CHEM 052: *Exploring Chemistry II*
Spring 2021

Instructor

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Office Location

Innovation Hall
Room E356

Office Hours (MS Teams)

2:30-4:00 p.m., Monday
3:30-5:00 p.m., Wednesday
Or by appointment

Class Meeting Times (Thurs)
Sectns A&B: 1:15-5:15 pm

Class Lab Room
Discovery Hall
Rooms W211 & W213

Teaching Assistants
Alexandria Alveshere
Diego Javier-Jimenez

Course Overview

We continue our experimental exploration of foundational chemistry, begun last semester in CHEM 051. This semester we will start out with a collaborative effort with CHEM 048, and explore qualitative/structural analysis using spectra from chemical instrumentation (e.g., NMR, IR, and Mass Spec). We will then focus on laboratory experiences exploring chemical equilibrium (solubility, acid-base, and complex-ion) kinetics, thermochemistry, and electrochemistry.

Required Text/Course Materials

As with last semester, there are no required texts for this course. Handouts for each laboratory exercise will be provided, as needed, and will include literature references as necessary. You can continue to use the same lab notebook, safety goggles, etc. that you used last semester.

Course Learning Objectives

Together with the CHEM 048 co-requisite course, you will obtain a foundational understanding of the major ideas in chemistry, often demonstrated with organic compounds. This course serves to both support the work done in CHEM 048 as well as to explore other chemical concepts and methodologies fundamental to all areas of chemistry.

We will continue our use of a discovery or guided-inquiry structure in this course so that, in addition to the subject-based content, you will be exposed to and directed to solve chemical problems in the laboratory using the scientific method. It is our hope that the critical thinking and problem-solving skills you will learn and employ in learning chemistry this year will serve you as you explore disciplinary areas other than chemistry and will provide you with a template for exploration throughout your life.

Some specific learning objectives of this course (across both semesters) include understanding:

- the scientific method as a process for problem solving and learning chemical principles
- covalent and ionic bonding
- bond polarity and dipole moment
- intermolecular forces
- chemical equilibrium
- acids and bases
- pH, pK_a, pK_b
- reaction kinetics and mechanisms
- reaction energetics (thermochemistry)
- spectroscopic identification of organic compounds

(Note: this is not an exhaustive list and is subject to change based on the needs of the students in the class.)

But, most importantly, this is not a course in which the destination is most important – rather, we will be more concerned with process, *how* we come to understand the fundamentals of chemistry. I am less concerned that you know "the answer" and more concerned that you understand how to figure out what "the answer" is!

COVID-19 Considerations

In order to both ensure the safety of everyone in this class as well as meet the learning objectives of this laboratory course, we've made a number of changes to the course structure and operation this semester. Our laboratory rooms have been carefully marked so as to maintain physical distancing both at the lab benches as well as near shared facilities (e.g., balances, fume hoods, sinks, etc.). Reducing lab densities requires that only *half* of the usual lab capacities be used and, whereas students would typically work in pairs, like we did last semester, this semester each student will work by themselves. We are fortunate, though, in that enrollments are at a level where we can safely accommodate all of the students in both sections of this course in the lab each week (as we were able to do for the last half of the fall semester).

As we did last fall, we must continue our efforts to ensure that our class behaves as a caring and safe community - we can only operate safely in the lab if we all are willing to work to ensure the health of everyone in our "community." In addition to the usual safety precautions taken while working in a chemistry lab in which hazardous substances are handled (e.g., safety goggles, gloves, etc.), we will also provide and require that you wear a disposable medical procedure mask while in the lab. Keeping our community safe also requires that we share information regarding our own health as it relates to working safely together in lab – so, prior to entering the lab, you will be asked to complete a check-in form (not unlike the daily check-in you make as part of the Green and Gold Promise with questions similar to those asked by some businesses prior to admission to their facilities). If you are not feeling well, have been exposed to someone who has tested positive for Covid-19 (or have, yourself, tested positive), travelled outside of the state within the past 14 days, etc. you should not be working in the lab. I have committed to weekly testing – just as you have – and should I not feel well or test positive or if I have been exposed to someone who has tested positive, I will not be with you in the lab until I can do so safely.

I am confident that, with attention to all of these safety protocols, we can continue to have a safe and meaningful semester in and outside of the lab!

