

# CHEM 1412 – General Chemistry II Honors Course Syllabus – Spring 2010

**Course:** Chemistry 1412H –General Chemistry II Honors  
**Instructor:** Dr. Judy Chu  
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**Office Hours:** M 2-4 p.m.  
And By Appointment

## Required Books and Supplies:

Chang, R., **Chemistry**, 10<sup>th</sup> Ed., Published by McGraw Hill, 2010.  
**CHEM 1412 Lab Manual, Brazosport College**, Published by Signature Labs.  
Scientific Calculator.  
Safety Goggles – must meet ANSI Z87.1-1989 certification.

## Course Description:

This course is a continuation of General Chemistry I. Materials to be covered include chemical kinetics and equilibria, thermodynamics, electrochemistry, and organic chemistry. To pass the course, the student must **successfully complete** the laboratory portion of the course.  
Prerequisite: CHEM 1411 (final grade of C or better).

## Student Resources:

1. Desire2Learn: <https://online.brazosport.edu/index.asp>
2. Course Name: **CHEM1412-JChu-S10**  
User Name: First initial of first name, last name, and last 4 digits of your Student ID number.  
Initial Password: BC+your pin number (example: bc123456) obtained from the registrar.
3. Tutorials: <http://www.brazosport.cc.tx.us/~chem/tutor.html>

## Expectation of Students

Students will:

- attend every class.
- show up prepared (text, notebook, pen, assignments completed) and on time.
- seek help at the first sign of learning difficulties.
- fully participate in the class.
- have contributed significantly to all assignments turned in for credit (no copying).
- not cheat on any examination.
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## Grades:

Final Grades will be determined according to the following system:

Hourly Exams	40%
Homework / ChemSkillBuilder	15%
Lab	20%
Honors Project	10%
Final Exam	15%

Note: a student must successfully **complete** the laboratory portion of the course to obtain any credit for the lecture section Chem. 1412H.

### **Examinations**

The examinations will last approximately one hour during class, with the exception of the final, which will last two hours. The exact date of each quiz will be announced in class closer to the actual date. **There will be no make-up exams.** However, if the student anticipates a legitimate absence (as judged by the instructor) for an exam, arrangements can be made to take the exam in the Learning Resource Center, LRC. This must be done before the next scheduled class after the exam. A missed exam will be counted as a zero toward the final grade. The final exam grade will replace one missed exam grade, with the exception of the ChemSkill Builder.

### **Homework Assignments:**

Homework assignments are based on the **Online ChemSkill Builder**. The average of your scores from ChemSkill Builder will count as 15% of your grade. ChemSkillBuilder has the advantage of giving the student immediate feedback concerning the correctness of the student's work. If a student answers incorrectly, the correct answer with an explanation is provided. There is no limit to the number of times a student can complete an exercise. If a student scores higher in a subsequent try the higher grade will be figured into the average. To receive any credit for the homework, it must be completed on or before the due date listed in the schedule.

Instructions for student self-registration are as follows:

Log on to <http://www.chemskillbuilder.com>.

1. You can use your user name and password from last semester (CHEM 1411H). However, you need to add the CHEM 1412 Honors section, to receive credit for your work.
2. If you have not previously registered or used ChemSkillBuilder, click on "New Student Registration" and follow the instructions below to register:
  - a. Enter your Student Login Number and create a user name. Click on "Submit" when finished.
  - b. Fill in all of the boxes. Click on the school drop-down menu and select "Brazosport College". Click on instructor drop-down menu and select "Judy Chu". Select **CHEM1412** and Section **Honors**.
  - c. When registration is complete, you will be asked to log back in with your student login number and user name.
  - d. You are ready to begin ChemSkill Builder. Click on an assigned unit from the left-hand navigation bar and begin.

