Instructor

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Lecture

TR 8:30 – 9:45 AM, Billings Lecture Hall

Office Hours

T 10:00 AM – 11:00 AM, WR 11:00 AM – 12:00 PM, Cook A116

Exams

W Sep. 23, Oct. 14, Nov. 4, Dec. 2, 6:40 PM – 9:40 PM, Billings Lecture Hall
M Dec. 14, 7:30 AM – 10:15 AM, Billings Lecture Hall

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

Tro, N. *Chemistry: A Molecular Approach*, 3rd Ed., Pearson, 2014.

Web Content

Lecture notes will be available through Blackboard (bb.uvm.edu). These materials are available for all current, UVM-affiliated, students, but they may not be shared off-campus without permission of the instructor.

Quizes will be administered using the Mastering Chemistry (www.masteringchemistry.com) system. A free subscription comes with your textbook when purchased at the UVM bookstore.

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 September 8, 2015.

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 following *tentative* lecture schedule:

Sep. 1: Chapter 1.1-1.2: Course Introduction, Scientific Method
Sep. 3: Chapter 1.3-1.8: Physical and Chemical Change**,** Measurement
Sep. 8: Chapter 2.1-2.9: Atomic Theory, Periodic Table
Sep. 10: Chapter 3.1-3.7: Chemical Bonds, Inorganic Compounds
Sep. 15: Chapter 3.8-3.12: Chemical Equations , Organic Compounds
Sep. 17: Chapter 4.1-4.6: Chemical Reactions, Precipitation Reactions
Sep. 22: Catch-up, Exam #1 Review
Sep. 23: Exam #1 (**6:40 PM**)
Sep. 24: Chapter 4.7-4.9: Aqueous Reactions, Redox Reactions
Sep. 29: Chapter 5.1-5.7: Gas Laws, Partial Pressure
Oct. 1: Chapter 5.8-5.10: Kinetic Molecular Theory, Real Gases
Oct. 6: Chapter 6.1-6.5: Thermodynamics, Internal Energy
Oct. 8: Chapter 6.6-6.10: Enthalpy, Enthalpy of Reaction
Oct. 13: Catch-up, Exam #2 Review
Oct. 14: Exam #2 (**6:40 PM**)
Oct. 15: Chapter 7.1-7.3: Quantum Mechanics, Spectroscopy
Oct. 20: Chapter 7.4-7.6: Uncertainty Principle, Atomic Structure
Oct. 22: Chapter 8.1-8.6: Electron Configuration, Atomic Size
Oct. 27: Chapter 8.7-8.9: Ionization Energy, Electron Affinity
Oct. 29: Chapter 9.1-9.6: Ionic Bonding, Covalent Bonding
Nov. 3: Catch-up, Exam #3 Review
Nov. 4: Exam #3 (**6:40 PM**)
Nov. 5: Chapter 9.7-9.9: Polyatomic Molecules, Metals
Nov. 10: Chapter 10.1-10.5: VSEPR, Polarity
Nov. 12: Chapter 10.6-10.8: Valence Bond Theory, Molecular Orbital Theory
Nov. 17: Chapter 11.1-11.6: Intermolecular Forces, State Changes
Nov. 19: Chapter 11.7-11.13: Phase Diagrams, Crystalline Solids
Dec. 1: Catch-up, Exam #4 Review
Dec. 2: Exam #4 (**6:40 PM**)
Dec. 3: Computational Chemistry, Thermal Corrections
Dec. 8: Catch-up, Final Exam Review
Dec. 14: Final Exam (**7:30 AM**)

Each lecture will have the following format:
8:30 AM – 9:05 AM: Topic #1
9:05 AM – 9:10 AM: Short Recess
9:10 AM – 9:45 AM: Topic #2

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 polices 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 (http://www.uvm.edu/~chem/courses/?Page=31Videos.html), 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 third week of classes. During the first two weeks 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.

Aug. 31 – Sep. 4: No laboratory / No Recitation
Sep. 7 – Sep. 11: No laboratory / No Recitation
Sep. 14 – Sep. 18: Acid Content / Recitation #1
Sep. 21 – Sep. 25: Chemical Reactions / No Recitation
Sep. 28 – Oct. 2: Gas Law / Recitation #2
Oct. 5 – Oct. 9: Enthalpy / Recitation #3
Oct. 12 – Oct. 16: Calorimetry / No Recitation
Oct. 19 – Oct. 23: Flame Emission / Recitation #4
Oct. 26 – Oct. 30: Quantitative Analysis / Recitation #5
Nov. 2 – Nov. 6: Quantitative Analysis / Recitation #6
Nov. 9 – Nov. 13: Structure Building / Recitation #7
Nov. 16 – Nov. 20: Evaporation and Intermolecular Forces / Recitation #8
Nov. 23 – Nov. 27: No laboratory / No Recitation
Nov. 30 – Dec. 3: Check-out
Dec. 7 – Dec. 18: No laboratory / No 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 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 up to 10-20 practice problems to the Mastering Chemistry 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 Chem031B 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 50 laboratory sections, this means that there are 50 additional hours throughout the week where you can get help!

Supplemental Instruction (SI): Yet more out of class help is available through the Supplemental Instruction program. There will be weekly review sessions and office hours available where you can get assistance from the Chem031 SI leader.

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

Your grade will be based upon a lecture (75 %) and a laboratory (25 %) component.

Lecture

The lecture grade will break down as follows: **Problem Sets** (20 %): 100 points, **Exams** (80 %): 400 points

Problem Sets

A total of 11 open-book, open-notes problem sets will be administered via the online Mastering Chemistry system throughout the semester. Each problem set will consist of 10 questions, worth 1 point each for a total of 10 points. 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.

Problem sets will be due at 11:59 PM on the Wednesday or Friday following our completion of a chapter from the text. ***No extensions will be granted*** for the problem sets, but your lowest grade out of the 11 problem sets will be dropped. Thus, the problem sets will contribute a total of 100 points to the lecture component of your course grade.

Exams

Five exams are scheduled for Chemistry 031:

September 23, 6:40 – 9:40 PM: Chapter 1.1 – 4.6

October 14, 6:40 – 9:40 PM: Chapter 4.7 – 6.10

November 4, 6:40 – 9:40 PM: Chapter 7.1 – 9.6

December 2, 6:40 – 9:40 PM: Chapter 9.7 – 11.13

December 8, 7:30 – 10:15 AM: Cumulative

All exam times are scheduled by the registrar and were blocked off in your schedule when you registered for the course. The mid-term exam weeks have been selected in consultation with the instructors of the other four sections of Chem 031. Thus, ***there will be no make-up exams.*** Instead, your lowest exam grade will be dropped.

Each exam will be worth 100 points. With one dropped exam, the exams will contribute a total of 400 points to the lecture component of your course grade.

Laboratory

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!