

CHEM 113-General Chemistry

Spring 2008

Instructor: Dr. Andrew Bryan, Room 309 Science Bldg, ext. 1738
voicemail : ext. 1738 email: bryan@campbell.edu

Office Hours: 3 – 4:30 PM M W, 1-2 PM T,TH (other times by appointment)

Text: Chemistry, Zumdahl, Seventh Edition, Houghton Mifflin, 2007. (with student solutions manual, study guide and technology guide.)

Website:
http://college.hmco.com/chemistry/zumdahl/chemistry/7e/student_home.html

Calculator: An inexpensive non-programmable scientific calculator is required for this course and lab. Learn how to use it before your tests! Note: Programmable calculators will not be allowed on exams.

General Description:

This course is continuation of Chemistry 111. Emphasis will be placed on chemical and physical properties of solutions, chemical equilibria, acid/base equilibria, chemical kinetics, descriptive chemistry, general thermodynamics and electrochemistry, taught in accordance with the Statement of Purpose of Campbell University (found at <http://www.campbell.edu/admn/ingoals/Sacs.html>)

Statement of Purpose of Campbell University (excerpt)

- IV. Therefore, the mission of Campbell University, as a community of Christian scholars, is to
- A. provide students with a Christian world view;
 - B. bring the word of God, mind of Christ, and power of the Spirit to bear in developing moral courage, social sensitivity, and ethical responsibility that will inspire a productive and faithful maturation as individuals and as citizens;
 - C. transfer from one generation to the next the vast body of knowledge and values accumulated over the ages;
 - D. encourage creativity, imagination, and rigor in the use of intellectual skills;
 - E. affirm the University's commitment to the belief that truth is never one-dimensional but in wholeness is revelatory, subjective, and transcendent as well as empirical, objective, and rational, and that all truth finds its unity in the mind of Christ;
 - H. equip students with superior vocational skills, productive insights, and professional integrity;

Course Objectives:

- To provide students with a Christian worldview of the chemical sciences
- To promote a Christian ethic with regard to chemical issues
- By the end of the term, students earning a passing grade should be able to:
 - Understand the Properties of Solutions including
 - Solution composition and concentration units
 - The energies of solution formation
 - Factors affecting solubility
 - The vapor pressure of solutions
 - Boiling-point elevation and freezing-point depression
 - Osmotic Pressure
 - Colligative properties and electrolyte solutions
 - Colloids (briefly)
 - Understand simple thermochemistry including
 - The nature of energy

- Enthalpy and calorimetry
- Hess's law
- Standard enthalpies of formation
- Present sources of energy (briefly)
- New energy sources (briefly)
- Understand liquids and solids including
 - Intermolecular forces
 - The liquid state
 - Introductory structures and types of solids (briefly)
 - Structure and bonding in metals (briefly)
 - Network atomic solids (briefly)
 - Molecular solids (briefly)
 - Ionic solids (briefly)
 - Vapor pressure and changes of state
 - Phase diagrams
- Understand chemical kinetics including
 - Reaction rates
 - Rate laws
 - Form of the rate law
 - Integrated rate law
 - Reaction mechanisms
 - Model for chemical kinetics
 - Catalysis
- Understand chemical equilibrium including
 - The equilibrium condition
 - The equilibrium constant
 - Equilibrium expressions involving pressure
 - Heterogeneous equilibria
 - Applications of the equilibrium constant
 - Solving equilibrium problems
 - Le Châtelier's principle
- Understand acids and bases including
 - The nature of acids and bases
 - Acid strength
 - The pH scale
 - Calculating the pH of strong acid solutions
 - Calculating the pH of weak acid solutions
 - Bases
 - Polyprotic acids
 - Acid-Base properties of salts
 - Acid-Base properties of oxides
 - Lewis Acids and Bases
- Understand applications of aqueous equilibria including
 - Acid-base equilibria
 - Common ion
 - Buffered solutions
 - Buffer capacity
 - Titrations and pH curves
 - Acid-base indicators
 - Solubility equilibria
 - Solubility equilibria and the solubility product
 - Complex ion equilibria
- Understand spontaneity, entropy and free energy including
 - Spontaneous processes and entropy
 - Entropy and the second law of thermodynamics

The effect of temperature on spontaneity
 Free energy
 Entropy changes in chemical reactions
 Free energy and chemical reactions
 The dependence of free energy on pressure
 Free energy and equilibrium
 Free energy and work
 Understand simple electrochemistry including
 Galvanic cells
 Standard reduction potentials
 Cell potential, electrical work and free energy
 Dependence of cell potential on concentration
 Batteries
 Corrosion
 Electrolysis
 Commercial electrolytic processes

Prerequisite:

Completion of Chemistry 111 with a grade of C or better is required. If you made a D or F in CHEM 111, or have not taken CHEM 111 (or its equivalent), you should not be registered for this course.