### **Class Attendance Policy**

- If you are unable to complete this course, you must withdraw by Friday, Nov. 6, 2009. Withdrawal from a course is a formal procedure, which the student must initiate. If you stop attending class and do not withdraw, you will receive a performance grade, usually an "F". If you think you must withdraw from this course, please talk with me about it first.
- Being late for class and leaving class early (without permission) are extremely disruptive to the class. If it becomes habitual, the student will be asked to withdraw from the course.

### **Academic Code of Conduct**

A student, who cheats on an exam or other assignment, will receive a zero for the exam or assignment. Repeat offenses will be discussed with the Dean of Student Services and **will result in a failing grade for the course.** While studying with fellow students is encouraged, any work turned in for credit must be substantially the work of the student (no copying). Students are advised to read the *Standards of Student Conduct* in the *Student Guide and Calendar* for a complete description of college policies, rules and regulations in this and other areas.

## Study Tips

Class attendance and participation will be important to your success. Come to class prepared. This means that you should spend **at least six hours per week outside of class** studying and doing homework assignments. Space out your studies evenly. Your retention and understanding of the material will be enhanced if you follow these simple rules.

## Course Objectives:

The course is designed to help the student:

- A. Determine the rate of a chemical reaction, to write the rate law for any reaction given the rate and reagent concentrations, and to write the integrated rate law for first order reactions.
- B. Describe a chemical system at equilibrium and to calculate the effect of a given change in reaction conditions on the equilibrium concentrations.
- C. Determine whether or not a reaction will occur, and to calculate the heat flow in a reaction system, the maximum amount of useful work that can be done by a spontaneous reaction, and the equilibrium state at a given temperature.
- D. Determine the overall reaction in an electrochemical cell and the cell potential at the given reactant concentrations.
- E. Identify the family of an organic compound given its structure and to be able to name the compound and write a reaction typical of the compound.
- F. Gain a background sufficient to provide for success in more advanced courses in chemistry.
- G. Acquire the laboratory skills necessary to perform both quantitative and qualitative analyses in a laboratory setting as specified in section III.

## Chem. 1412 Honors\* – MW Lecture Schedule Spring 2010

Week	Date	Topic	Chap. - Unit	ChemSkill Builder	Due Date
1	Jan. 11	Chemical Equilibrium, Constant and Expression	14.1-14.2	17.1, 17.2, 17.3	1/13
1	Jan. 13	Calculations using Equilibrium Constant	14.3-14.4	17.4	1/20
2	Jan. 18	<b>Martin Luther King Holiday</b>			
2	Jan. 20	Factors affecting Equilibrium Const.	14.5	17.5	1/25
3	Jan. 25	Reaction Rate and Rate Law	13.1-13.3	16.1, 16.2, 16.3	1/27
3	Jan. 27	Activation Energy and Temperature Dependence of Rate Constants	13.4	16.4, 16.6	2/1
4	Feb. 1	Reaction Mechanism and Catalysis	13.5-13.6	16.5	2/3
4	Feb. 3	Review for Exam 1			
5	Feb. 8	<b>Exam 1</b>			
5	Feb. 10	Bronsted Acids and Bases, pH, Strength of Acids and Bases	15.1-15.4	18.1, 18.2, 18.3, 18.4	2/15
6	Feb. 15	Acid-Base Eq. Const calculations	15.5-15.7	18.5	2/17
6	Feb. 17	Polyprotic Acids, Salts, Hydrolysis	15.8-15.12	19.1, 19.2	2/22
7	Feb. 22	Solution Equilibria, Common Ion Effect, Buffers	16.1-16.3	19.3	2/24
7	Feb. 24	Acid-Base Titrations, Indicators, Solubility Equilibria	16.4-16.6	19.4, 19.5, 20.1	3/1
8	Mar. 1	Fractional Precipitation, Common Ion Effect, pH and Solubility	16.7-16.9	20.2, 20.3	3/3
8	Mar. 3	Complex Ion Equilibria, Qualitative Analysis	16.10-16.11	20.4	3/8
9	Mar. 8	Review for Exam 2			
9	Mar. 10	<b>Exam 2</b>			
10	Mar. 15-19	<b>Spring Break</b>			
11	Mar. 22	Thermodynamics, Spontaneity, Entropy	18.1-18.3	21.1, 21.2	3/24
11	Mar. 24	2 <sup>nd</sup> Law of Thermodynamics, Gibbs Free Energy	18.4-18.5	21.3, 21.4	3/29
		<b>Mar. 26 - Last Day to Withdraw</b>			
12	Mar. 29	Gibbs Free Energy and Chemical Equilibrium	18.6-18.7	21.5	3/31
12	Mar. 31	Redox Reactions, Galvanic Cells and Standard Reduction Potential	19.1-19.3	10.3, 10.4, 10.5	4/5
13	Apr. 5	Thermodynamics of Redox Rxns, Concentration Cell, EMF, Batteries	19.4-19.8	22.1, 22.2, 22.5	4/7
13	Apr. 7	Review for Exam 3			
14	Apr. 12	<b>Exam 3</b>			
14	Apr. 14	Class of Organic Cmpds, Aliphatic Hydrocarbons	24.1-24.2	24.1, 24.2, 24.3	4/19
15	Apr. 19	Aromatic Hydrocarbons, Functional Groups	24.3-24.4	24.5, 24.6	4/21
15	Apr. 21	Polymers	25.1-25.2	25.1, 25.2	4/26
16	Apr. 26	Nuclear Chemistry	23.1-23.7	23.1-23.4, 23.6	4/28
16	Apr. 28	Review for Final Exam			
17	May 3	<b>Final Exam</b> May 3, 10:30 - 12:30			

