

CH 123/Spring 2004 January 15, 2004

## **General Chemistry II**

### **Course Outline**

#### **Instructor Information**

Dr. J. J. Weimer, Associate Professor, Chemistry/Chemical & Materials Engineering

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Office Hours: MSB 125, MW 13:00-15:00, F 11:30-13:00, and otherwise by appointment

#### **Goal**

The goal of this course is to complete your studies in general chemistry.

#### **Objectives**

An objective is a milestone toward meeting a goal. This course will

1. Present the concepts and principles needed to understand solutions, chemical kinetics, chemical equilibria, acid/base reactions, aqueous reaction chemistry, reaction entropy and free energy, electron transfer reactions, main and transition group elements, and possibly nuclear chemistry;
2. Identify relevant problems that involve the above information;
3. Formulate appropriate solutions to these problems;
4. Illustrate how computational tools and literature references can be used to help solve a selection of these problems more effectively; and
5. Illustrate how the above knowledge plays an important role in the world today.

#### **Outcomes**

An outcome is a measurable accomplishment of the work undertaken. At the end of this course, you will

1. Have a basic understanding of the concepts and principles that describe solutions, chemical kinetics, chemical equilibria, acid/base reactions, aqueous reaction chemistry, reaction entropy and free energy, electron transfer reactions, main and transition group elements, and possibly nuclear chemistry;
2. Be able to identify relevant problems that involve the above information;
3. Be able to formulate appropriate solutions to these problems;
4. Be aware that computational tools and literature references are useful to solve a selection of these problems more efficiently; and
5. Understand that this knowledge plays an important role in the world today.

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#### **Course Requirements**

Prerequisite: CH 121 (chemistry)

Parallel: CH 126 (you must be signed up for CH 126 in parallel)

Textbook: Chemistry & Chemical Reactivity, 5th Ed., J. C. Kotz, P.M. Treichel, Jr, and P. A. Harman,

(Thomson Brooks/Cole, USA) 2003.

**Computer Tools:** You are required to have access to a computer with internet connectivity through an email client and a Web browser. You are strongly recommended to know how to use word processing, spreadsheet, and symbolic math applications for word processing, computational calculations, and graphing.

**Email:** You are required to maintain a working email service and send me your email address.

**Literature Search:** You are required to be able to research for specific information about the course material in the library and elsewhere as needed.

### **Resources**

Lectures, Recitations, and Tutorial Room

Lectures are MWF 10:20 - 11:15 in MSC 113. **Attendance is required and will be monitored**

**on a random basis.** Anyone who is found to have missed more than 10% of the classes (meaning four lectures out of forty one total lectures) without a formal excused absence will not be able to

take advantage of any offers made to the class to change how their grades are calculated.

Any

information presented during the lectures is fair game for assignments and exams.

Recitation sections to discuss homework are not formally scheduled as part of the course.

A

recitation may be scheduled prior to each exam as interest dictates.

The Chemistry Department staffs a tutorial room for students who need help with problems in

chemistry. Please see the Chemistry Department for a list of the hours when this room is occupied.

### **Other Reference Books**

The CRC Handbook of Chemistry and Physics is a useful, comprehensive reference source for a

range of chemical and physical properties of matter.

Other reference texts can be found by searching the UAH Library (<http://library.uah.edu/>) for REFERENCE

texts with the SUBJECT general chemistry or by searching appropriately on the Web.

Finally, a study guide can be purchased for the final exam. Further details will be provided during

the course.

### **Internet and Computer Resources**

Web pages will be set up for the course at <http://chemistry.uah.edu/courseware/>.

Information about

computer software and hardware available on campus is at

[http://www.uah.edu/admin/is/is\\_home/](http://www.uah.edu/admin/is/is_home/).

## Laboratory

The laboratory provides an opportunity for working with the concepts and principles presented in

this course and **must** be scheduled in parallel with this course.

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## Assessment Methods

### Assignments

Homework will be assigned using the OWL system. Further instructions and a URL for login are

provided on the course Web page.

### Exams

Four course exams will be given during lecture periods. They will be closed book and will cover

material up to and including the review session prior to the exam. An excused absence can be

granted from one course exam for legitimate reasons. **No make-up course exams will be given.**

A comprehensive final exam will be given. It will be drawn from the ACS exam bank for general

chemistry that covers information presented in both CH 121 and CH 123.

### Course and Instructor Evaluation Forms

You will be given a form at the end of the semester that allows you to assess how well the course

has met its objectives and outcomes. You will also be given an opportunity near the end of the

course to rate the performance level of the course and instructor.

### Grading

Each homework assignment will be graded based on an appropriate scale and number of points.

**No late homework will be accepted.** Unless your attendance record precludes this option, you

will be able to drop one homework grade.

The grades on each course exam will be based on an appropriate number of points. To allow for

variations in individual performance on course exams, unless your attendance record precludes this

option, you will be allowed to increase the weighting on one course exam by 2.5% and decrease

the final score on another by 2.5%. **You will not be permitted to drop any course exam grades.**

Your grade on the final exam will be determined by appropriately scaling the ACS ranking you

receive on your final exam. The ACS ranking is based on placement of your score with all students

across the nation who have taken the same standardized ACS exam.

The final course grade will be calculated according to the following weightings:

Homework Course Exams Final Exam  
with 4 exams 20% 50% (12.5% each) 30%  
with 3 exams 20% 45% (15% each) 35%

Final course grades will be assigned based on the scale: below 90% - B, below 80% - C, below 65% - D, below 55% - F. The +/- grading system will be used as appropriate.

### **Formats**

#### **Homework**

All homework must be done through the Web based OWL system. You must obtain a valid login code from the textbook you purchased for the course or from the OWL registration system. Only the newest edition of the textbook is valid, and you may continue to use your login from CH 121 if it was valid within the last year.

