

**Chemistry 1223 (02): General Inorganic Chemistry II, Core 7 or 9**  
**Spring 2009**  
**MWF 10:00-10:50, Olin Hall 100**

**Professor:** Dr. Lee Lewis  
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**Text:** **Chemistry**, 9<sup>th</sup> edition by Raymond Chang (required)  
The **Student Solutions Manual** and **Student Study Guide** accompanying this text are very useful but not required.

**Requirements:** A non-graphing scientific calculator (TI-30X) is required (and supplied) for both in-class exercises and exams. If more familiarity with the calculator is desired, you may purchase one for approximately \$10 to 14 from either the bookstore or a local discount store. Each student must familiarize himself/herself with available computer facilities in order to access the World Wide Web as well as personal email accounts. Each student must check email periodically in order to receive class announcements, assignments, and test/quiz aids.

**Objectives:** This course provides students with an understanding of basic chemical principles applicable to real-world problems and situations, encourages students to think independently about scientific concepts related to real-world issues, and enhances the students' thinking and problem-solving skills. This course also encourages thinking and applying chemical and scientific principles towards "the big-picture" problem-solving (the application of individual concepts in solving a multi-component problem).

This course, plus Chemistry 1221 (General Chemistry Laboratory), satisfies Core Curriculum 7 or 9. The following skills will be developed during the course of this class (<http://www.millsaps.edu/admiss/apply/articulationguide.pdf>):

<b>Liberal Arts Abilities</b>
<b>Reasoning.</b> the ability to analyze and synthesize arguments, to question assumptions, to evaluate evidence, to argue positions, to draw conclusions, and to raise new questions. The two types of reasoning most used in this class are: <i>Scientific</i> -the ability to use inductive reasoning to interpret and classify facts by a general statement, formulation of a hypothesis about how to explain the facts, and the deductive reasoning to test the hypothesis with carefully designed experiments. <i>Quantitative</i> -the ability to use mathematical reasoning as a tool of analysis and as a means of conveying information. Students will enhance their reasoning skills through using logic and critical analysis in interpreting and applying data in all aspects of problem-solving for homework, quizzes, tests, and class discussions.
<b>Communication.</b> the ability to express ideas, arguments, and information coherently and persuasively orally and in writing. Students will enhance their writing and communications skills through classroom and lab discussions, writing clear and concise explanations for tests and quizzes, and a writing assignment.
<b>Historical Consciousness.</b> the ability to understand the achievements, problems, and perspectives of the past and to recognize their influence upon the course of events. Students will enhance their knowledge of history through learning the theories, laws, and principles garnered and developed from past and present study and how to these past and present principles in application to present and future problems.

**Note:** It is the responsibility of any student with a disability or disabilities to 1) contact Patrick Cooper to register for disability services (You can reach him via e-mail at [coopeap@millsaps.edu](mailto:coopeap@millsaps.edu) or by calling extension 1228. It is school policy that accommodations will not be granted until a meeting with Patrick has taken place, each semester, and until the appropriate paperwork has been received by the instructor.) and 2) to notify his/her professor **within the first three weeks of the semester**. A request for an appointment with his/her professor is recommended so a viable plan may be developed to meet the special need(s) of the student.

**Grading:** The student's grade will be compiled from the following areas:

**CATEGORY PERCENTAGE OF FINAL GRADE/IMPORTANT POINTS**

**Exams:** 66% (22% each test)

There will be three tests of equal percentage.

**Final Exam:** 22%

The final will be comprehensive over the course of the semester and will be a standardized ACS (American Chemical Society) Exam.

**In-Class Quizzes/Worksheets/Homework/Pop-Tests:**

12%

There will be approximately 8 to 9 in-class quizzes, several out-of-class homework assignments, and the occasional pop quiz or worksheet during the semester.

**Writing Assignment:**

A writing assignment will be assigned and included in the laboratory grade. This assignment is appropriate to include in the student's Writing Portfolio if desired.

