

**Instructor**

Prof. Matt Liptak  
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**Lecture**

MWF 9:40 – 10:30 AM, Williams 301

**Office Hours**

TR 10 AM – 11 AM, F 2 PM – 3 PM, or by appointment, Cook A116 / STEM W112

**Exams**

R Feb. 9, Mar. 9, Apr. 6, Apr. 27, 6:00 PM – 9:00 PM, Williams 301  
R May 11, 10:30 AM – 1:15 PM, Williams 301

**Course Description**

First semester of a two-semester sequence. Topics include matter, stoichiometry, gas laws, thermochemistry, quantum theory, atomic structure, electronic configurations, bonding and intermolecular forces.

**Textbook**

Gilbert, T.R.; Kirss, R.V.; Foster, N. *Chemistry: An Atoms-Focused Approach*, 1<sup>st</sup> Ed., Norton, 2014.

**Web Content**

Lecture notes will be available through Blackboard (bb.uvm.edu). These materials are available for all current, UVM-affiliated, students.

Quizzes will be administered using the SmartWork (<http://smartwork.wwnorton.com>) system. A free subscription comes with your textbook when purchased at the UVM bookstore.

**SmartWork Enrollment Key:** CHEMAT11173

**Course Goals**

Upon completion of Chemistry 031, it is anticipated that you will:

1. Understand how to use the scientific method to solve a problem.
2. Employ the periodic table to predict chemical properties.
3. Balance a comprehensive range of chemical reactions.
4. Use thermodynamics and quantum mechanics to formulate reasonable hypotheses.
5. Describe chemical bonding using molecular orbitals.

**Academic Honesty**

As UVM students, you are expected to conduct yourself in accordance with the Code of Academic Integrity: <http://www.uvm.edu/policies/student/acadintegrity.pdf>

**Accommodations**

All special accommodations must be requested via e-mail before January 30, 2017.

*The instructor reserves the right to change everything, with notice*

### Lecture

New material will be covered during lecture. I will *not* present a comprehensive coverage of the course material since this is accomplished by the textbook. Instead, each class will be devoted to in-depth coverage of the topics/concepts that I believe are most important and/or challenging. Thus, it is *strongly* recommended that you read the textbook to stay ahead of the *tentative* lecture schedule shown below. Several course meeting dates have not been assigned a lecture so that we have time to catch-up should we fall behind, review for upcoming exams, or cover special topics not in the textbook.

