

Chemistry 1A - Section 1196
General Chemistry I
Fall 2009

Instructor: **Dr. Peter A. Doucette**
Office: **Chem 122**
email: **pdoucette@elcamino.edu**

Office Hours: Tu & Th: 1:00 -2:00, W: 12:00-12:30, or by appointment

Meeting times and locations:	Lectures:	T Th	2:00-4:05	Chem 103
	Labs:	M	1:00-4:10	Chem 165
		W	2:05-4:10	Chem 165

COURSE OUTLINE

1. Required Materials:

Textbook: Petrucci, Harwood, Herring, and Madura; *General Chemistry: Principles and Modern Applications*; 9th ed.

Lab Manual: Scroggins; *Chemistry 1A Experiments*

Scientific Calculator (logarithms and exponents)

Safety Goggles (Instructor Approved)

2. Course prerequisites:

Chemistry 4 with a minimum grade of C; **or** one year of high school chemistry or equivalent and qualification by testing (El Camino College Chemistry Placement Test) and assessment. You must also be eligible for Math 170

3. Course description:

This course details fundamental theory and principles of atomic and molecular structure, physical states and chemical reactions. Included is the study of elements, compounds, periodic relationships, bonding, acids and bases, oxidation-reduction, energy, solutions, electrolytes and chemical equations. Descriptive chemistry of water and selected nonmetals including hydrogen, oxygen and carbon is presented.

4. Course Objectives:

- Become more proficient in the ability to use scientific terminology; name and write chemical formulas for inorganic compounds: binary nonmetal compounds, salts, acids and bases; write and classify chemical equations for elementary chemical reactions and perform stoichiometric calculations involving chemical reactions.
- Be able to provide a historical picture of the development of atomic theory; state the fundamentals of quantum theory; assign quantum numbers and construct orbital diagrams; predict and explain periodic trends of elements in terms of electronic configurations; describe and illustrate the structure and bonding of molecules by constructing Lewis structures, sketching and labeling the molecular geometries of a molecule, describing the hybridization of the atoms involved, and determining polarity; predict and explain properties of molecules in terms of structure and bonding and predict and explain properties of conductors, semiconductors and insulators in terms of structure and bonding.

- c. Use the Kinetic Molecular Theory to explain the behavior of gases; compare and contrast various gas laws; perform gas law calculations; relate intermolecular forces to observed properties of solids, liquids and gases; interpret phase diagrams and describe basic crystal systems.
- d. Explain solubility in terms of properties of both solute and solvent; determine concentrations of solutions quantitatively and experimentally; give qualitative and quantitative descriptions of solution properties as a function of solute type and solute concentration; classify solutes as strong, weak or non-electrolytes and write net ionic equations for chemical reactions.
- e. Compare and contrast acid-base theories; predict acid strengths based on structure and write and classify acid-base reactions.
- f. Determine oxidation numbers; balance oxidation-reduction equations; identify oxidizing and reducing agents.
- g. Apply the First Law of Thermodynamics; relate ΔE to ΔH ; calculate ΔH through calorimetry, Hess' Law, enthalpy of formation, and bond energies.
- h. Compare and contrast properties and reactions within a family of compounds; describe the role of nonmetals and nonmetal compounds in pollution; draw Lewis structures and name simple organic compounds; identify the classes of organic compounds.
- i. learn fundamental chemistry techniques such as gravimetric analysis, spectral analysis, titration, use of pH meter; become proficient in the use of the following laboratory equipment: analytical balance, spectrophotometer, pH meter, burets, pipets, volumetric flasks; illustrate basic principles of gases, solutions, acids and bases, and oxidizing and reducing agents through experimental set ups.

5. Grading: Approximate total points

3 Midterms	(200 points each)	600
Lab Reports	(150 points total)	150
Quizzes	(25 points total)	25
Assigned Problems	(25 points total)	25
Final Exam	(250 points)	<u>250</u>
Total Possible (tentative)		1050

6. Grade Distribution:

Letter grades are given based on the percentage of total points.

A	100 - 89%
B	88 - 78%
C	77 - 65%
D	64 - 52%
F	51 - 0%

7. Quizzes and Exams:

Quizzes: When time permits, I will give quizzes to prepare you for the exams. Quizzes will be graded.

Exams: Exams will be given on scheduled days in room 103. The format of the exams depends on the content of the material being tested, but is usually made up of multiple choice, true/false and short answer questions. There will be no make-up exams. If you miss an exam, you will receive a zero unless you give a documented reason for missing the exam.

8. Practice Problems/Assigned Problems:

Practice problems are given for each topic covered and we go over many of them in class. I do not collect and grade these, but you should complete and understand all questions, preferably before we go over them in class. I will also assign **problems from the book that will be collected and graded**.

9. Lectures:

Course material will be presented primarily on an overhead projector and the white board. The overheads will be available at the following website: www.chem.ucla.edu/~pdoucett/chem1a (temporarily, until I switch to an ELCO server). You can print the notes out and bring them to class allowing you to think and participate (not sleep!) during lectures rather than trying to write down everything I cover. Additional notes can then be made in the margins of the printed overheads. **To print documents, first save them on your hard drive - do not print from the web!**

10. Study Strategies:

- Working problems is an essential part of the course and you should make this one of your primary goals. You should do all of the problems I assign and **you should avoid looking at the answer key until you have figured out the problem on your own**. There are a lot of problems out there and the more you do, the better you will get.
- It is very important not to fall behind and you should study and do the assigned problems while the lecture material is fresh in your mind. Students that fall behind often have to drop the course, so don't be one of them!
- Finally, **COME TO EVERY CLASS PREPARED AND ON TIME!**

11. Laboratory:

You should read and fully understand all labs **BEFORE** coming into the lab. If you wait until right before the lab class to read the lab, you will not understand the lab and it will be obvious to me that you did not prepare. If there is a pre-lab exercise for the lab (some are hard to find unless you read through the whole lab) it is due before you begin the lab even if I don't specify that there is a prelab. There are no make-up labs. Points will be deducted for messy, unsafe, incomplete or late work. You must **ALWAYS** wear instructor-approved goggles when in the laboratory even if you are doing calculations after you have finished a lab. You will be asked to leave lab for repeated infractions of this rule.