**Attendance:** Attendance is mandatory for this class. *If more than six lectures are missed, the student's grade will automatically drop a letter grade (e.g. from a B to a C).*

Grades will be assigned according to the following scale:

A	A-	B+	B	B-	C+	C	C-	D+	D	F
94-100	90-93	86-89	83-85	80-82	76-79	73-75	70-72	66-69	60-65	< 60

**Tentative Exam Schedule:** ***Exam 1---Friday, February 13***  
***Exam 2-- Friday, March 13***  
***Exam 3-- Wednesday, April 15***

**Final:** The time designated for CHEM 1223(02) (MWF classes at 10:00) to take the final exam is Thursday, April 30 at 2:00 P.M. Any requests for a different exam time must be submitted in writing to the Dean.

**Makeup Policy:** All assignments must be turned in by or before the due date. There are NO EXCEPTIONS. Makeup exams will NOT be given except in the case of extenuating circumstances.

**Grading Errors:** If the student thinks that the instructor has made an error in his/her grade, please submit in writing the reason(s) why the student thinks he/she deserves more credit along with the assignment. This request must be turned in within one week of the assignment having been returned to the student.

**Honor Code:** This course operates under the guidelines defined by the Millsaps College Honor Code. (See Major Facts, ps. 28-32, [http://www.millsaps.edu/student\\_life/majorfacts.pdf](http://www.millsaps.edu/student_life/majorfacts.pdf) and the last page of this syllabus.) Specifically all assignments are to be accomplished with no help from any source (including but not limited to human, cyber, or text) unless given permission by your instructor. Unless otherwise noted, all work turned in for a grade is pledged to be that of your own. The following actions are considered Honor Code violations if they occur during a CHEM 1213 exam: Cell phones are not permitted even to check the time. The student may not leave the room without the professor's consent except in the case of an emergency. After taking an exam, discussion of an exam with other individuals who have not taken the exam is a violation.

**Changes:** Changes to this syllabus are not anticipated. If there are any changes to the course material due to time constraints, they will be announced in class.

**Course Outline (Tentative Timeline)**

**Note:** At the end of each chapter are many sample problems. In order to strive for success in chemistry, one should work these problems. To help you get *started*, there is a list of "Suggested Study Problems" after each chapter. In addition, reading ahead before attending class and taking notes during class helps a student strive for success in chemistry. Thus, the dates in parentheses are suggested dates of when we will cover the materials. It is suggested to read ahead by ten pages after the previous lecture.

**Chapter 10      Chemical Bonding II: Molecular Geometry and Hybridization of Atomic Orbitals (January 12-14)**

(Sections 10.1 through 10.4 were covered during the fall semester. It is the student's responsibility to review these materials to aid with understanding sections 10.5 through 10.)

Section 10.5      Hybridization of double and triple bonds

Section 10.6      Molecular Orbital Theory

Section 10.7      Molecular Orbital Configurations

Section 10.8      Delocalized Molecular Orbitals

Suggested Study Problems

Concepts: 4, 15, 17, 25, 26, 33, 45, 48

Problems: 8, 12, 19, 27, 30, 38, 44, 51, 52, 57, 67

**Chapter 11      Intermolecular Forces and Liquids and Solids (January 16-26)**

Section 11.1      The Kinetic Molecular Theory of Liquids and Solids

Section 11.2      Intermolecular Forces

Section 11.3      Properties of Liquids

Section 11.8      Phase Changes

Section 11.9      Phase Diagrams

Suggested Study Problems: 2, 3, 7, 10, 12, 16, 18, 19, 23, 30, 31, 39, 51, 52, 55, 75, 78, 81, 86, 88, 92, 93, 94, 107

**Chapter 12      Physical Properties of Solutions (Laboratory, Weeks of Jan. 26-29 and Feb. 2-5)**

(The material in Chapter 12 will be covered as part of laboratory, and you are responsible for the following material in lecture.)

