

# CHM 135H: Chemistry: Physical Principles

## Course Syllabus: Winter 2023

### I CONTACTS

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Welcome to CHM135!! Here is your CHM135 teaching team this term – we are all very excited to get to know you and teach you over the semester.

#### The Teaching Team



**Prof. Scott Browning**  
(he/him)

Course Coordinator  
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**Prof. Eugenia Kumacheva**  
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**EMAIL** [chm135h@utoronto.ca](mailto:chm135h@utoronto.ca): Please direct all course enquiries to the teaching team email.

#### STUDENT 'OFFICE' HOURS:

Wednesdays 10:10 – 11:00 am in Wilson Hall (New College), Rm. 523

Fridays 10:10 – 11:00 am in Lash Miller, Rm. 157

**PRACTICAL/LABORATORY STUDENT HELP HOURS:** see the Quercus CHM135H PRA tile.

## II COURSE OVERVIEW

**Welcome to CHM 135H – Chemistry: Physical Principles!** CHM 135H is designed to provide a foundation in physical chemistry for students who intend to follow a science program, primarily in the Life or Health Sciences. CHM 135H and CHM 136H (Introductory Organic Chemistry I) are also the recommended courses for those applying for entry into professional programs. CHM 135H and CHM 136H are also acceptable for admission to any of the undergraduate programs offered by the Department of Chemistry. High-school level Chemistry SCH4U and Mathematics MHF4U + MCV4U or their equivalents are pre-requisites for CHM 135H and this course is a pre-requisite for CHM 136H.

### STUDENT LEARNING OUTCOMES

By the end of CHM 135H, successful students will be able to

- describe macroscopic properties of chemical substances and explain how atomic or molecular behaviour accounts for those properties, including in everyday situations;
- solve quantitative chemical problems and interpret the solutions in consideration of molecular behaviour;
- appreciate the interdisciplinary nature of chemistry and relate chemical concepts to problems in other disciplines.

### TEXTBOOK

The required course textbook is "Chemistry: The Molecular Nature of Matter and Change", 9<sup>th</sup> Edition, by Martin Silberberg and Patricia Amateis. The textbook is available either in print or [electronically](#) through the [U of T Bookstore](#) at reduced cost.

## III HOW THE COURSE IS ORGANIZED

This semester, CHM 135H has lecture, tutorial and laboratory ('practical') components, each of which is offered at prescribed times. A schedule of lecture topics and accompanying tutorials are provided below.

Week	Lecture and Tutorial Topic	Rough Guide to Textbook Sections	Lecture (week of)	Tutorial (week of)
1	<b>Unit 1a</b> High school refresher	Ch. 1-4 (parts only)	January 9	January 16
2	<b>Unit 1b</b> Quantum Theory and Atomic Structure	Ch. 7.1-7.4, 8.1-8.3	January 16	January 23
3	<b>Unit 2a</b> Bonding, Intramolecular Forces, Gases	Ch. 9.1-9.3, 9.5, 10.1-10.3 12.3, 5.1-5.5	January 23	January 30
4	<b>Unit 2b</b> States of Matter, Phase Changes, Solutions	Ch. 12.1, 12.2, 12.4, 13.1, 13.3, 13.4, 13.5, 13.6	January 30	February 6

Week	Lecture and Tutorial Topic	Rough Guide to Textbook Sections	Lecture (week of)	Tutorial (week of)
5	<b>Unit 3</b> Kinetics	Ch. 16	February 6	February 13
Term Test 1: Thursday, February 16, 6:00 – 7:30pm				
6	<b>Unit 4a</b> Equilibrium	Ch. 17	February 13	February 6
	<b>Reading Week</b>		February 20	
7	<b>Unit 4b</b> Acids and Bases	Ch. 18	February 27	March 6
8	<b>Unit 4c</b> Buffers, Titrations	Ch. 19.1, 19.2, 19.3	March 6	March 13
9	<b>Unit 5a</b> Thermochemistry	Ch. 6.1-6.6	March 13	March 20c
Term Test 2: Thursday, March 23, 6:00 – 7:30pm				
10	<b>Unit 5b</b> Thermodynamics	Ch. 20.1-20.4	March 20	March 27
11, 12	<b>Unit 6</b> Electrochemistry	4.5, 21.1-21.5	March 27, April 3	April 3
Final Exam (during Final Assessment Period: April 11-28); Final Exam date TBD				

Note: this schedule is approximate and may be subject to change. The textbook chapters provided below (and also presented in more detail on your Quercus TUT tile) are a rough guide to the material. We will not cover all parts of each chapter and some material may be covered in class that is not in the textbook.

