CHEM 051: *Exploring Chemistry I*
Fall 2017

Instructor

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Office Location

Discovery Hall
Room W321

Office Hours

2:00-3:00 p.m., Monday
10:30-11:30 a.m. - Tuesday
11:00 a.m.- noon, Thursday

Class Meeting Times

Sectn A: Wed 1:10-5:10 pm
Sectn B: Thurs 1:15-5:15 pm
Sectn C: Thurs 6-10 pm

Class Lab Room

Discovery Hall
Room W407

Teaching Assistant

Chris Snyder

Course Overview

Chemistry is an experimental science, so what better way to provide the foundation for your current and future studies than to discover them in the laboratory? In this course, we will explore some of the fundamental concepts underlying all of Chemistry by learning how to do science: ask questions, postulate hypotheses, design and perform experiments to test those hypotheses, share data, and try forge a little bit of order from the chaos of the natural world.

This is a lab-based course that will introduce you to new experimental methods and teach you basic skills that will serve you as you take more advanced coursework in Chemistry and other natural science disciplines. We will also spend time working together before and after our work in the lab, exploring how to move from questions borne of our natural curiosity, to designing experiments, to compiling and evaluating the resulting data. Lastly, we will address ways in which we communicate the results of our work so that others might also learn more about the behavior and properties of chemical substances.

Required Text/Course Materials

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.

This is, however, a laboratory course, so you will need a lab notebook and safety glasses (the same ones you will need and use in CHEM 047 - Organic Chemistry for Majors I - will be fine to use). I also recommend that you purchase an inexpensive scientific calculator to use in the lab and in other classes where you are not able to use a graphing calculator or other personal electronic device on exams. The UVM Bookstore sells a nice one for $7.99 (Yikes! I paid more than $125 for mine when I first started college . . . but then that was in the Precambrian Era . . .)

Course Learning Objectives

Together with the CHEM 047 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 047 as well as to explore other chemical concepts and methodologies fundamental to all areas of chemistry.

We will use 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!

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).* The first and last lab sessions are worth 1 point each, and each of the remaining 12 lab sessions worth 1.5 points each, for a total of 20 possible points for the semester. Since this is a laboratory course, you are expected to be in lab each week for each experiment/exercise. There are no makeup lab sessions. **It is not possible to pass this course with more than two absences (excused or unexcused).**

- *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 will be reviewed ten times during the semester 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 Friday of each week and due by the start of lab each week. There will be 14 of these assignments and they will be graded on a scale of 0 to 3 points. As long as a student has turned in all 14 assignments, their point total will be the sum of the ten best assignments (for a maximum of 30 points) and half of

the points awarded for the remaining 4 assignments will be awarded as extra credit. Note that students who do not turn in all 14 assignments will not be eligible for receiving extra credit.

- *ACS Exams: 10% (10 points):* During the 4th week of the semester, instead of having our usual lab class, you will be asked to take a 2-part General Chemistry standardized, multiple-choice exam created by the American Chemical Society (ACS). You do not need to study for this, as the purpose of this exam is to provide a baseline for assessing your learning this year – you will, however, need to bring a simple scientific non-graphing calculator (no other electronic devices will be allowed). Five points will be awarded for taking each of the two parts of the exam - points awarded are not based on your score on the exams, but it is expected that you do your best and complete both parts of the exam during the lab period (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. A student's accommodation letter lists those accommodations that will not be implemented until the student meets with their faculty to create a plan.

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

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: http://www.uvm.edu/~saffairs/