**Jan. 20:** Chapter 1.1-1.7: Scientific Method

**Jan. 23:** Chapter 1.8-1.10: Measurement

**Jan. 25:** Chapter 2.1: Atomic Structure

**Jan. 27:** Chapter 2.2-2.3: Periodic Table

**Jan. 30:** Chapter 2.4-2.7: Molar Mass

**Feb. 1:** Chapter 3.1-3.3: Nature of Light

**Feb. 3:** Chapter 3.4-3.5: Nature of Electrons

**Feb. 6:** Chapter 3.6-3.7: Hydrogen Atom

**Feb. 10:** Chapter 3.8-3.9: Aufbau Principle

**Feb. 13:** Chapter 3.10: Atomic Size

**Feb. 15:** Chapter 3.11-3.12: Ionization

**Feb. 17:** Chapter 4.1-4.2: Molecules

**Feb. 22:** Chapter 4.3-4.5: Lewis Structures

**Feb. 24:** Chapter 4.6-4.9: Resonance

**Feb. 27:** Chapter 5.1-5.2: VSEPR

**Mar. 3:** Chapter 5.3-5.6: Polarity

**Mar. 6:** Chapter 5.7: MO Theory

**Mar. 10:** Chapter 6.1: Dispersion Forces

**Mar. 20:** Chapter 6.2-6.3: Dipolar Forces

**Mar. 22:** Chapter 6.4-6.5: Phase Changes

**Mar. 24:** Chapter 7.1-7.3: Chemical Equations

**Mar. 27:** Chapter 7.4-7.7: Stoichiometry

**Mar. 29:** Chapter 7.8: Reaction Yield

**Mar. 31:** Chapter 8.1-8.3: Solutions

**Apr. 7:** Chapter 8.4-8.5: Aqueous Reactions

**Apr. 10:** Chapter 8.6-8.8: Redox Reactions

**Apr. 12:** Chapter 9.1-9.3: Thermodynamics

**Apr. 14:** Chapter 9.4-9.5: Calorimetry

**Apr. 17:** Chapter 9.6-9.8: Hess's Law

**Apr. 19:** Chapter 10.1-10.3: Gases

**Apr. 21:** Chapter 10.4-10.6: Gas Laws

**Apr. 24:** Chapter 10.7-10.12: Partial Pressure

## Laboratory/Recitation

### Laboratory Safety

OSHA-approved safety glasses or goggles, which can be obtained at the UVM bookstore, must be worn at all times when in the laboratory. Contact lenses are *not* permitted in the laboratory, but prescription glasses will fit underneath safety *goggles*. Open-toed shoes are not permitted in the laboratory at any time. *Any violation of these policies will result in a grade of zero for the experiment.*

### Laboratory Preparation

Prior to each laboratory, you should: print out and read a copy the experiment, watch the laboratory demonstration video, prepare your laboratory notebook, and complete the Pre-lab quiz. You must bring the following items with you to each laboratory meeting: safety glasses, laboratory notebook, print out of the laboratory experiment, and breakage card.

### Attendance/Make-up Policy

Laboratory attendance is mandatory, *missing more than two laboratories for any reason will result in an F for Chem031*. Make-up labs will be offered for documented, UVM-approved reasons. Make-up labs will only be available during the *same* week as your lab section *if* space permits. If you need to request a make-up laboratory, you should contact the laboratory supervisor, Christine Cardillo (Christine.cardillo@uvm.edu) *at least* one week in advance of your laboratory section meeting time.

### Laboratory/Recitation Schedule

Laboratories will begin during the second week of classes. During the first week you must: purchase a breakage card from the first floor stockroom (Cook A143, \$40), purchase safety glasses from the UVM bookstore, and pass the online safety quiz posted to Blackboard.

**Jan. 23 – Jan. 26:** Check-in / Recitation

**Jan. 30 – Feb. 2:** Measurements and Density / Recitation

**Feb. 6 – Feb. 9:** Flame Emission Spectra / Recitation

**Feb. 13 – Feb. 16:** Periodic Trends / Recitation

**Feb. 20 – Feb. 23** Presidents' Day – NO LAB / NO RECITATION

**Feb. 27 – Mar. 2:** Molecular Models / Recitation

**Mar. 6 – Mar. 9:** Town Meeting Day – NO LAB / NO RECITATION

**Mar. 13 – Mar. 17:** Spring Break – NO LAB / NO RECITATION

**Mar. 20 – Mar. 23:** Evaporation and Intermolecular Forces / Recitation

**Mar. 27 – Mar. 30:** Determination of a Chemical Formula / Recitation

**Apr. 3 – Apr. 6:** Chemical Reactions of Copper / NO RECITATION

**Apr. 10 – Apr. 13:** Acid Content of a Food Product / Recitation

**Apr. 17 – Apr. 20:** Heat Capacity and Enthalpy / Recitation

**Apr. 24 – Apr. 27:** Gas Law Determination of Molecular Weight / Recitation

**May 1 – May 4:** Check-out / Recitation

## Homework

For those of you that are first-year students, you will find that the learning format in college is significantly different from that of high school. Whereas a course in high school meets every day for nine months, a course in college meets 2-3 times per week for three months. Also, where you probably spent 35-40 hours per week in class at the high school level, you will only spend 15-20 in class at *UVM*. These differences mean that the expectations on your outside of class effort are *much* higher at *UVM* as compared to high school. As a general rule of thumb, the expectation is that you will put in *a minimum of two hours per week per lecture credit hour of effort* into studying outside of class. This adds up to a minimum of 100 hours throughout the semester, and I assure you that this effort will be most effective if distributed throughout the semester rather than crammed into the time periods immediately prior to exams. What should you be doing to most effectively utilize your study time?