### LECTURE/'CLASS'

Brief class notes will be available on the CHM 135H course website on Quercus ahead of each class. Be prepared to make notes on the material discussed in class as this is a key component of active learning. There will also be opportunities to actively participate in learning course concepts through problem-solving, asking and answering questions and discussions with your peers. Recordings of lectures will be provided for a limited amount of time. These recordings are intended to help students with unexpected absences – we understand that it may not be possible to attend every class. The recordings are only a partial substitute for the learning that occurs in class so it is in your best interest to make every effort to attend class. We have found in the past that providing the recordings for the entire semester leads students to procrastinate. Based on this and feedback from past CHM 135 students, we will be offering

the recordings for 2 weeks to support those with unexpected absences while also encouraging all students to keep up with the course material.

## TUTORIALS

Tutorial sessions will meet each week starting on the week of January 16<sup>th</sup>. **It is essential that you have enrolled in a tutorial section through ACORN.** The location of your tutorial can be found on ACORN.

The objectives of the CHM 135H tutorial are: (i) to re-visit the course content seen in class; (ii) to solve problems in smaller groups and with your teaching assistant; and (iii) to give you an opportunity to work in a smaller group environment. These smaller tutorial sessions will also provide you a chance to meet your peers and build a community within the course. In your CHM 135H TUT course tile on Quercus, you will find the following information:

1. Weekly assigned practice problems and solutions to these assigned textbook problems;
2. Links to TeamUp! group quizzes (Tutorial 1 will be a practice TeamUp! to review high school material);
3. Content to refresh your high school background.

The TeamUp! group quizzes will be completed during tutorial and only your best 7 of 10 TeamUp! scores will count towards your final grade. There will be no make-up TeamUp! quizzes. Dropping the lowest three scores will account for any necessary absences.

Active student participation in problem solving through completion of homework is linked to success in learning chemistry. The assigned textbook problems will provide you an important opportunity for self-assessment, will help you make sure you are keeping up with the course materials and are essential preparation for tutorial. During your tutorial sessions, your tutorial teaching assistant (TA) will discuss any questions that you may have concerning the assigned exercises and assist you in understanding the important concepts of the course material.

Chemistry is an area of study that relies on problem-solving. In order to learn chemistry and be successful on the course assessments, you need to practice. Remember that you are the best judge of your own learning (provided that you are honest with yourself!)

## PRACTICALS

**Every CHM 135H student must be enrolled in a laboratory (PRA) section through ACORN.** All PRA sections will meet in LM102 during the weeks of January 23, February 6, February 27, March 13 and March 27. Note that, as of January 18<sup>th</sup>, PRA section additions or changes can be made only at the Chemistry Department. Please ensure that the PRA section that you chose fits with your schedule.

More details about the PRA part of CHM 135H can be found on your Quercus PRA tile. Before the day of your first scheduled laboratory class, you will be informed of your equipment locker, bench space or workstation and the lab demonstrator group to which you have been assigned. Please make a note of this information.

Each student will require a CHM 135H (23S) Laboratory Manual to complete the laboratory component of the course. Detailed information regarding each of the five experiments and all lab policies, including preparation, late penalties and lab schedule are found in the manual. It is available from the Chemistry Club office, located in LM 203; a schedule of their sales hours is posted in Lash

Miller Labs as well as on the CHM 135H course website. You will also require a lab coat, indirectly vented safety goggles, gloves and a lab notebook for your first laboratory class. If you do not already have them, these materials may also be purchased from the Chemistry Club office. If you chose to wear a mask, you will need a special flame-resistant mask for the lab that can also be purchased from the Chemistry Club office.

In advance of your first scheduled laboratory class, consult your Laboratory Manual for information on how to prepare for your first lab class. If you do not adequately prepare for the experiments, including the first one, you will not be allowed to stay in the lab and will receive zero for that experiment.

