COLBY COMMUNITY COLLEGE

Syllabus

CH177 – Chemistry I
Fall 2012
5 Credit Hours

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Lecture Times: MW 9:25 – 10:40 THO 407
Lab Times: M 13:40 - 16:30 THO 408
T 13:40 - 16:30 THO 408

ABOUT THIS CLASS

Three hours of lecture and three hours of laboratory per week are included. This is a study of the basic principles, laws and theories of chemistry, designed for those students needing five or more hours of general chemistry. Inorganic, important metallic and nonmetallic substances are covered. The course is recommended for certain students of agriculture, home economics, nursing, biology and general education. A physical lab is required with lecture in this course. (Offered each semester)

COURSE MATERIALS:

Required Text: *Chemistry*, John E. McMurry, Robert C Fay
Students are expected to attend classes. However, various sports events, the judging team, etc. will require students to miss class. If a student is absent, it is his/her responsibility to obtain the notes and any assignments.

COURSE REQUIRMENTS

Lecture Exams: 4 exams, 100 pts each
Quizzes: 10 pts each
Final Exam 200 pts
Lab Write-Ups: 20 pts each

COURSE OBJECTIVES

1. A higher level of critical and creative thinking processes
2. The ability to solve problems using a variety of techniques and methods
3. The ability to utilize the technology relevant to the learner's discipline
4. An greater awareness of the world around you

Assessment Outcomes tested during this course*:*

Students will be able to:

- Explain the processes involved in the scientific method, and be able to apply it to investigate natural phenomena and solve problems.
- Explain the design and significance of experiments that led to the adoption of modern atomic theory.
- Recognize and interpret isotopic notation; understanding the relationship between average atomic masses and isotopic masses (example: calculating the average mass of an element given isotopic masses and natural abundance).
- Relate atomic mass to composition in terms of subatomic particles.
- Descriptive chemistry of ionic and covalent compounds.
- Learn the names and symbols (or formulas) for often-used elements, simple and polyatomic ions, Arrhenius acids and bases, and simple ionic and covalent compounds.
- Describe and identify Arrhenius, Bronsted-Lowery, and Lewis acids and bases.
- Identify conjugate acids and bases.
- Determine the valence electron configuration of the s and p block elements and the 3d metals.
- Determine oxidation states and assign oxidation numbers of atoms in simple ions, and the central atoms of polyatomic ions and covalent compounds.
- Use the valence electron configuration to predict common oxidation numbers of group 1, 2, 13, 16, and 17 elements.
- Define periodic trends in electronegativity, ionization energy and electron affinity, and relate them to the electron configuration of the element.
- Describe general properties of solutions.
- Understand the forces that affect the aqueous solubility of materials.
- Calculate the molar concentration of a solute.
- Describe procedures for preparing a solution of known molarity.
- Chemical reactions and stoichiometry.
- Classify chemical reactions and predict whether simple chemical reactions will proceed.
- Employ stoichiometric reasoning in evaluating reactions of gases, liquids and solids.
- Perform calculations that employ relationships involving masses, formula units, and the mole relationships.
- Determine empirical and molecular formula from appropriate data.
- Demonstrate the ability to balance chemical equations.
- Discuss solubility rules
- Write net ionic equations based on solubility rules.
- Balance simple acid base reactions
- Define oxidation and reduction.
- Balance simple redox reactions and determine the identity of the oxidizing and reduction agents.
- Determine limiting reagents from stoichiometric data; calculate the maximum product yield, and leftover reagent.
- Calculate theoretical yield from stoichiometric data.

- Properties of solids, liquids, and gases
- Describe the origins and relative magnitudes of intermolecular forces.
- Relate phase behavior to nature of intermolecular forces.
- Compare general properties of solids, liquids and gases; including density, compressibility, heat capacity, and randomness intermolecular forces.
- Describe phase transitions and phase diagrams (e.g. triple point and critical point).
- Understand general properties of gases.
- Describe properties and temperatures of gasses to kinetic molecular theory.
- Understand and employ ideal gas laws.
- Understand general properties of liquids.
- Understand general properties of solids.
- Compare and contrast properties of ionic, molecular and metallic solids.
- Describe, define, and perform calculations involving the following basic concepts of thermodynamics:
- Heat capacity.
- Calorimetry.
- Heat/Work/Energy.
- Enthalpy/Standard states.
- Hess's Law.
- Heat of formation.
- Phase changes/Energy.
- Use of other thermodynamic cycles in the determination of thermodynamic quantities, such as the lattice energy of an ionic solid.
- Conceptually and quantitatively relate spectroscopic observation of atoms to quantum mechanical theories.
- Describe the historical development of and distinction between classical and wave mechanics.
- Describe the radial and angular dependence of solutions to the Schroedinger equation for hydrogen-like atoms (s, p, d orbitals).
- Describe the behavior of photons and electrons during electronic transitions between principle quantum levels and calculate the wavelength and frequency of light involved in these transitions.
- Using the Aufbau principle, write the electron configuration of many electron atoms and monatomic ions.
- Relate quantum mechanical theory to the organization of the periodic table and the periodic properties of elements.
- Molecular Bonding and Structure.
- Describe the characteristics of ionic and covalent bonding.
- Draw Lewis dot structures for atoms, simple ionic and molecular compounds.
- Predict the shape of simple molecules and ions using VSEPR theory.
- Explain how electronegativity differences relate to bond polarity.
- Identify polar and non-polar molecules.
- Understand valence bond descriptions of molecular structure and bonding.
- Understand hybridization, including sp^3, sp^2 and sp hybridization.
- Predict hybridization from VSEPR structures.

- Determine bond orders and relate them to relative bond strength.
- Describe the MO theory description of bonding and antibonding orbitals. Relate MO theory to concepts such as the structural, energetic, spectroscopic, and magnetic properties of molecules.

