



CHM 135H: Chemistry: Physical Principles

Course Syllabus: Winter 2024

I CONTACTS

EMAIL chm135h@utoronto.ca Please direct all course enquiries to the teaching team email.

TEACHING TEAM

<p>Professor Kris Quinlan (she/her) Course coordinator, Instructor first & last third</p> 	<p>Professor Eugenia Kumacheva (she/her) Instructor middle third</p> 
<p>Dr. Mima Staikova (she/her) Practical Instructor</p> 	<p>Mr. Alex Fernandes (he/him) Course Administrator</p> 

STUDENT HELP HOURS: Drop-in sessions led by current instructor Wed and Fri 10:10 – 11 am in SS 1073 with the following exceptions: Fri. Jan. 12, Wed. Feb. 14, Fri Mar. 1, Wed. Mar 20 in LM 108 and Wed. Feb. 7 in BL 112)

PRA STUDENT HELP HOURS: details on the Laboratory Information link on CHM 135 Quercus page

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. Along with CHM 136H (Introductory Organic Chemistry I), these 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
- work safely and confidently in the lab using a variety of glassware and equipment
- collect data using a variety of analytical instrumentation and use Excel to transform and visualize that data

TEXTBOOK:

The required course textbook is "Chemistry: The Molecular Nature of Matter and Change" 9th 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. **We will not be using online homework, so an access code is not required if you have a print book.** To access the e-book, after purchase from the bookstore, go to this [link](#), register or sign in with your U of T email address, and enter the 20-digit access code you received from the bookstore with purchase. Note that if you do not yet have an access code, you can get a 14-day free trial for limited time access.

III HOW THE COURSE IS ORGANIZED

CHM 135H will cover the physical principles important in chemistry:

Week	Topic	Rough Guide to Textbook Sections	LECTURE week of	Tutorial week of
	High school refresher	Ch. 1-4 (parts only, see Tutorial 1)		Jan. 15
1-2	Quantum Theory and Atomic Structure (part 1)	Ch. 7, 8.1-8.3	Jan. 8 & 15	Jan. 22
3	Bonding, Intermolecular Forces, Gases (part 1)	Ch. 9.1 – 9.3, Ch. 9.5, Ch. 10.1-10.3, Ch. 10.3, Ch. 12.3, Ch. 5 (5.1-5.3, parts of 5.4 and 5.5)	Jan. 22	Jan. 29
4	Gases (part 2) States of Matter, Solids, Liquids, Phase Changes, Solutions	Ch. 5 (not 5.6) Ch. 12.1, 12.3, 12.4, 13.1, 13.4, 13.5, 13.6	Jan. 29	Feb. 5
5	Kinetics	Ch. 16	Feb. 5	Feb. 12
6	Equilibrium	Ch. 17	Feb. 12	Feb. 26
Term Test 1: Wednesday, Feb. 14, 6:10 – 7:40 pm				
Family Day: February 19 (University closed) and Reading Week: February 19-23				
7	Acids and Bases	Ch. 18 (no polyprotic acids)	Feb. 26	Mar. 4
8	Buffers, Titrations, Solubility	Ch. 19.1, 19.2 (no polyprotic acids), 19.3 (no separation of ions)	Mar. 4	Mar. 11
9	Thermochemistry	Ch. 6.1-6.6	Mar. 11	Mar. 18
10	Thermodynamics	Ch. 20.1-20.4	Mar. 18	Mar. 25
Term Test 2: Wednesday, Mar. 20, 6:10– 7:40 pm				

11	Electrochemistry (part 1)	Ch. 4.4-4.5, Ch. 21.1-21.3	Mar. 25 (no class on Fri, Mar. 29)	Apr. 1 (last tutorial)
12	Electrochemistry (part 2)	Ch. 21.4, 21.5	Apr. 1*	video
Final Exam: (during final assessment period April 10 - 30, 2024, date TBD)				

Note: The above schedule is approximate. The textbook chapters are a **rough guide** to the material. We will not cover all parts of each chapter section and some material may be covered in class that is not in the textbook.

* **Last class is on Monday, Apr. 8th to make up for class on Mar. 29.**

CLASS

The first class for CHM135S will take place on Monday, Jan. 8th. The lectures are designed to be attended live – in class, you will be an active participant in your learning through problem-solving, asking and answering questions and discussions with your peers. Brief class notes will be available on the CHM 135H course website on Quercus ahead of each class. Many of the problems will be done as a class and do not appear in the notes. Be prepared to make notes on the material discussed in class as this is a key component of active learning. To encourage participation, we will be doing in-class problem solving worth 5% of your final mark. **Please bring a phone or tablet to class to participate.**

Class recordings will be provided through Quercus and 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 and fall behind in the course. Based on this and feedback from past CHM 135 students, **we will be offering each recording for 1 week** to support those with unexpected absences while also encouraging all students to keep up with the course material. Please note that watching the recordings multiple times is not a good way to learn chemistry – it is much better to do problems and actively engage with the material.

TUTORIALS

Tutorial sessions will meet each week in person starting on the week of Jan. 15th. **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 a chance to meet your peers and build a community within the larger course. In your CHM 135H course tile in Quercus, you will find the following information:

- 1) Weekly practice problems and solutions to 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 (from Tutorials 2-11) 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, and 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. 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 (if you are honest with yourself!)

PRACTICALS

Every CHM 135H student must be enrolled in a laboratory section through Acorn. There are no labs the first week of classes. PRA sections will take place **the weeks of** January 22nd, February 5th, February 26th, March 11th, and March 25th. Please ensure that the PRA section that you chose fits with your schedule. If you plan to take both CHM135H1S and BIO130H1S labs on the same day and time, please select BIO130H1S PRA sections that end in 1.

