

CHEM 165: Introduction to Physical Chemistry
Michael Ruggiero, PhD

E-mail: Michael.Ruggiero@uvm.edu

Office Hours: By Appointment

Class Room: Innovation Hall E102

Class Hours: TR 13:15 - 14:30

Office: Innovation Hall E342

Credits: 3.0

Textbook: *Physical Chemistry for the Chemical Sciences 1st Edition* by Chang and Thoman
ISBN: 1891389696

Course Prerequisites

CHEM 032 or CHEM 036 or CHEM 052

MATH 020 or MATH 022 or MATH 023

PHYS 011 or PHYS 031 or PHYS 051

Course Description

In this course you will learn the fundamental concepts that govern much of the chemical world that you have explored thus far. You will be exposed to the fundamental concepts that describe the dynamics of atoms and molecules, which in turn will be used to predict and explain chemical phenomena. This course serves as an introduction to physical chemistry, and provides a broad overview of concepts in quantum mechanics, statistical and classical thermodynamics, and the kinetics and properties of gases. The learning objectives are simple: by the end of this course you should feel equipped to be able to describe chemical systems eloquently, both with mathematical expressions and intuitive thought.

Grading and Evaluation

- 70% Homework
- 30% Midterm and Final (15% each)

We will use the Cengage WebAssign online homework tool this semester for homework problems. Access, along with the e-book, can be purchased from the bookstore, ISBN: 9781945801204. When you first setup WebAssign, you will use the **course code: uvm 0077 2169** to register for our class. Additional details will be provided in class.

Philosophy

Each of us approaches science with a different perspective informed by our personal upbringing, educational background, socioeconomic status, racial identity, ethnicity, and gender. My goal is to create a classroom environment that supports students from a diverse set of backgrounds. I strongly believe that our best path forward to making scientific progress is to promote inclusiveness and equality. It is my expectation that every member of this class will also support diversity and inclusion. As a community, we should strive to uphold the ideals of **Our Common Ground** and welcome any suggestions as to how I can promote a more diverse and inclusive classroom.

Course Format

Course Modality

This course will be a mixture of in-class and remote learning, with everything synchronous, i.e., even if you are remote you will be expected to attend class at the scheduled time. The course will be recorded, and recordings will be provided **only in justified cases**. Please contact me if you are in a situation that requires access to a remote lecture. In-person attendance is limited to 60 people, and scheduling for modality will be performed on a weekly basis.

Attendance Policy and Classroom Environment Expectations

General Attendance, Participation Policies, and Expectations

Attendance/participation in this course is expected and accounts for a percentage of your grade. The **UVM attendance policy** outlines expectations for attendance. Students are expected to maintain a respectful learning environment so that everyone is heard. Racist, sexist, or any other bigoted language will not be tolerated and are grounds for being asked to leave with a non-passing grade.

Excused Absence Policies:

- **Religious Holidays:** Students have the right to practice the religion of their choice. If you need to miss class to observe a religious holiday, please submit the dates of your absence to me in writing by the end of the second full week of classes. You will be permitted to make up work within a mutually agreed-upon time frame. <https://www.uvm.edu/registrar/religious-holidays>
- **Inter-collegiate Athletics:** Members of UVM varsity and junior varsity teams are responsible for documenting in writing any conflicts between their planned athletic

schedule and the class schedule by the end of the 2nd full week of classes. You will be permitted to make up work within a mutually agreed-upon time frame.

- **Medical and Emergency Absences:** Absences due to sickness (including COVID-19), as well as medical and family emergencies, should be brought to my attention as soon as possible. You will be permitted to make up work within a mutually agreed-upon time frame.
- **Other Absences:** Absences due to extracurricular or other activities not specified above should be brought to my attention as soon as possible so that we can work out an arrangement to make up work.

Technical support for students

Students, please read this technology [check list](#) to make sure you are ready for classes. Students should contact the Helpline (802-656-2604) for support with technical issues.

Research and Citation Help

For help selecting research topics, finding information, citing sources, and more, ask a librarian. Although they are working remotely, librarians are always eager to help. You may ask questions by phone, e-mail, chat, or text, or make an appointment for an individual consultation with a librarian.

- **Howe Library:** <https://library.uvm.edu/askhowe>
- **Dana Medical Library:** <https://dana.uvm.edu/help/ask>
- **Silver Special Collections Library:** <https://specialcollections.uvm.edu/help/ask>

Course Evaluation

All students are expected to complete an evaluation of the course at its conclusion. The evaluations will be anonymous and confidential so that students may speak candidly about their experiences. The information gained, including constructive criticisms, will be used to improve the course.

