

Policies for Principles of Chemistry (Chem 1210)

Instructor: Dr. Robert Brown **Class Times/Location:** 8:30-9:20 A.M. MWF/ENGR 103

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Office Hours: MWF 10:30-11:30 AM and by individual student appointments

Course Text: Chemistry: The Central Science (10th Edition) by T.L. Brown, H.E. LeMay, B.E. Bursten, Prentice Hall, 2006. **Note:** Supplementary text material is available on the web (<http://www.prenhall.com/brown/index2.html>). The material includes chapter self tests. **Lecture notes** will be available online: <http://www.chem.usu.edu/~brown/classes/chem1210F07/chem1210.html>. Lecture notes will begin being posted during the first week of classes. Notes may or may not be posted prior to each class. These lecture notes are meant as an additional study aid and are not a substitute for **regular** attendance of class lectures or assigned chapter reading and problems.

Prerequisite: Successful completion of Math 1050 or higher is required and previous high school chemistry is recommended.

Course Description: Chemistry 1210 is the first semester of a two-semester course of general chemistry intended for students in the natural sciences and engineering. The course will cover the material in the first 13 chapters of the text (excluding chapter 12).

Recitations: All students must register for a section of recitation listed in the course schedule (Sections 901-908). Recitation sections consist of groups of about 30 students and are administered by teaching assistants. **One sixth (1/6) of your Chemistry 1210 grade** (100 points) is derived from performance in recitation (quizzes and participation). The recitation setting is designed to develop the problem solving skills that are needed for in class examinations. **Recitation sections will begin during the second week of classes.**

Supplemental Instruction: Christina Hanson (email: c.m.hansen@aggiemail.usu.edu) will be the SI leader for the class. Christina attends all class sessions and is an important additional resource for students. Supplemental Instruction is an important resource that is available to the student for improving course problem solving skills. Christina's schedule for SI this semester is: Tuesdays: 6:30-7:20 in ENGR 106; Wednesdays: 4:30-5:20 in ENGR 103 and Fridays: 2:30-3:20 in Main 326.

Resource Room: A Resource Room will be available for all students taking general chemistry. Students may go during a specified time period to receive individual help from a teaching assistant. The times and locations of this service will be announced during the first week of class.

Exams: Three hourly exams (100 points each) will be given during class on the dates indicated on the attached course schedule. The final exam is in-class and counts 200 points and will be comprehensive (currently scheduled for Friday, December 14 from 7:30-9:20 AM in BNR 102). Exam questions will be in multiple-choice format and will be based upon

material covered in class, including assigned readings from the text. You are strongly encouraged to read the text chapters and work the practice problems in the text (especially those that I specifically suggest in class for each chapter). Also, it is helpful to take the practice chapter quizzes available on-line (www.prenhall.com/brown) and review the practice exams that will be posted on the course web site. Your class performance ultimately depends on your proficiency under testing conditions.

Missed Exam Policy: Missed exams which have documented and acceptable excuses will be made up with a comprehensive exam (based upon all material covered prior to the make up exam date) to be held at the end of the semester at a single time and date to be arranged. Excusable absences include: (1) illness when verified by a note from the Student Health Center or your doctor; (2) a family emergency which will require a note from your academic advisor and (3) any regularly scheduled university activities (e.g., sports teams) **only with prior approval** and a note from the person in charge of the activity stating explicitly the reasons for the absence. Students should notify the instructor in advance, if possible, prior to missing any exam. Students missing an exam will have one week to notify the instructor that they have a valid excuse and to produce the necessary documentation. Missed exams that are not made up will be scored as zero.

Grading: Grades will be assigned according to the results from three in class exams, recitation quizzes and the final examination using the following point distributions:

Exam I	100 points
Exam II	100 points
Exam III	100 points
10 Recitation Quizzes (10 points each)	100 points
Final Exam (Comprehensive)	200 points
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Total	600 Points

Course Grading Scale (percentage of 600 points)

A/A- : 100-88% **B+/B/B- :** 87-77% **C+/C/C- :** 76-60% **D :** 59-50% **F :** below 50%

Note: Grade cutoffs may change to lower percentages (but not higher) depending upon the exact class exam averages.

