

Chemistry 20: Dr. Amy Grant

Fall 2008

Office Hours: Tu & F 12-1, Th 1-2, and by appointment

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Prerequisite: Mathematics 40 or 41B.

Required Materials: Timberlake, An Intro to General, Organic, and Biochem, 10th ed.; Henrickson, et. al., A Lab for General, Organic, and Biochem, 6th ed; Scientific Calculator; Safety Goggles (Instructor Approved).

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| Grading: | Exams (4 x 100 pts) | 400 |
| | Quizzes (11 x 20) + 20 pt elements quiz | 240 |
| | Labs/Exercises (15 x 10 pts) | 150 |
| | Participation and Attendance | 10 |
| | <u>Comprehensive Final</u> | <u>200</u> |
| | Total | 1000 |

Final letter grades will be assigned approximately to the following distribution:

100-88% = A; 87-78% = B; 77-65% = C; 64-54% = D; < 54% = F

Lab: Bring the lab manual and blank report pages. If you forget pages, you may make copies after lab lecture. You must attend the entire lab lecture to do the lab. Late students will receive a penalty or be asked to leave depending on what was missed. Writing something on another student's lab paper, bringing in previously graded experiments, or copying a sentence or piece of data is considered cheating. You must do independent work. Keep your lab lecture notes on safety, disposal and important info out during lab. Read the experiment before coming to lab. Absences result in zeros. Wear appropriate shoes to labs involving burners or chemicals. Don't touch the chemicals!

Assignments: Check the web page for assignments every week. Assignments won't be collected, but you must practice problems to do well. It's also helpful to rewrite class notes and redo problems given in class on blank paper. Plan to study every day. This class will require far more time than you expect.

Quizzes and Tests: Missed quizzes/exams/labs result in a zero except in certain situations. *To discuss a situation, you must contact me or leave me a message at least one day before the next class meeting so I can decide the nature of the situation.* Generally, doctor's or other appointments are not considered emergencies as they can be rescheduled. You must clear the memory of your programmable calculator before taking a quiz or test.

Academic Courtesy: Come to class on time and prepared. Please refrain from side conversations. Questions, comments, and corrections from the class are appreciated. Occasionally questions will be answered after class. This class is a cellphone-free environment. I do not want to see or hear your cell phone at any time.

Attendance: Students with excessive absences or lateness may receive a lower grade, and/or receive deductions on the Participation and Attendance points. Students who drop the course before the final W drop date will receive a "W". It is your responsibility to drop the course to avoid an "F". To drop, you must check out of your lab drawer and have a card signed by the stockroom.

How to Do Well: A few students will need remedial math before they can pass chemistry, and a few will have a personal emergency. These situations probably require retaking the course. For others who fail Chem 20, I've noticed one or more of the following: They zone out during lecture, they don't study enough hours or days a week, they have too many time commitments outside of school, they don't try enough problems on their own, and they don't try aggressively to clear up confusion before moving to a new chapter. Don't wait until it's too late! See me or email me if you have any trouble. I want you to succeed!

| Week | Date | |
|------|-------------|--|
| 1 | Wed 8/27 | Introduction, Chapter 1 (Measurements). Bring your scientific calculator starting in the next class. |
| | Thu 8/28 | Chapter 1, Safety Video: Students must be present at the safety video to work in lab. |
| | Fri 8/29 | Chapter 1 |
| 2 | Wed 9/3 | Quiz 1 (Ch. 1) Lecture: Chapter 2 (Matter) |
| | Thu 9/4 | Safety; Check-In; Handout: Burners (L1). Students must be present at the safety lecture to work in lab. Don't forget your goggles, closed shoes, and experiment. |