**Reading:** It is *highly* recommended that you reference the lecture schedule and stay ahead of me by reading the text. This will allow you to focus on mastering the most important/challenging concepts during lecture.

**Practice Problems:** I will post 10-20 practice problems to the SmartWork site for each chapter. Working through these problems will not only help you master the important concepts, but also prepare you for the quiz format. In addition, there are *many* valuable practice exercises, problems, and quizzes (with answers!) in the text book.

**Review Notes:** I will post all of my lecture notes to Blackboard immediately following lecture. I *strongly suggest* that you review these notes shortly after class to ensure that you master the material.

**I need help!** If you are struggling with any concept presented in class, you should not hesitate to seek out additional help sooner rather than later. Fortunately, you have *many options*:

**Instructor Office Hours:** My office hours are your drop-in time for Chem031 assistance. These three hours per week are fully dedicated to Chem031 students.

**Teaching Assistant Office Hours:** Every teaching assistant for every section of Chem031 has one hour of office hours per week per lab section. These office hours are open to all Chem031 students, not just those in a particular lab section. Since there are 5 laboratory sections, this means that there are 5 additional hours throughout the week where you can get help!

**Learning Co-Op:** If you prefer an individualized tutor, the Learning Co-Op organizes this relationship for students. Please contact the Learning Co-Op directly in order to be put in touch with a potential tutor.

## Grading

### Problem Sets (100 Points)

A total of 11 open-book, open-notes problem sets will be administered via the online SmartWork system throughout the semester. Problem sets will be due at 11:59 PM on the date noted below, and the answers will be available at midnight. Thus, ***no extensions will be granted*** for the problem sets, but your lowest grade out of the 11 problem sets will be dropped.

**January 30, 11:59 PM:** Chapter 1

**January 31, 11:59 PM:** Chapter 2

**February 7, 11:59 PM:** Chapter 3.1 – 3.7

**February 16, 11:59 PM:** Chapter 3.8 – 3.12

**February 28, 11:59 PM:** Chapter 4

**March 7, 11:59 PM:** Chapter 5

**March 23, 11:59 PM:** Chapter 6

**March 30, 11:59 PM:** Chapter 7

**April 11, 11:59 PM:** Chapter 8

**April 18, 11:59 PM:** Chapter 9

**April 25, 11:59 PM:** Chapter 10

These problem sets are intended to solidify your understanding of the major course concepts and challenge you to think critically using your new-found knowledge. Please follow a “no writing or typing utensil” rule when discussing these assignments with your classmates. In other words, you may discuss the problem sets with your classmates, but no one is allowed to take any notes during the course of the conversation.

### Mid-term Exams (300 Points)

Four mid-term exams are scheduled for Chemistry 031. All exam times are scheduled by the registrar and were blocked off in your schedule when you registered for the course. Thus, ***there will be no make-up exams***. Instead, your lowest exam grade will be dropped.

**February 9, 6:00 – 9:00 PM:** Chapter 1.1 – 3.7

**March 9, 6:00 – 9:00 PM:** Chapter 3.8 – 5.7

**April 6, 6:00 – 9:00 PM:** Chapter 6.1 – 8.3

**April 27, 6:00 – 9:00 PM:** Chapter 8.4 – 10.12

### Final Exam (200 Points)

The final exam will be cumulative. The exam time was chosen by the registrar.

**May 11, 10:30 AM – 1:15 PM:** Cumulative

### Laboratory (200 points)

The laboratory component of your course grade will be determined based upon four categories: quizzes, notebook usage, laboratory technique, and laboratory reports. All laboratory sections will be normalized to an average grade of 80 %.

*Please note that laboratory attendance is mandatory. It is departmental policy that if you miss more than two laboratories, even for legitimate reasons, you will fail Chem031!*

*The instructor reserves the right to change everything, with notice*