exercises. If you tend to work slowly, expect that the assignments may take you longer than that. They can typically be completed more quickly if you've prepared/studied before starting the assignment.

1. Go to https://www.saplinglearning.ca/ibiscms/login/
2. Enter your Username and Password then click "GO".
3. Click on the assignment you want to work on. This will bring up the first question in the assignment. Questions can be done in any order; use the menu at the left to navigate between them. The menu shows your scores on each question so you can easily see which questions you still need to complete. Sapling won't save answers if you jump from one question to another without clicking "check answer" first. To register your answer, click the "check answer" at the top right. Your work is scored immediately; there is no need to submit the assignment as a whole after you've finished all questions.

New assignments will appear approximately once a week. Unless you are otherwise informed, there is one assignment due every Tuesday night. All assignments are weighted equally, and HW5A/HW5B combine to make one assignment (due at the same time). The late penalty is 20% per day for work submitted after the deadline.

If you are unfamiliar with Sapling, please work through the practice assignment before beginning the for-credit ones. Everyone is expected to work through the Organic Chemistry Drawing practice assignment. Assignments apply a 5% penalty per incorrect attempt. So, if it takes you five tries to answer a question correctly, you still score 80% on it!

Schedule (Subject to Change)

Assignment	Due Date
Practice Assignment *(not for credit)*	n/a
HW1: Reviewing Electron Configurations, Lewis, VSEPR, etc.	Tues. Jan. 19
HW2: Molecular Orbital Theory of Homonuclear Diatomics	Tues. Jan. 26
HW3: Molecular Orbital Theory of Heteronuclear Diatomics	Tues. Feb. 2
HW4: Molecular Orbital Theory of Polyatomic Molecules	Tues. Feb. 9
Reading Break – No Assignment Due	Tues. Feb. 16
HW5A: Metallic Bonding and Semiconductors	Tues. Feb. 23
HW5B: Valence Bond Theory	Tues. Feb. 23
HW6: Enthalpy, Entropy and Free Energy	Tues. Mar. 2
HW7: Free Energy and Equilibrium	Tues. Mar. 9
HW8: Phase Diagrams and Effects of Temperature on Equilibrium	Tues. Mar. 16
HW9: Redox Reactions and Electrochemistry	Tues. Mar. 23
HW10: Organic Molecules – Functional Groups and Stereochemistry	Tues. Mar. 30
HW11: Organic Reactions	Tues. Apr. 6
HW12: Organic Acids and Bases	Tues. Apr. 13

The deadline for all assignments is midnight Mountain time on the date listed. (The computer will say Wednesday 1am to allow for slight differences between computer clocks.)