Intellectual Property Statement

Students are prohibited from publicly sharing or selling academic materials that they did not author (fe.g. class syllabus, class presentations, etc). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.

Student Learning Accommodations

In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact SAS, the Student Accessibility Services office on campus. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly encouraged to meet with their faculty to discuss the accommodations they plan to use in each course.

Contact SAS:

A170 Living/Learning Center

802-656-7753

access@uvm.edu

<https://www.uvm.edu/access>

Diversity, Equity, and Inclusion Resources

The Division of Diversity, Equity, and Inclusion believes excellence should be inclusive of the entire University of Vermont (UVM) community and is steadfastly committed to this belief. Every day, our Division strives to make our work accessible, affirming, and action-oriented to help ensure excellence is inclusive of everyone.

<https://www.uvm.edu/diversity>

UVM Prism Center

The Prism Center serves the diverse queer and trans communities at the University of Vermont. We support and empower lesbian, gay, bisexual, transgender and queer students, as well as students whose identities fall in between or expand beyond those categories, and work to create a campus community where people of all sexual and gender identities can thrive.

<https://www.uvm.edu/prism>

Interfaith Center

Each of us engages those questions differently, perhaps through a religious tradition, philosophy, or spiritual practice. No matter how you make meaning of your life, you are welcome at the Interfaith Center for reflection, spiritual practice, education, and community building.

<https://www.uvm.edu/interfaithcenter>

Mosaic Center for Students of Color

The Mosaic Center for Students of Color (MCSC) Vision is to create a diverse and rich community of empowered, engaged, and enthusiastic students of color at UVM. We fully support the holistic development of self-identified students of color so that they can obtain their goals for academic achievement, personal growth, identity formation, and cultural development.

<https://www.uvm.edu/mcsc>

Women & Gender Equity Center

The UVM Women & Gender Equity Center cultivates joyful community while advancing gender equity across identities. We envision a brave, diverse, and equitable learning environment for all members of the UVM community. We provide advocacy services for those in our community who have experienced sexual or intimate partner violence, and strive to provide programming, education, and events that ask our community to explore the intersections of their gender and other identities.

<https://www.uvm.edu/wagecenter>

Tips for Success

Students are encourage to attend class, do homework, come to office hours, work with peers, and ask questions to help them succeed in class. In case the course goes fully online, here are a few resources for students on remote/online learning:

- Checklist for success in <https://learn.uvm.edu/about/support-for-students/checklist-online-credit-courses/>
- Academic support for online courses: <https://www.uvm.edu/academicsuccess/online-learning-student-resources-remote-instruction>

Helpful resources other than the instructor include the [Undergraduate/Graduate Writing Center](#), [Supplemental Instruction](#), [Learning Co-op tutors](#), and supplemental course materials.)

Important University Policies

Academic Integrity:

Offenses against the Code of Academic Integrity are deemed serious and insult the integrity of the entire academic community. Any suspected violations of the code are taken very seriously and will be forwarded to the Center for Student Ethics and Standards for further investigation. Violations of the Code of Academic Integrity—including any inappropriate collaboration, collusion, cheating, corroboration, plagiarism, or any other related offense—will be fully investigated according to the rules set by the UVM Academic Integrity Office and may be punishable with a score of zero for the assignment in question. Details can be found at <http://www.uvm.edu/policies/student/acadintegrity.pdf>.

Grade Appeals:

If you would like to contest a grade, please follow the procedures outlined in this policy: <https://www.uvm.edu/policies/student/gradeappeals.pdf>

Code of Student Conduct:

<http://www.uvm.edu/policies/student/studentcode.pdf>

FERPA Rights Disclosure:

The purpose of this policy is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

<http://catalogue.uvm.edu/undergraduate/academicinfo/ferparightsdisclosure/>

Promoting Health and Safety:

The University of Vermont's number one priority is to support a healthy and safe community:

Center for Health and Wellbeing: <https://www.uvm.edu/health>

Counseling & Psychiatry Services (CAPS): Please call 802-656-3340 for assistance.

C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the Dean of Students website at <https://www.uvm.edu/studentaffairs>

Topics

- Quantum Mechanics
- Atomic and Molecular Structure
- Harmonic Oscillator and Vibrations
- Spectroscopy
- Electronic Structure
- Statistical and Classical Thermodynamics
- Boltzmann Function
- Kinetic Theory of Gases