Test Schedule

TEST #1: Monday, January 28, 2008
TEST #2: Wednesday, February 27, 2008
TEST #3: Wednesday, April 9, 2008
Final Exam: published by registrar

****No Make up tests will be given There will be no exemptions from the final exam! Tests must be taken during the scheduled periods. ****

****Cell phones are not allowed during exams. Bookbags, purses, hats etc. will be placed in front of the class during exams. ****

Lecture Quizzes/Worksheets:

Short lecture quizzes will be given in laboratory. Schedule below:

	Week of	Quiz/Worksheet Topic
	Jan 14	Chem 111 Review (Lecture Handout to be turned in first laboratory period)
	21	Concentration Units
	28	No Quiz/Worksheet
	Feb 4	ΔE , q , w , C , and ΔT
	11	Hess' Law
	18	Lewis Structures/Intermolecular Forces
	25	No Quiz/Worksheet
	Mar 3	No Quiz/Worksheet (Spring Break)
	10	Kinetics
	17	No Quiz/Worksheet
	24	Writing Equilibrium Constant Expressions
	31	Equilibrium Constant Calculations
	Apr 7	No Quiz/Worksheet
	14	No Quiz/Worksheet due to Lab Final

Attendance:

Attendance is required in lecture and lab. Attendance will be taken by sign-in sheet. According to university policy four absences is considered the maximum number of "cuts" for this class. **Four cuts results in a final grade of "F"**. NOTE: All absences will be recorded in accordance with this policy. Tardies interrupt class! Be prompt. **The instructor reserves the right to impose a penalty for excessive tardies.** It is your responsibility to notify the instructor after class when you are tardy, or you may be marked absent.

For an absence to be considered as excused, it must be documented, e.g. a note signed and dated by a university official, doctor, lawyer, etc. in accordance with university policy. Excused absences are included as part of your "allowed" absences!

Military excuses: Extra leniency will be allowed in the case of absences for military deployment. However, documentation will need to be provided by your superior.

Remember that missing any class or lab will be making an already difficult course seem more impossible.

Inclement Weather Policy:

Campbell University policy is to remain in operation during periods of inclement weather. The University also recognizes that flexibility is required in extreme circumstances and thus, all persons are encourage to use maturity, good judgment, and professionalism in dealing with adverse weather conditions. In the rare situation where conditions force the University to alter its schedule, announcements will be made over radio (90.1FM and others), television (Local channels 5, 11 and 17), internet (www.campbell.edu) and telephone (on-campus: 5700; local 910-814-5700; long distance, 1-800-760-8980). If Dr. Bryan is unable to make it to campus, his voicemail message will reflect the change.

Grading For This Course:

Tests (3) and Quizzes	50%
Laboratory	25%
Final Exam	<u>25%</u>
	100%

Grading is based on the 10 point scale.(90% or better, A; 80-90%, B; 70-80%, C; 60-70%, D; less that 60%, F.)

Note: In the calculation of your final grade, if your final exam (percentage) is greater than one of the mid-semester tests (percentage), the final exam (percentage) will be substituted. You should not rely on this for "pulling up your semester grade!" Mark Twain once said, "Luck is always against the man [or woman] who depends upon it". **Note if you do miss a mid semester test for any reason, your final exam percentage will replace this score! (Do not use this as an excuse to miss a mid-semester test!)**

Withdrawing from this course:

Friday, February 1, is the last day to drop this course without receiving a grade. Friday, March 14, is the last day to drop this course with a wp or wf grade. Note a minimum of 12 hours of coursework is necessary to be considered a full-time student. If dropping a course causes you to fall below that number, you may loose financial aid and suffer other consequences.

Integrity Statement:

All students are subject to the academic integrity and behavioral expectations of the University. In accordance with the University Catalog found at (http://www.campbell.edu/catalog/03_05/stand_expect.html) matters of cheating, plagiarism or other type of academic dishonesty will result of a grade of FX in the course. The "F" indicates failure of the course; the "X" indicates the reason for the failure (i.e., academic dishonesty). The "FX" will remain on the student's record until he or she graduates or transfers to another college or university.

Classroom Conduct:

Cell phones and beepers should not be used in class. Personal conversations and other disruptive behavior will not be tolerated. Students who are being disruptive will be asked to leave. Students arriving late to class should quietly find a seat one of the side aisles, and pick up any handouts after class.