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| | Fri 9/5 | Elements Quiz Lecture: Chapter 3 (Elements and Atomic Structure) |
| 3 | Wed 9/10 | Quiz 2 (Ch. 2) Lecture: Chapter 3, Chapter 4 (Nomenclature and Bonding) |
| | Thu 9/11 | Experiment 1: Measurement and Density (L2) |
| | Fri 9/12 | Chapter 4 |
| 4 | Wed 9/17 | Chapter 4 |
| | Thu 9/18 | Experiment 2: Graphing (L3) |
| | Fri 9/19 | Test 1 (covering Chapters 1-3) <i>If you miss a test or quiz, see the syllabus for instructions.</i> |
| 5 | Wed 9/24 | Chapter 4 |
| | Thu 9/25 | Nomenclature Exercise Handout (open book and open notes, L4) |
| | Fri 9/26 | Quiz 3 (Ch. 4) Lecture: Chapter 4 |
| 6 | Wed 10/1 | Experiment 11: Structure of Covalent Molecules and Polyatomic Ions (L5) |
| | Thu 10/2 | Experiment 6: Simple Chemical Reactions (L6) Don't forget your goggles, closed shoes, and experiment. |
| | Fri 10/3 | Quiz 4 (Ch. 4) Lecture: Chapter 5 (Chemical Calculations) |
| 7 | Wed 10/8 | Chapter 5 |
| | Thu 10/9 | Experiment 7: Hydrates (L7) Don't forget your goggles, closed shoes, and experiment. |
| | Fri 10/10 | Lecture: Chapter 5 |
| 8 | Wed 10/15 | Quiz 5 (Ch. 5) Chapter 6 (Gases) |
| | Thu 10/16 | Experiment 15: Combined Gas Laws (L8) Don't forget your goggles, closed shoes, and experiment. |
| | Fri 10/17 | Test 2 (covering Chapters 4-6) <i>If you miss a test or quiz, see the syllabus for instructions.</i> |
| 9 | Wed 10/22 | Chapter 7 (Solutions) |
| | Thu 10/23 | Experiment 17 and Handout: Acid/Base Indicators (L9). |
| | Fri 10/24 | Quiz 6 (Ch. 7) Lecture: Chapter 8 (Acids and Bases) |
| 10 | Wed 10/29 | Chapter 8, Chapter 10 (Alkanes) |

COURSE OBJECTIVES

General Skills - The student will become proficient in the ability to:

1. use scientific terminology
2. name and write chemical formulas for inorganic compounds: binary nonmetal compounds, salts and acids
3. write and classify chemical equations for elementary chemical reactions
4. perform stoichiometric calculations involving chemical reactions

Structure - The student will:

1. demonstrate a basic understanding of Bohr theory
2. predict and explain periodic trends of elements in terms of electronic configurations
3. describe and illustrate the structure and bonding for molecules by: constructing Lewis structures, labeling molecular geometries, determining polarity

States of Matter - The student will:

1. use the Kinetic Molecular Theory to explain the behavior of gases
2. perform calculations involving the gas laws
3. relate intermolecular forces to observed properties of solids, liquids and gases

Aqueous solutions - The student will:

1. explain solubility in terms of properties of both solute and solvent.
2. determine concentrations of solutions quantitatively and experimentally
3. give qualitative & quantitative descriptions of soln colligative properties as a function of solute type and solute conc
4. classify solutes as strong, weak or nonelectrolytes
5. write net ionic equations for chemical reactions

Acids and Bases - The student will:

1. compare and contrast Arrhenius and Bronsted-Lowry acid theories
2. write acid-base reactions
3. determine pH and understand how a buffer works

Oxidation-Reduction - The student will:

1. determine oxidation numbers
2. identify the element oxidized and the element reduced in redox reactions

Organic Chemistry - The student will:

1. use the common and IUPAC systems to name simple examples of various classes of organic compounds
2. draw structural formulas of simple examples of various classes of organic compounds
3. write equations, using structural formulas, for selected common reactions of organic compounds
4. draw structural formulas which illustrate a knowledge of structural isomerism and geometric isomerism

Biochemistry - The student will:

1. demonstrate an understanding of chirality by drawing Fischer projections of enantiomers containing one chiral C
2. draw open chain and ring structural formulas for the common monosaccharides
3. describe the linkage between monosaccharide units in terms of the bonding involved
4. state the functions of the common di- and polysaccharides
5. draw the general structural formula of a fatty acid and a triglyceride
6. draw the structural formulas of at least three saturated and one unsaturated fatty acid
7. explain the function of a fatty acid in a membrane in terms of the structure of the fatty acid
8. draw a general structure for a phospholipid
9. draw the ring system found in steroids
10. draw the general structural formula for a zwitterion and explain how this structure can function as a buffer
11. draw the structural formulas of at least three amino acids at physiological pH
12. explain the geometry of a peptide bond by using resonance structures
13. state the features which characterize the primary, secondary, and tertiary structure of a protein
14. define denaturation as it applies to a biological system

Laboratory - The student will:

1. learn fundamental chemistry techniques such as titration, use of pH meter
2. become proficient in the use of: balance, common laboratory glassware such as burets, pipets, and volumetric flasks
3. illustrate basic principles of gases, solutions, acids and bases, and ox and red agents through experimental set ups