\*This schedule is subject to change.

\*Online ChemSkillBuilder work is due at 8 AM on the indicated date.

**CHEM 1412 Honors LAB SCHEDULE – Spring 2010****Wednesday 1 – 3:50PM**

<b>WEEK</b>	<b>DAY</b>	<b>EXPERIMENTS</b>
1	Jan. 13	TECH 380 – Safety & Check-In
2	Jan. 20	MISC 877 – Graphical Analysis Using Excel
3	Jan. 27	Exp. 616 –Introducing Chemical Equilibrium
4	Feb. 3	Exp. 508 – Kinetics of a Chemical Reaction
5	Feb. 10	Exp. 508 – Kinetics of a Chemical Reaction (cont.)
6	Feb. 17	Exp. 356 - Gravimetric Sulfate
7	Feb. 24	Exp. 356 - Gravimetric Sulfate (cont.)
8	Mar. 3	Exp. 499 – pH of Acids, Salt, and Buffer Solutions
9	Mar. 10	Exp. 494 - pH Titration
10	Mar. 17	<b>No Lab (Spring Break)</b>
11	Mar. 24	Exp. 364 -Group I Qualitative
12	Mar. 31	Exp. 364 -Group I Qualitative (cont.)
13	Apr. 7	Exp. 450 – Electrochemistry
14	Apr. 14	Exp. 439 – Synthesizing Aspirin
15	Apr. 21	Exp. 360 – Colorimetric Determination of Aspirin
16	Apr. 28	Honor's Project Presentations Clean-up and Check out

Important Semester Dates:

Martin Luther King Holiday – January 18

Spring Break – March 15-19

Last Day to Withdraw from Classes– March 26

# CHEM 1412 H– Spring 2010

Dr. J. Chu, Office: K-206, Phone: 230-3435, judy.chu@brazosport.edu

## Homework Assignment based on the ChemSkill Builder Units

### Chapter 14 – Chemical Equilibrium

#### Unit 17 – Chemical Equilibria

- Section 1: Equilibrium Law and  $K_c$
- Section 2: Gas Equilibria and  $K_p$
- Section 3: Heterogeneous Equilibria
- Section 4: Equilibrium Calculations
- Section 5: Le Chatelier's Principle