The experiments were chosen to reflect many of the topics that are covered in the course so that you can see how the concepts discussed in class relate to the results observed in the lab. Further, you will learn techniques in the laboratory that will be useful in many areas of science. All experiments are designed to allow you to complete data collection in one three-hour laboratory class. Pre-lab preparation is required, including a pre-lab quiz, and lab reports are submitted through the Quercus PRA course tile after the experiment has been completed. To succeed and learn in the lab, good preparation and time management are essential. Help will be available during the practical student 'office' hours posted on the Quercus PRA course tile. We hope that you will find the CHM 135H Laboratories an enjoyable learning experience.

## **DISCUSSION BOARD**

In addition to tutorial and student 'office' hours, we will be using Piazza, a free platform that facilitates online Q&A discussions. To join Piazza, click <https://piazza.com/utoronto.ca/winter2023/chm135h1slec0101>. Once signed up, you can access Piazza through Quercus on either the LEC or PRA course tiles. We highly encourage you to ask your content questions on Piazza where all students can benefit and collaborate on responses to these questions. A member of the teaching team will occasionally monitor the discussion board; however, it is considered a student-driven learning tool where students are expected to help one another.

Note that sharing solutions to lab report sheets, quizzes and TeamUp! questions (through Piazza or through any other means) is in violation of University of Toronto's Code of Behaviour on Academic Matters (see Academic Integrity section of this syllabus.)

## **IV GRADING SCHEME**

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Tutorial Quizzes (TeamUp!): 5% (best 7 of 10 count towards your mark)

Practical: 25% (5 experiments)

Term Tests: 35% (lower test: 12.5%, higher test: 22.5%)

Test #1: Thursday, February 16, 6:00 – 7:30 pm

Test #2: Thursday, March 23, 6:00 – 7:30 pm

Final Exam: 35% (TBA, during the examination period, April 11 – 28\*)

\*The actual date of the exam will be set by the Faculty of Arts & Science and could occur on the last date mentioned.

Note: if you have a course conflict with the term tests, you will be given the opportunity to write at a different time.

Tests and exams in CHM 135H will consist of a mix of multiple-choice and short answer questions.

Students who miss a test must complete the Acorn Absence Declaration AND email [chm135h@utoronto.ca](mailto:chm135h@utoronto.ca) with a screenshot of the Acorn Absence Declaration as soon as possible and within one week of the absence to get consideration for a missed test. Consideration for one missed test will result in the other test accounting for 22.5% of the final mark and the final exam accounting for 47.5% of the final mark. For students missing both term tests, the mark for the missing tests will be replaced by the mark on the final exam.

## V COURSE POLICIES

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Each member of this course is expected to maintain a:

- professional and respectful attitude during all course activities, including classes, laboratories, tutorials, and other online activities.
- personal calendar/schedule/organizer to ensure that all course activities are completed and due dates are met.
- collection of notes recorded independently based on concepts covered in course activities (students registered with Accessibility Services requiring a class note-taker will have access to this accommodation)
- familiarity with the university policy on Academic Integrity

The University of Toronto is committed to equity, human rights and respect for diversity. All members of the learning environment in this course should strive to create an atmosphere of mutual respect where all members of our community can express themselves, engage with each other, and respect one another's differences. The CHM 135 Teaching team will neither condone nor tolerate behaviour that undermines the dignity or self-esteem of any individual in this course and we 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, we encourage you to reach out to the staff in our Equity Offices.

### E-mail and Getting Help

- For any course-related communication, please only use [chm135h@utoronto.ca](mailto:chm135h@utoronto.ca). Do not send messages through Quercus.
- For course content questions, please ask during your tutorial, during the weekly student 'office' hours or post your question on the course discussion board. **Please keep in mind that email is not the mechanism to receive explanations of course material.**
- Any questions on laboratory content can be directed to your lab TA during regular lab time, asked during the PRA help hours or posted on the Piazza discussion board.

- When you e-mail the teaching team at [chm135h@utoronto.ca](mailto:chm135h@utoronto.ca), please include your full name and student number, making sure to use your UTORONTO email address. Keep the language and tone of your email professional. We will forward the e-mail to the correct person if necessary.
- Most emails will receive a reply within 24 hours of being sent (except on weekends) but keep your expectations reasonable as to the degree of detail that an email reply to your enquiry can realistically provide.
- Note that the tutorial and practical teaching assistants (TAs) cannot provide any assistance via email.