Laboratory:

- Registration for lab is required in this course. Labs will reinforce the material covered in class by "hands-on" experience. Lab begins **Monday, January 14**.
- Students must obtain the General Chemistry Laboratory Manual as well as safety goggles from the bookstore and be prepared for the first week's laboratory **before** their scheduled laboratory period.
- The Lab Manager for this course is **Mrs. Elmore**, 814-5420. She is the person to contact if you have problems concerning your lab.
- You will be required to wear Safety Goggles in Lab. Only approved Goggles may be worn in lab. **Mrs. Elmore** must approve personal Safety Goggles (those purchased outside of the bookstore) before they can be worn in lab.
- Failure to attend lab and do required work will significantly reduce your chances of passing this course (it represents 25% of your final grade.) **You cannot receive credit for CHEM 113 without passing CHEM 113L laboratory during the semester you are taking CHEM 113.**

Laboratory Schedule:

	Week of	Experiment
	Jan 14	Sign-in / Background
	21	EXPERIMENT 13: Concentration Units
	28	EXPERIMENT 14: Determination Of Bleach - A Redox Titration
	Feb 4	EXPERIMENT 15: Specific Heat Capacity
	11	EXPERIMENT 16: Hess's Law
	18	EXPERIMENT 17: Freezing Point Depressions
	25	EXPERIMENT 18: Chemical Kinetics - The Iodine Clock
	Mar 3	No Lab (Spring Break)
	10	EXPERIMENT 19: Spectroscopy of Dyes
	17	EXPERIMENT 21: Acid/Base Properties of Hair Care Products
	24	EXPERIMENT 22: Brønsted/Lowry Acids And Bases
	31	EXPERIMENT 20: Le Châtelier's Principle
	Apr 7	No Lab
	14	Lab Final

Makeup Laboratories and Quizzes

Apr. 21 at 6 pm and Apr. 22 at 6 pm will be makeup lab and lecture quiz dates. Students may perform a lab and/or lecture quiz to makeup for one missed, excused lab and lecture quiz. There is a maximum of 40 students that can take a makeup. Students must petition Mrs. Elmore before April 18th for permission to perform a makeup lab. Permission to perform a makeup lab will be granted to qualified students on a first come basis. Students with excused absences must attend a makeup lab or their absence will convert to unexcused.

Student Support Services:

Students with documented disabilities who desire modifications or accommodations should contact the office of Student Support Services located in the Universities Hight House.

Students desiring a tutor should contact the office of Student Support Services located in the Universities Hight House. Hight House will try to arrange for group tutoring for all students. Dr. Bryan will announce when this has been finalized.

For personality and career interest testing, and job placement services, contact:

John Creech - Assistant Dean of Student Services

910-893-1901 or creech@campbell.edu

Study Hints:

General Chemistry is a course that will require a good deal of study time. A good rule of thumb is to devote 3-4 hours of outside study for each hour of lecture.

Students find studying in groups of four or five is helpful. Many lifelong friendships are made in study groups.

A student's suggestion: Copy the lecture notes before class.

Attempt suggested problems before looking up the answers. If you don't have the correct answer, rework the problem. Only after reworking the problem should you refer to the solutions manual.

Don't wait until the last minute to study for an exam. There are too many concepts for this strategy to be successful.

Course Outline (Spring 2008)

Dates	Topic	Chap.(sect.)	PS#
I.	•Review of Concentrations	11(11.1)	#1
	•Energy Changes, First Law, Calorimetry	6(6.1-6.2)	#2
	•Enthalpy & Hess's Law	6(6.3-6.6)	#3
	•Intermolecular Forces and State	10(10.1-10.2)	#4
II.	•Types of solids (very brief)	10(10.3-10.7)	#4
	•Phase Changes, Diagrams, and Energy	10(10.8-10.9)	#4
	•Solutions and Colligative Properties	11(11.2-11.8)	#5
	•Chemical Kinetics- Rate, Rate Laws	12(12.1-12.5)	#6
	•Kinetics - Mechanisms and Models (brief)	12(12.6-12.8)	#6
III.	•Equilibria, LeChatelier's Principle	13(13.1-13.7)	#7
	•Acid-Base Equilibria, pH	14(14.1-14.12)	#8
	•Acid-Base(cont.) pH, buffers, titrations	15(15.1-15.5)	#9
IV.	•Solubility, Precipitation Reactions	15(15.6-15.8)	#10
	•Complex Equilibria		
	•Spontaneity and Entropy	16(16.1-16.3)	#11**
	• Free Energy and Chemical Change	16(16.4-16.9)	#11**
	• Electrochemical Cells	17(17.1-17.4)	#12**
	• Applications of Electrochemistry	17(17.5-17.8)	#12**

*Final Exam will be comprehensive. Topics listed above are tentative and subject to change. Please attend class for specific assignments.

**Additional Problems may be assigned for these sections