Section 12.1      Types of Solutions

Section 12.2      A Molecular View of the Solution Process

Section 12.3      Concentration Units

Section 12.4      The Effect of Temperature on Solubility

Section 12.5      The Effect of Pressure on the Solubility of Gases

Section 12.6      Colligative Properties of Nonelectrolyte Solutions

Section 12.7      Colligative Properties of Electrolyte Solutions

Section 12.8      Colloids

Suggested Study Problems: 1, 3, 4, 6, 7, 12, 16a, 18, 22, 24c, 25, 28, 37, 49, 56, 61, 62, 66, 76, 78, 87, 92

**Chapter 13      Chemical Kinetics (January 28-February 9)**

Section 13.1      The Rate of a Reaction

Section 13.2      The Rate Law

Section 13.3      Relation between Reactant Concentration and Time

Section 13.4      Activation Energy and Temperature Dependence of Rate Constants

Section 13.5      Reaction Mechanisms

Section 13.6      Catalysis

Suggested Study Problems: 2, 6, 8, 11, 12, 18, 20, 22, 28, 30, 35, 38, 40, 52, 54, 76, 80, 88

**Chapter 14 Chemical Equilibrium** (*February 11-23*)

- Section 14.1 Concept of Equilibrium and the Equilibrium Constant  
 Section 14.2 Writing Equilibrium Constant Expressions  
 Section 14.3 The Relationship between Kinetics and Chemical Equilibrium  
 Section 14.4 What does the Equilibrium Constant Tell Us? (K and Q)  
 Section 14.5 Factors that Affect Chemical Equilibrium

Suggested Study Problems: 8 (b, e, f), 15, 18, 20, 22, 26, 30, 32, 36, 40, 44, 48, 51, 52, 56, 68, 78

**Ch's 4&15 Acids and Bases** (*February 25-March 11, Spring Break is 3/16 to 3/20*)

- Section 4.3 Acid-Base Reactions (Review on own. Be prepared to work problems in class on day covered.)  
 Section 4.7 Acid-Base Titrations (Review on own. Be prepared to work problems in class on day covered.)  
 Section 15.1 Bronsted Acids and Bases  
 Section 15.2 The Acid-Base Properties of Water  
 Section 15.3 pH—A Measure of Acidity  
 Section 15.4 Strengths of Acids and Bases  
 Section 15.5 Weak Acids and Acid Ionization Constants  
 Section 15.6 Weak Bases and Base Ionization Constants  
 Section 15.7 The Relationship Between the Ionization Constants of Acids & Their Conjugate Bases  
 Section 15.8 Diprotic and Polyprotic Acids  
 Section 15.9 Molecular Structure and the Strength of Acids  
 Section 15.10 Acid-Base Properties of Salts  
 Section 15.11 Acid-Base Properties of Oxides and Hydroxides  
 Section 15.12 Lewis Acids and Bases

Suggested Study Problems:

Ch. 4: 26, 27, 28, 30, 32, 34, 83, 86, 88

Ch. 15: 5, 6, 9, 16, 20, 34, 38, 40, 42, 50, 52, 62, 66, 72, 76, 80, 81, 90, 94, 106

**Chapter 16 Acid-Base Equilibria and Solubility Equilibria** (*March 23-April 3*)

- Section 16.1 Homogeneous versus Heterogeneous Solution Equilibria  
 Section 16.2 The Common Ion Effect  
 Section 16.3 Buffer Solutions  
 Section 16.4 Acid-Base Titrations  
 Section 16.5 Acid-Base Indicators  
 Section 4.2 Precipitation reactions (Review on own and especially know solubility rules. Be prepared to work problems in class on day covered.)  
 Section 16.6 Solubility Equilibria  
 Section 16.8 The Common Ion Effect and Solubility  
 Section 16.9 pH and Solubility  
 Section 16.11 Application of the Solubility Product Principle to Qualitative Analysis

Suggested Study Problems: 2, 3, 4, 6, 10, 16, 18, 20, 22, 24, 26, 32, 33, 34, 38, 39, 40, 43, 44, 48, 51, 55, 58, 60, 64, 68

Cont. on next page...