Week	Date	Day	Lecture/Lab
1	8/31/09	M	Course Introduction, Introduction to Lab, Lab Safety
		T	Math review, Chapter 1 – <i>Matter, Its Properties and Measurement.</i>
		W	Locker Check-In, Ch. 1 – cont'd
		Th	Chapter 2 – <i>Atoms and the Atomic Theory</i>
2	9/7	M	Labor Day Holiday – No Class
		T	Ch. 2 – cont'd
		W	Experiment A – Gravimetric & Volumetric Equipment
		Th	Chapter 3 – <i>Chemical Compounds</i>
3	9/14	M	Experiment 1 – Gravimetric Analysis for Sulfate Ion
		T	Ch. 3 – cont'd
		W	Experiment 1 – cont'd
		Th	Chapter 4 – <i>Chemical Reactions</i>
4	9/21	M	Chem Compact G
		T	Ch. 4 – cont'd
		W	Ch. 4 – cont'd
		Th	Midterm 1
5	9/28	M	Experiment 4 – Solution Concentration by Spectrophotometry
		T	Chapter 5 (and parts of 16) – <i>Intro. to Rxns in Aq. Soln/Acids and Bases</i>
		W	Graphical Analysis and Presentation of Data Using Excel (website)*
		Th	Ch. 5/16 – cont'd
6	10/5	M	Experiment 14 – Acid/Base Titration I
		T	Ch. 5/16 – cont'd
		W	Experiment 14 – Acid/Base Titration II
		Th	Ch. 5/16 – cont'd
7	10/12	M	Experiment 17 – Ions In Aqueous Solution
		T	Chapter 6 – <i>Gases</i>
		W	Ch. 6 – cont'd
		Th	Chapter 7 – <i>Thermochemistry</i>
8	10/19	M	Experiment 18 – The Strengths of Oxidizing and Reducing Agents
		T	Ch. 7 – cont'd
		W	Ch. 7 – cont'd
		Th	Midterm 2
9	10/26	M	Experiment 5 – Analysis of KClO ₃ /KCl Mixture
		T	Ch. 7 – cont'd
		W	Experiment 5 – cont'd
		Th	Chapter 8 – <i>Electrons in Atoms</i>
10	11/2	M	Experiment 2 – Calorimetry: Hess's Law (water only – no goggles)
		T	Ch. 8 – cont'd
		W	Experiment 2 – Calorimetry: Hess's Law (acids and bases – goggles!)
		Th	Ch. 8 – cont'd

*material will be available on the course website that is not in the lab manual

11	11/9	M	Atomic Spectra and Energy Levels (website)*
		T	Chapter 9 – <i>The Periodic Table and Some Atomic Properties</i>
		W	Ch. 9 – cont'd
		Th	Chapter 10 – <i>Chemical Bonding I</i>
12	11/16	M	Lewis Structure Lab (website)*/Model Making
		T	Ch. 10 – cont'd
		W	Ch. 10 – cont'd
		Th	Midterm 3
13	11/23	M	Experiment 10 – Model-Making: Organic Compounds
		T	Chapter 11 – <i>Chemical Bonding II</i>
		W	Ch. 11 – cont'd, <i>Molecular Orbital Theory worksheet</i>
		Th	Thanksgiving Holiday – No Class
14	11/30	M	Experiment 13 – Crystal Lattices (Metallic)
		T	Ch. 11 – cont'd
		W	Chapter 12 – <i>Liquids, Solids and Intermolecular Forces</i>
		Th	Ch. 12 – cont'd
15	12/7	M	Experiment 13 – Crystal Lattices (Ionic Salts)
		T	Ch. 12 – cont'd
		W	Ch. 12 – cont'd
		Th	Chapter 13 – <i>Solutions and Their Physical Properties</i>
16	12/14	M	Ch. 13 – cont'd, <i>Lab Check-Out</i>
		T	Ch. 13 – cont'd
		W	Ch. 13 – cont'd
		Th	Final Exam

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Dropping:

It is your responsibility to drop the course to avoid an "F". To drop, you must check out of your lab drawer.

Drop dates:

Friday, September 11: Last day to drop with a full refund

Friday, September 25: Last day to drop without notation on permanent record

Friday, November 20: Last day to drop with a "W"

CHEMISTRY PROGRAM LEVEL STUDENT LEARNING OUTCOME:

Students will practice safe laboratory procedures by putting their goggles on at the beginning of a chemistry lab experiment involving burners or chemicals, and by keeping their goggles in place during the entire course of the experiment. Students will not remove their goggles until the students are leaving or until the instructor has said that it is safe to do so (whichever comes first).

CHEM 1A COURSE LEVEL STUDENT LEARNING OUTCOME:

On a written exercise, given the names of chemical compounds, students will be able to write the correct reactant formulas, states of matter (when required), identify reaction type, predict the formulas of products, and balance the chemical equation.