Also Note: the attached syllabus is tentative. I will attempt to follow it as closely as possible with respect to lecture topics and exam material. However, any changes as to the exact material to be covered in lecture and on each exam will be announced in class. It is therefore extremely important for you to attend class regularly.

Course Withdrawal: Students may withdraw from Chemistry 1210 as outlined in the most recent edition of the Utah State University General Catalog (pg. 36) and the most recently revised semester calendar (page 3 of Fall 2007 Schedule of Classes).

Additional Provisions: The administration of Chemistry 1210 will adhere strictly to the regulations outlined in the Fall 2007 Schedule of Classes (pages 102-108).

Course Learning Objectives

General course learning objectives include:

1. Develop knowledge of key facts as outlined during the course
2. Develop a suitable knowledge of the vocabulary of chemistry
3. Ability to explain chemical and physical properties using the periodic table
4. Ability to explain chemical and physical properties of macroscopic materials in terms of microscopic (atomic and molecular) structure.
5. Be able to explain chemical and physical properties of materials based upon their quantum structure.
6. Explain shapes of molecules based upon their electronic structure.
7. Relate physical properties of materials to the shape of the constituent molecules.
8. Provide a microscopic description of the 3 common phases of matter.
9. Perform quantitative stoichiometric calculations interchangeably using mass, moles, volumes, etc.

Some additional specific course learning objectives include (but are not limited to):

Describe units of measurement for mass, length, velocity, time
Use the metric system of units and perform conversions mathematically
Perform calculations utilizing correct significant figures
Identify and describe the particles inside an atom and describe the structure of an atom
Know the Periodic Table in relation to: atomic number; atomic mass; valence electrons
Be able to name simple atoms and general ionic and molecular compounds
Balance chemical equations
Differentiate between a chemical formula and an empirical formula
Define units of solution concentration
Define an acid, a base, a salt, and electrolyte
Calculate formula weights and perform stoichiometric calculations
Determine theoretical yields and experimental yields
Utilize the First Law of thermodynamics and Hess's Law
Be able to calculate enthalpies of balanced chemical reactions
Describe the nature of electromagnetic radiation
Describe the origin of line spectra and how they lead to quantum numbers
Describe Bohr orbitals and the structure of a many-electron atom
Describe the shapes of the Atomic Orbitals (s, p, d, f)
Utilize the Periodic Table to predict atomic trends in size and ionization energies
Draw Lewis diagrams for atoms and polyatomic species
Describe the Octet Rule and draw resonance structures
Predict molecular shapes using the Valence Shell Electron Repulsion Model
Predict molecular polarity
Differentiate single, double, and triple bonds and estimate relative bond energies
Describe the notion of hybrid orbitals and when this approximation works
Describe the properties of gases
Utilize the gas laws of Boyle, Charles, and Avogadro to calculate gas properties
Perform calculations using the Ideal Gas Law and understand its limitation
Describe and differentiate between the solid, liquid, and gas phases
Define the term colligative property
Show how vapor pressure of a solvent is affected by solute concentration

“Gain Score” Assessment Strategies

In order to gauge the effectiveness of the Chemistry 1210 course, several different methods of “Gain Score Analysis” will be employed. A “gain score” is a measurement of how much a student’s capability has (hopefully) increased from the beginning until the completion of the course. Throughout the semester, “embedded questions” will be presented (as part of the regular exams and quizzes). Results for the class as a whole will be pooled and tabulated at the end of the semester and the Gain Scores for the entire class will be available on the Chemistry & Biochemistry Department’s Assessment web page. Gain scores are not considered in grading. The Gain Score results are used as part of the University’s campus wide assessment process. **No individual student scores will be posted, only the collective gain scores for the class.**

One example of a gain score assessment would be the comparison of the performance on weekly quizzes to the performance on similar questions on a particular hour exam and/or the final examination. Another example of a gain score would be comparing results on specific hour exam questions to the results for the same or similar questions on the comprehensive final exam. The kinds of questions used for Gain Score assessment would emphasize some of the above-mentioned “Learning Objectives”. Gain Scores allow us to assess various aspects of the Chem 1210 course and help us to improve the course.