ATTENDANCE/MAKEUP POLICY

It is the responsibility of the student to check his/her schedule and make any adjustments through the drop/add procedure. Students must attend classes within the certification period in order to be enrolled. State law requires the withdrawal of any student who does not attend class at least one time during this period.

Students will have five instructional days to add or drop with a full refund for a full-semester or first 8-week classes. To add a class after five days, the student must first receive written approval from the Dean of Academic Affairs and then the instructor. After 15 days students will not be allowed to add a full-semester or first 8-week class.

Students may withdraw any time after this five day period and until the date published by the Registrar's Office as the last date to withdraw, in which case a W will be recorded on their transcripts. After that time a grade of W cannot be given.

ASSIGNMENT POLICY

All assignments must be typewritten unless otherwise indicated. All assignments are due at class time on the due date unless other arrangements are made with the instructor prior to the due date. No Exceptions! True emergencies will be discussed.

TEST POLICY

All tests, quizzes and exams must be taken the date scheduled unless arrangements are made with the instructor prior to the test date. No Exceptions! True emergencies will be discussed.

FINAL EXAMINATION

A comprehensive final exam will be scheduled according to the final schedule and cannot be altered. The final exam will be composed of one-half of the material covered since the last exam and one-half comprehensive material. Generally, the test will be (but not limited to) true and false, matching and short answer.

LABORATORY SESSIONS

Laboratory sessions meet once a week for the designated 180 minute long periods found in the line schedule, for a total of three hours in lab each week. Each lab exercise that is evaluated will be valued up to 100 points. Any biological/natural science laboratory is associated with the possibility of exposure to chemical preservatives, disinfectants and potentially pathogenic organisms. Any individual with known allergies to chemical agents, is pregnant, or immunity challenged, should consult the instructor and their physician prior to attending lab. All students are expected to attend all lab sessions. Missed Lab assignments cannot be made up. No eating, drinking, chewing or smoking is allowed in any of the labs at any time.

GRADING SYSTEM

90% - 100%	**A**
80% - 89%	**B**
70% - 79%	**C**
60% - 69%	**D**
59% and below	**F**

ACADEMIC INTEGRITY

Colby Community College defines academic integrity as learning that leads to the development of knowledge and/or skills without any form of cheating or plagiarism. This learning requires respect for Colby's institutional values of quality, service and integrity. All Colby Community College students, faculty, staff, and administrators are responsible for upholding academic integrity.

Cheating is giving, receiving, or using unauthorized help on individual and group academic exercises such as papers, quizzes, tests, and presentations through any delivery system in any learning environment. This includes impersonating another student, sharing content without authorization, fabricating data, and altering academic documents, including records, with or without the use of personal and college electronic devices.

Plagiarism is representing or turning in someone else's work without proper citation of the source. This includes unacknowledged paraphrase, quotation, or complete use of someone else's work in any form. It also includes citing work that is not used and taking credit for a group project without contributing to it. The following procedure will be used for students who violate the policy:

- First Offense – Student will receive a zero for the assignment and the student will be reported to the Dean of Academic Affairs.
- Second Offense – The student will be reported to the Dean of Academic Affairs and removed from the class.
- Third Offense – The student will be reported to the Dean of Academic Affairs and dismissed from the college.

Any questions about this policy may be referred to the Dean of Academic Affairs.

Access and Opportunity - Reasonable Accommodation and Institutional Standards

According to the Americans with Disabilities
Act, it is the responsibility of each student with a disability to notify the college of his/her disability and to request accommodation. If a member of the class has a documented learning disability or a physical disability and needs special accommodations, he/she should contact Student Support Services, which is located in the Student Union.

EXTRA CREDIT

Reserved for true emergencies and at the discretion of the instructor.

LECTURE SCHEDULE Spring 2012

Week	Date (Tuesdays)	Date (Thursdays)
1		22-August Chapter 1
2	27-August Chapter 2	29-August Chapter 2
3	3-September **Labor Day**	5-September **Exam #1 (Ch 1-2)**
4	10- September Chapter 3	12-September Chapter 3
5	17-September Chapter 4	19-September Chapter 4
6	24-September Chapter 4	26-September **Exam #2 (Chp 3-4)**
7	1-October Chapter 5	3-October Chapter 5
8	8-October Chapter 6	10-October Chapter 6
9	15-October Chapter 7	17- October Chapter 7
10	22-October Chapter 9	24-October **Exam # 3 (Ch 5-7)**
11	29- October Chapter 9	31- October Chapter 9
12	5-November Chapter 8	7-November Chapter 8
13	12-November Chapter 8	14-November **Exam #4 (Ch 8-9)**
14	19-November Chapter 10	21-November **Thanksgiving**
15	26-November Chapter 10	28-November Chapter 10
16	3-December Chapter 11	5-December Chapter 11
17	**Finals**	**Finals**

LAB SCHEDULE Spring 2012

Week	Topic (Tuesday or Thursday)
2	Basic Laboratory Operations
3	Qualitative Analysis of a Hydrate
4	Percent of Aspirin in an Aspirin Tablet via Acid/Base Titration
5	Analysis of Vitamin C in Beverages via Oxidation/Reduction Titration
6	Paper Chromatography
7	Proof of Alcohol
8	Mass Percent of $NaHCO_3$ tablets
9	Halogen Reactions
11	Building Molecular Models
12	Gas Laws and Airbags
13	Synthesis of Aspirin
14	Bleach Analysis

Disclaimer: This syllabus is not a contract and the instructor retains the right to make changes in the course's schedule, policies and requirements as necessary so long as those changes with the policies of Colby Community College and do not affect transferability.