### Chapter 13 – Chemical Kinetics

#### Unit 16 – Chemical Kinetics

- Section 1: Reaction Rates from Chemical Data
- Section 2: Rate law equations
- Section 3: Experimental Kinetics
- Section 4: First Order Rate Problems
- Section 5: Reaction Mechanisms
- Section 6: Temperature and Rate

### Chapter 15 – Acids and Bases

#### Unit 18 – Acid-Base Equilibria

- Section 1: Acid-Base Reactions
- Section 2:  $K_w$  and pH Calculations
- Section 3: pH Meter Simulation
- Section 4: Strong Acids and Bases
- Section 5: Weak Acids and Bases

### Chapter 16 – Acid-Base Equilibria and Solubility Equilibria

#### Unit 19 – Buffers and Hydrolysis

- Section 1: Salt Hydrolysis
- Section 2: Common Ion Effect
- Section 3: Buffers
- Section 4: Titration Calculations
- Section 5: Titration Curves

#### Unit 20 – Solubility Equilibria

- Section 1: Solubility Product Equation
- Section 2: Solubility Calculations
- Section 3: Common Ion Effect
- Section 4: Simultaneous Equilibria (Complex Ion Equilibria)

### Chapter 18 – Entropy, Free Energy and Equilibrium

#### Unit 21 – Thermodynamics

- Section 1: Enthalpy Change
- Section 2: Entropy Change
- Section 3: Free Energy Changes
- Section 4: Spontaneous Reactions
- Section 5: Free Energy and Concentration

## **Chapter 19 – Electrochemistry**

### Unit 10 – Oxidation-Reduction Reactions

Section 3: Balancing Simple REDOX Equations

Section 4: Half-Reaction Method

Section 5: Balancing Complex REDOX Equations

### Unit 22 – Electrochemistry

Section 1: Using Redox Potentials

Section 2: Voltaic Cells

Section 5: Nernst Equation Problems

## **Chapter 23 – Nuclear Chemistry**

### Unit 23 – Nuclear Chemistry

Section 1: Properties of Radiation

Section 2: Balancing Nuclear Reactions

Section 3: Predicting Nuclear Stability

Section 4: Isotope Decay Kinetics

Section 6: Nuclear Binding Energy

## **Chapter 24 – Organic Chemistry**

### Unit 24 – Organic Chemistry

Section 1: Hydrocarbon Structure and Nomenclature

Section 2: Functional Group Nomenclature

Section 3: Addition and Substitution Reactions

Section 5: Condensation and Hydrolysis

Section 6: Chirality and Optical Activity

### Unit 25 – Polymer Chemistry

Section 1: Addition Polymers

Section 2: Condensation Polymers

### **Recommended Homework Problems in the Textbook**

14 (8,13,15,17,21,29,37,39,43,51,53,57)

13 (5,15,17,18,19,21,27,29,37,41,49,52,71)

15 (4,6,16,18,20,31,40,42,46,52,62,66,73,78)

16 (4,8,10,14,20,22,31,37,44,46,58,60,70,78)

18 (2,5,10,14,18,20,24,26,30,52)

19 (2,6,12,16,18,21,22,24,29,30,36,39)

24 (3,6,12,14,16,23,25,26,28,31,35,36,41,42)

## CHEM 1412 – Spring 2010

Dr. J. Chu

### General Chemistry II Lab

#### Safety:

1. Safety goggles must be worn at all times in the laboratory.
2. Know the locations of eyewashes, showers, fire extinguishers and exits.
3. Use common sense.
4. Never point the open end of a test tube at someone.
5. Bare feet are NOT allowed into the laboratory. Open sandals and shoes are discouraged.
6. All broken glass goes in the glass boxes located on the ledges above the benches.