### **Absences**

Students who are absent from class for any reason (e.g., COVID, other illness or injury, family situation) and who require consideration for missed academic work should report their absence through the online absence declaration. The declaration is available on ACORN under the Profile and Settings menu. You must also email the teaching team ([chm135h@utoronto.ca](mailto:chm135h@utoronto.ca)) with a screenshot of the Acorn Absence Declaration and what graded work you missed as soon as possible and within one week of your absence to receive consideration for any missed graded work.

## **VI TECHNOLOGY REQUIREMENTS**

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This course requires the use of computers, and technical issues are possible. When working on an assignment, students are responsible for scheduling enough time to allow for reasonable delays due to technical difficulties to be overcome, so such issues will not be acceptable grounds for deadline extension. Particularly, maintaining an up-to-date, independent backup copy of your work is strongly recommended to guard against hard-drive failures, corrupted files, lost computers, etc. We encourage you to spend a moment at the start of the semester to make a plan for what you would do if you lost access to the computer that you primarily intend to use, which will help ensure that you are prepared for this unlikely possibility. To help you prepare, we suggest reading through the “Getting Setup for Success” section of the Online Excel Resource used in the CHM135 labs. A link to this resource can be found on the Experiment 1 page of your Quercus CHM135S PRA tile.

## **VII INSTITUTIONAL POLICIES AND SUPPORT**

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### **ACADEMIC INTEGRITY**

Academic integrity is essential to the pursuit of learning and scholarship in a university and to ensuring that a degree from the University of Toronto is a strong signal of each student’s individual academic achievement. As a result, the University treats cases of cheating and plagiarism very seriously. The University of Toronto’s Code of Behaviour on Academic Matters ([governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019](http://governingcouncil.utoronto.ca/secretariat/policies/code-behaviour-academic-matters-july-1-2019)) outlines the behaviours that constitute academic dishonesty and the processes for addressing academic offences. Potential offences include, but are not limited to:

In laboratory reports:

1. Using someone else’s ideas or words without appropriate acknowledgement.
2. Submitting your own work in more than one course without the permission of the instructor.
3. Making up sources or facts.

4. Obtaining or providing unauthorized assistance on any report. Please note that the use of websites (such as Chegg.com or the course discussion board) to post laboratory report material/questions or to post/access answers to questions is an academic offence under the University of Toronto's Code of Behaviour on Academic Matters. Alleged instances of this nature are forwarded to the Faculty of Arts & Science Student Academic Integrity office.

On quizzes and term tests:

1. Using or possessing unauthorized aids.
2. Looking at someone else's answers or collaborating/discussing answers during a quiz or term test.
3. Misrepresenting your identity.

In general academic work:

1. Falsifying institutional documents or grades.
2. Falsifying or altering any documentation required by the University.

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 institutional resources (see [www.academicintegrity.utoronto.ca/](http://www.academicintegrity.utoronto.ca/)) or your instructor.

### **COPYRIGHT**

If a student wishes to copy or reproduce class presentations, course notes or other similar materials provided by instructors, he or she must obtain the instructor's written consent beforehand. Otherwise, all such reproduction is an infringement of copyright and is absolutely prohibited.

### **ACCESSIBILITY NEEDS**

Students with diverse learning styles and needs are welcome in this course. The University of Toronto is committed to accessibility: if you require accommodations for a disability, or have any other accessibility concerns about the course, please contact [Accessibility Services](#) as soon as possible.

### **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, tutorial, class or laboratory session. Students must inform the teaching team via email ([chm135h@utoronto.ca](mailto:chm135h@utoronto.ca)) before the session/assignment date to arrange accommodations.

### **ADDITIONAL SERVICES & SUPPORT**

The following are some important links to help you with academic and/or technical service and support:

- General student services and resources at [Student Life](#)
- Full library service through [University of Toronto Libraries](#)
- Resources on conducting online research through [University Libraries Research](#)
- Resources on academic support from the [Academic Success Centre](#)
- Learner support at the [Writing Centre](#)
- Information for [Quercus support](#)



**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, most recently, the Mississaugas of the Credit River. 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. Explore traditional territories and learn about the importance of land acknowledgements at <https://www.whose.land/en>.