**Chapter 18**    **Entropy, Free Energy, and Equilibrium** (*April 6-10*)  
*Chapter 6: Review on your own* the First Law of Thermodynamics and other material associated with enthalpy

Section 18.1    The Three Laws of Thermodynamics  
Section 18.2\*    Spontaneous Processes  
Section 18.3    Entropy  
Section 18.4    The Second Law of Thermodynamics  
Section 18.5    Gibbs Free Energy  
Section 18.6    Free Energy and Chemical Equilibrium  
Suggested Study Problems: To be assigned at a later date.

**Ch's 4&19**    **Oxidation-Reduction** (*April 13-24*)

Section 4.4    Oxidation-Reduction Reactions  
Section 19.1    Redox Reactions  
Section 19.2    Galvanic Cells  
Section 19.3    Standard Reduction Potentials  
Suggested Study Problems  
Ch. 4: 44, 45, 46, 47, 48, 99  
Ch. 19: A handout will be given.

### ACADEMIC HONOR CODE of MILLSAPS COLLEGE

Millsaps College is an academic community dedicated to the pursuit of scholarly inquiry and intellectual growth. The foundation of this community is a spirit of personal honesty and mutual trust. Through their Honor Code, the students of Millsaps College affirm their adherence to these basic ethical principles.

An Honor Code is not simply a set of rules and procedures governing students' academic conduct. It is an opportunity to put personal responsibility and integrity into action. When students agree to abide by an Honor Code, they liberate themselves to pursue their academic goals in an atmosphere of mutual confidence and respect.

The success of the Code depends on the support of each member of the community. Students and faculty alike commit themselves in their work to the principles of academic honesty. When they become aware of infractions, both students and faculty are obligated to report them to the Honor Council, which is responsible for enforcement.

The pledge signed by all students upon entering the College is as follows:

**As a Millsaps College student, I hereby affirm that I understand the Honor Code and am aware of its implications and of my responsibility to the Code. In the interests of expanding the atmosphere of respect and trust in the College, I promise to uphold the Honor Code and I will not tolerate dishonest behavior in myself or in others.**

Each examination, quiz, or other assignment that is to be graded will carry the written pledge: **"I hereby certify that I have neither given nor received unauthorized aid on this assignment. (Signature)"** The abbreviation "Pledged" followed by the student's signature has the same meaning and may be acceptable on assignments other than final examinations.

It is the responsibility of students and faculty to report offenses to the Honor Code Council in the form of a written report. This account must be signed, the accusation explained in as much detail as possible, and submitted to the Dean of the College.

#### The Honor Council, 2008-2009

Students:

David Butler, Chair

Joey Quillin, Vice-Chair

Brooke Furrh, Sergeant-at-Arms

Stephen Butler, Mark Herndon, Amanda Smith

Faculty:

Mr. Harvey Fiser, Senior Faculty Secretary

Dr. Rachel Heard

Ms. Ashleigh Powers

Four graduate student positions and one non-voting freshman position will be filled at the beginning of the fall term.

#### Offenses and Violations of the Honor Code

(From pp. 34-35 of the Major Facts...)

The following is a representative, but not exhaustive, list of academic offenses covered by this code: [If you have any doubt as to whether an action is a violation, ask your professor. See additional violations on p. 2 of this syllabus.]

- A. Plagiarism
- B. Dishonesty on examinations and tests
  - a. Using any outside material deemed not usable by the professor of the course [e.g. any material not given to you by the professor to take the actual test]
  - b. Giving or receiving answers [or any information] while taking a test
  - c. Revealing the content of an exam [or any information about the exam] before others have taken it
- C. Dishonesty on assignments
  - a. Receiving unauthorized help on an assignment
  - b. Submitting the same paper for two classes unless approved by the professors of both classes
  - c. Interfering with another student's course materials
- D. Lying about academic matters, including missed assignments or absences
- E. Unauthorized use of a computer file, program, user name, or password
- F. Unauthorized use of, tampering with, or removing community materials from laboratories [or removing any material that is not your personal property from a chemistry laboratory] or the library.