#### Laboratory Housekeeping:

1. Arrange apparatus neatly and compactly. Keep all books except the laboratory manual off the laboratory workbench.
2. Do not throw filter paper or solid materials into the water troughs or sinks.
3. Keep all reagent bottles clean (especially acids and bases).
4. Keep the reagent-dispensing area clean. Pay particular attention to keeping the balances clean and in order. If you spill chemicals, clean them up immediately. Put caps back on reagent containers.
5. At the end of the laboratory period, clean off your workspace with a sponge or wet paper towel. Check to see that the gas and water have been turned off. You are responsible for keeping the area neat. Repeated failure to do so may result in loss of credit.

#### **CLEAN UP STARTS 10 MINUTES BEFORE THE OFFICIAL END OF THE CLASS PERIOD.**

When the time is up, you are supposed to be out of the laboratory. Failure to properly budget your time is presumptive of poor planning and your grade may suffer.

#### Grading:

1. Most experiments include a Pre-lab **quiz** (25 points), which must be administered at the beginning of the lab period in which the experiment will be performed. The Pre-lab exercises for the experiment can be used as an aid for the quiz, and must be turned in with the quiz at the same time. There will be no make up quizzes. You are expected to come to the lab prepared to perform the assigned experiment.
2. The Data Sheets and Observations (50 points) and the Post-lab exercises (25 points) will be due at the end of the period following the completion of the experiment.
3. The Data Sheets and Observations must be completely filled out in ink. When you make an error, cross it out with a single line. Do not use liquid paper or obliterate the error. For example: error error

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#### References:

Occasionally reference data may be required on some of the compounds used in lab. Consult the CRC Handbook of Chemistry and Physics. A copy of the **CRC** can be found in the lab.

## Working With Your Lab Partner

Lab Partner's Name \_\_\_\_\_

Best way to contact (phone, email...) \_\_\_\_\_

To become a productive lab partner, develop and fine-tune the following skills and abilities:

1. **RESPONSIBILITY.** Before leaving the lab, make sure both you and your lab partner have completely filled out both your and your partner's data sheets. This is your insurance policy.
2. **LISTENING SKILLS.** You must be able to put your own thoughts aside and listen without interrupting or interpreting what your partner is saying. Try it - it's not easy.
3. **SELF-CONFIDENCE.** You must believe in yourself and in the worth of your contributions. Speak up!
4. **OPEN-MINDEDNESS.** Welcome change, and listen to the ideas others bring.
5. **CREATIVITY.** Try stretching yourself outside of your routines. Try a different method. It might work better than your current method.
6. **THOUGHT.** Keep your goal in sight. Instead of following the lab manual like a recipe, consider the instructions to be a guide. When you make an error, how can you adapt the manual's procedure to still reach your goal? Which type of balance will give you enough significant digits?
7. **RELIABILITY.** Do what you say you're going to do.
8. **OBJECTIVITY.** Assess ideas, thoughts, and opinions from all sides, not just yours.
9. **OPTIMISM.** Look at problems as opportunities. Knocking over the beaker containing your product can lead to learning about purification techniques.
10. **COOPERATION.** You must be able to accept team decisions and work just as hard on other people's ideas as you do on your own.

Adapted from Ern, B. L. and Lawley, C. M. (1992). The office professional as a team player. Office Hours, 229, 1.

## Chemistry 1412 Honors Project

As stated in the syllabus, the honors project is 10% of the course grade.

- **Topic** – The topic range is quite broad. The criterion is some aspect of chemistry as it relates to society, an average person's life. The topic should be narrow enough that it can be covered in at least some depth in a 10 minute presentation. Topic should be approved by the instructor.
- **Individual or Team** – Students may elect to form two person teams. Team members would then be responsible for a 20 minute presentation and would receive the same grade.
- **Components** –
  - Bibliography – A written list of references in some acceptable format.
  - Outline – Written, to be turned in along with the bibliography at least one week prior to the presentation.
  - Presentation – The presentation would be oral and may be supplemented by use of the whiteboard, flipcharts, transparencies or PowerPoint. The presentation will be scheduled during the last portion of a regular class period on any non-test day before December 1.