Grading

Your course grade will be determined by your point total at the end of the semester. There are 100 possible points that can be earned, according to the following distribution categories:

- *Attendance: 20% (20 points).* There are 10 lab classes this semester which, at 2 pts each, gives a total of 20 possible points for the semester. However, since this is a laboratory course, you are expected to be in lab each week for each experiment/exercise. **It is not possible to pass this course with more than two absences (excused or unexcused), but should you be unable to attend lab or do the work for the lab due to illness this semester, please be**

assured that we will work with you to make appropriate accommodations for you to complete the required number of experiments/exercises.

- *Lab Notebook: 20% (20 points).* You will be expected to keep a notebook documenting all of your preparation for and work in the lab. Your lab notebook "carbonless copies" will be collected after each lab class session and assessed relative to the expectations and good laboratory practice presented to you in class. Each of these ten assessments will be worth 2 points, for a total of 20 possible points for the semester. While many of our labs will not require any advance preparation, for those that do require it, lack of evidence of preparedness for a laboratory experiment/exercise could result in your expulsion from the lab for the day, if it is determined that you are not prepared for working safely in the laboratory.

- *Participation: 20% (20 points).* We will rely heavily on working collaboratively in this course and your behavior in the laboratory will be assessed relative to your efforts to support the learning objectives of the class as a whole. No single person in this course will be able to perform all of the experimental measurements necessary to test the hypotheses posed and to answer the questions raised – collaboration and sharing of data and observations are essential to the success of the entire class. At the end of the semester, each student will be awarded up to 20 points based on their participation in the lab across the entire semester.

- *Lab Reflections/Reports: 30% (30 points).* While there will not be formal lab reports you will need to write for this course, after each lab experience there will be some kind of *prompt* to which you will be expected to think about and turn in a written reflection or (very brief) report prior to the next lab period. Typically, these will be no more than one page and will be assigned by Saturday of each week and due by the start of lab each week. There will be 10 of these assignments and they will be graded on a scale of 0 to 3 points.

- *ACS Exams: 10% (10 points):* Near the end of the semester, you will be asked to re-take Part 1 of the General Chemistry standardized, multiple-choice exam created by the American Chemical Society (ACS) (you took this exam early last fall). While you do not need to study for this, it would be a good idea to do a brief review of General Chemistry material – you will be allowed to use a scientific non-graphing calculator (no other electronic devices will be allowed). Ten points will be awarded for taking the exam - points awarded are not based on your score on the exams, but it is expected that you do your best and complete the exam during the time allotted (for which you will receive the full 10 points).

UVM Policies

Student Learning Accommodations: In keeping with University policy, any student with a documented disability interested in utilizing accommodations should contact the Student Accessibility Services (SAS) 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. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

Student Accessibility Services
A170 Living/Learning Center
802-656-7753
access@uvm.edu
http://www.uvm.edu/access

Policy on Disability Certification and Student Support:
http://www.uvm.edu/policies/student/disability.pdf

Diversity, Equity, and Inclusion Resources: Excellence should be inclusive of the entire University of Vermont (UVM) community and I am steadfastly committed to this belief. The **Division of Diversity, Equity, and Inclusion** strives every day 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. They 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's (MCSC) vision is to create a diverse and rich community of empowered, engaged, and enthusiastic students of color at UVM. They provide support for 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. They envision a brave, diverse, and equitable learning environment for all members of the UVM community. They 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

Religious Holiday Policy Statement: *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.*

Academic Integrity: This policy addresses plagiarism, fabrication, collusion, and cheating.

http://www.uvm.edu/policies/student/acadintegrity.pdf

Code of Student Rights and Responsibilities:
http://www.uvm.edu/policies/student/studentcode.pdf

Center for Health and Well-Being: http://www.uvm.edu/~chwb/

Counseling and Psychiatry Services (CAPS): http://www.uvm.edu/~chwb/psych/
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/deanofstudents/student_advocacy/care_form

CHEM 052 - Spring 2021

	Thurs	Topic/Experiment
Feb	4	NMR, IR, and Mass Spec (Lectures)
	11	NMR, IR, Mass Spec (Online)
	18	Solubility Equilibria
	25	**Exam Week (CHEM 048)**
March	4	Kinetics
	11	Thermodynamics
	18	Acid/Base Equilibria
	25	**Exam Week (CHEM 048)**
April	1	Acid/Base Buffer Equilibria
	8	Electrochemistry I
	15	**Spring Pause**
	22	**Exam Week (CHEM 048)**
	29	Electrochemistry II
May	6	Check-Out/Cleanup