In accordance with the Americans with Disabilities Act, reasonable accommodation will be provided for all persons with disabilities in order to ensure equal participation in Chemistry 1210. A student who requires an accommodation must contact the Instructor. The disability must be documented by the Disability Resource Center. In cooperation with the Disability Resource Center, reasonable accommodation will be provided for students with Disabilities. Course material may be requested in alternate formats through the Disability Resource Center.

Chemistry 1210 Course (tentative) Outline

Monday Aug. 27 Ch. 1 Matter, Elements, Compounds	Wednesday Aug. 29 Ch. 1 Measurements	Friday Aug. 31 Ch. 2 Atomic Structure	Monday Sept. 3 Holiday No Class	Wednesday Sept. 5 Ch. 2 Periodic Table	Friday Sept. 7 Ch. 2 Nomenclature
Sept. 10 Ch. 3 Balancing Equations	Sept. 12 Ch. 3 Atomic, Molecular Weights	Sept. 14 Ch. 3 Empirical Formulas	Sept. 17 Ch.3 Calculations on Chemical Equations	Sept. 19 Ch. 4 Molarity, Electrolytes	Sept. 21 Ch. 4 Acids, bases, salts, ions
Sept. 24 Ch. 4 Metals, titrations	Sept. 26 Review of Chapters 1-4	Sept. 28 Exam 1 Chapters 1-4	Oct. 1 Ch. 5 Energy, 1st Law Thermodynamics	Oct. 3 Ch. 5 Enthalpy, Hess's Law	Oct. 5 Ch. 5 Enthalpy of formation
Oct. 8 Ch. 6 Radiant Energy	Oct. 10 Ch. 6 Quantum Effects	Oct. 12 Ch. 6 Bohr atom, Orbitals	Oct. 15 Ch. 6 Many electron systems	Oct. 17 Ch. 7 Atomic size, Energies	Oct. 19 No Classes Fall Break
Oct. 22 Ch. 7 Electron ionization, Electron affinity	Oct. 24 Review of Chapters 5-7	Oct. 26 Exam 2 Chapters 5-7	Oct. 29 Ch. 8 Lewis Structures	Oct. 31 Ch. 8 Covalent Bonding	Nov. 2 Ch. 8 Resonances, Octet violations
Nov. 5 Ch. 8 Bond Energies	Nov. 7 Ch. 8 Oxidation Numbers	Nov. 9 Ch. 9 VSEPR Theory	Nov. 12 Ch. 9 Bond Polarity	Nov. 14 Ch. 9 Hybrid Orbitals	Nov. 16 Ch. 10 Gases, Gas Laws
Nov. 19 Ch. 10 Partial Pressures	Nov. 21 No Classes Thanksgiving	Nov. 23. 8 No Classes Thanksgiving	Nov. 26 Ch. 10 Review Chapters 8-10	Nov. 28 Exam 3 Chapters 8-10	Nov. 30 Ch. 11 Liquids & Solids
Dec. 3 Ch. 11 Liquids & Solids	Dec. 5 Ch. 13 Solution Properties	Dec. 7 Ch. 13 Solution Properties	Dec. 10 No Classes Finals Week	Dec. 12 No Classes Finals Week	Dec. 14 Final Exam

Note: The Chem 1210 Final Exam is currently scheduled for Friday Dec. 14 at 7:30-9:20 AM in ENGR 103