The CHM135 lab experiments are designed to complement the content discussed in class and teach you important lab skills and techniques that will be useful in subsequent chemistry classes and many other areas of science. To succeed and learn in the lab, good preparation and time management are essential. We hope that you will find the CHM 135H lab an enjoyable learning experience!

Before your first scheduled lab, details, including your lab room, demo group and workstation number, will be available on Quercus. This information will tell you exactly where to go for your lab session and so be sure record these details and bring them with you.

Each student will require a CHM 135H 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 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 Quercus site. You will also need a lab coat, indirectly vented safety goggles, gloves, and a hard cover lab notebook for your first laboratory class. If you do not already have them, these materials can also be purchased from the Chemistry Club store. If you chose to wear a mask, you will need a special flame-resistant mask for lab that can also be purchased from the Chemistry Club office.

In advance of your first scheduled laboratory class, you should 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.

A lab report for each experiment is due two weeks after your lab session and will be submitted online using MarkUs, except for Exp 5 lab report. MarkUs is a software built and maintained by the Department of Computer Science at U of T. Details on how to access MarkUs are available on the Laboratory Information page on Quercus. Late reports will be accepted up to 1 week after the due date with a penalty of 10% per day. We know that there are sometimes things beyond your control that make it difficult to get your report in on time and so you can apply for a 48-hour “Life Happens” extension on your report. If you miss your laboratory session, you need to fill in a form “Missed experiment”. Details and the links to both forms can be found on the Laboratory Information page on Quercus.

DISCUSSION BOARD

In addition to tutorial and student hours, we will be using Ed Discussion, a free platform that facilitates online Q&A discussions. Information on Ed can be found in your CHM 135H Quercus tile. We highly encourage you to ask your content questions on Ed where all students can benefit and collaborate on responses to these questions. Let’s all learn together! 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. If you have in-depth questions about lab or other course material, please attend student hours, so we can assist you!

Note that sharing solutions to report sheet, quiz, and TeamUp! questions (through Ed Discussion or through other means) is in violation of University of Toronto’s Code of Behaviour on Academic Matters (see Academic Integrity section of syllabus.)

IV GRADING SCHEME

In-Class Problem-Solving: 5% (best 29 of 36 classes count toward your mark)

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

Practical: 25% (5% per Experiment)

For each experiment: 92% report sheet questions, 5% pre-lab quiz, 3% in-lab safety/cleanliness

Term Tests: 32% (lower test: 12%, higher test: 20%)

Test #1: Wednesday, Feb. 14, 6:10 – 7:40 pm

Test #2: Wednesday, Mar. 20, 6:10 – 7:40 pm

Final Exam: 33% (during final assessment period April 10 - 30, 2024, date TBD)

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

Bonus marks:

[Background check](#) 1%

Reflection activities ([start of course](#) and post-Test#1, 0.5% bonus each)

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 include a mix of multiple-choice and short answer questions.

Students who miss a test must follow the absence policy below AND email chm135h@utoronto.ca with their written documentation 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 20% of the final mark and the final exam accounting for 45% of the final mark. For students missing both term tests the mark for the missing tests will be replaced by the final exam. **There are no make-up tests in CHM 135S.**

V COURSE POLICIES

Each member of this course is expected to maintain a:

- (i) professional and respectful attitude during all course activities, including classes, laboratories, tutorials, and other activities.
- (ii) personal calendar/schedule/organizer to ensure that all course activities are completed, and due dates are met.
- (iii) 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)
- (iv) 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. Do not send messages through Quercus.
- For course content questions, please ask during your tutorial, during the weekly student 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 TA during regular lab time, asked during the PRA help hours, or posted on the Ed discussion board.
- When you e-mail the teaching team at chm135h@utoronto.ca, please include your full name, student number, and UTORID, 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

If you are absent from your studies due to illness or other reasons and unable to complete graded course work (e.g., tests or labs) then a piece of written documentation is required. The following four items are the recognized forms of documentation:

1. [Absence Declaration via ACORN](#) (please note the Acorn absence declaration can be used for health conditions, personal or family emergencies, or bereavement and can only be used once per semester for a maximum of seven consecutive days – see website for full details)
2. [U of T Verification of Illness or Injury Form](#)
3. College Registrar's letter
4. Letter of Academic Accommodation from Accessibility Services

After obtaining the written documentation, students must additionally contact chm135h@utoronto.ca within 1 week of the missed work for any consideration to be granted.

For extended absences and for absences due to non-medical reasons, make sure to contact your [College Registrar's Office](#). They can help you decide between a request for an extension or other types of academic consideration, as well as help you access resources as needed.

If you suspect or know that you have a disability that is affecting your studies, [learn about the services and supports available through Accessibility Services](#). A disability can be physical disability, sensory disability, a learning disability, mental health disorder or a short-term disability like an injury. If you are not sure whether you have a disability, you can confidentially contact [Accessibility Services](#) with your questions.

VI TECHNOLOGY REQUIREMENTS

This course, particularly the lab, 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 PRA Quercus shell.

VII INSTITUTIONAL POLICIES AND SUPPORT

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) 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 data.
4. **Obtaining or providing unauthorized assistance on any report. Please note that both 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 and the use of ChatGPT or any other form of generative artificial intelligence tool in the writing report sheet answers 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. This course policy is designed to promote your learning and intellectual development and to help you reach course learning outcomes. At this point, ChatGPT or any other form of generative artificial intelligence, are not a reliable tools to help with course and lab content, so they are not permitted in CHM 135H.**

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 your instructor or from other institutional resources (see www.academicintegrity.utoronto.ca/).

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) **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](#)

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.