On the OWL system, you must provide YOUR last and first names, especially in cases where you are registering using someone else's textbook code. You must also provide a valid email address to the OWL system (see below for details on what is invalid).

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#### **Exams**

You must bring a calculator, pencil, eraser, and straight edge or ruler to all exams. Course exams will include calculation and essay questions. You will not need blank paper, partial credit will be awarded based on clarity and correctness of method, and abuse of significant digits or units will count against you on the course exams. The final exam will be multiple choice.

#### **Email**

In the subject of the first email message you send, put CH 123 Student. I do not read the body of the first message. The message must be sent from a system that you will use to read your email.

You are welcomed to send more than one email address.

In all subsequent email messages, please remember to include the phrase CH 123 somewhere in the subject line. This helps me to sort messages and reply promptly.

I will add your email address to a class list. Notices of changes in course assignments, updates to

Web pages, or other issues will be sent via email to the members of the list. Also, should you have

a question of general interest, I will respond to the question by forwarding it and my answer to the entire list of students.

**Email addresses that bounce email or give warnings of overfilled mailboxes will be considered invalid and may be dropped from the class list without warning.**

### **Course Records**

You are welcomed to tape record the lectures. Course lecture notes are also available from my office to photocopy.

### **Special Considerations**

Any student with learning disabilities or who is in need of special consideration for the lectures, exams or assignments is asked to see me as soon as possible during the first week of the course.

### **General Policies**

You are responsible for reading the relevant information in the textbook before it is covered in lecture; attending all lectures; attempting problems on the homework assignments; and making use of the lectures, office hours, email, and recitation sections to ask questions. Please let me know beforehand if you will miss a course exam. After the fact requests for excused absences must be presented within one day after the exam, and a written confirmation will be required to validate the late excuse.

The University has a Code of Student Conduct that is given in the Student Handbook. Academic

Misconduct will be dealt with severely in this class. I consider academic misconduct to include such things as copying from someone during an exam, misrepresenting who you are, presenting an assignment of questionable originality as your own work, and bringing a cheat sheet to an exam when not permitted. The consequences for academic misconduct may include a failing grade for the material presented or for the entire course.

Please raise comments about classroom management outside of the lecture period. Please do not wait until the end of the semester to vent your frustrations.

Extenuating circumstances (such as acts of God, illness, or personal trauma) for anything presented in this Course Outline will be handled on a case by case basis. Sufficient notification and possibly written validation of the excuse may be required.

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### **Course Disputes**

Disputes that arise during the course are to be brought forward to me first. For grade disputes,

you must bring the complaint forward no later than the next lecture after the return of the grade.

The dispute must be clarified in writing and the paperwork submitted to me in person.

For any

other disputes, complaints, or difficulties, I encourage you to talk with me during my office hours.

If such a discussion is unsatisfactory for you, your next step should be to contact the Chair of

Chemistry.

I hope you enjoy the course!

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## Syllabus

Topic Textbook Chapters

States of Matter

**I. Solutions and Their Behavior** 14

Control of Chemical Reactions

**II. Chemical Kinetics** 15

**III. Chemical Equilibria** 16

**IV. Acid/Base Chemistry** 17

**V. Aqueous Equilibria** 18

**VI. Entropy and Free Energy** 19

**VII. Electron Transfer Reactions** 20

Chemistry of the Elements

**VIII. Main Group Elements** 21

**IX. Transition Group Elements** 22

**X. [Nuclear Chemistry]** 23

Horizontal lines show the topics to be covered by each course exam.

Topics in [] will be covered as time permits.

# CH 126

## General/Inorganic Chemistry Laboratory II

### Fall 2004

**Instructor:** Office:  
e-mail: Office hours:  
Phone:

**Books & supplies:** Laboratory Manual Chemistry 126, General Chemistry II, Second Edition, by M. Setzer & W. Setzer,  
and a calculator.

**Clothing:** Students must provide the following safety clothing; these items **are not furnished**. Eye protection is required **at all times** while in the laboratory; **safety glasses** or prescription glasses that provide **adequate** protection of the eyes are acceptable (clear lenses only). If there is a question as to adequate coverage, please consult the Laboratory Manager. Contact lenses are extremely dangerous in a chemistry laboratory and are strongly discouraged. If you insist on wearing contact lenses, you must wear face-fitting goggles and you must identify yourself to your lab instructor. Rubber or latex **gloves** should be worn while carrying out experimental work, handling chemicals, etc. A **laboratory coat or apron** is required. If an apron is used, you must also have **long sleeves**. Long hair must be pulled back or otherwise restrained. Closed-toe shoes must be worn; sandals or any other types of open shoes are prohibited. No roller blades or skates are allowed in the lab. It is also recommended that students bring a roll of **paper towels** for their own use.

**General Information:** Each laboratory procedure should be carefully studied **before** the lab session. The pre-lab assignment must be completed prior to the experiment. You will not be allowed to begin an experiment without first completing the pre-lab. If you have not completely read the lab instructions and precautions, you are a hazard to yourself and those around you. The instructor will cover the overall purpose and principles of the experiment at the beginning of the laboratory. If there is anything about the experiment you do not understand, feel free to ask questions at any point. Some equipment must be signed out from the stockroom. This equipment **must be returned** at the end of your lab period. Report any injuries or chemical spills to your instructor immediately.

**Attendance and General Citizenship:** This is a 100-level course; attendance is **mandatory**. You are expected to show respect for your instructor and your classmates. Cell phones and pagers must be turned off while you are in lab. You will be required to leave if you do not observe these rules.

**Grading:** Grades will be assigned according to the following breakdown: Final grades will be assigned according to the average earned using the scheme at left. Percentage scores will correspond to the following letter grades:  $\geq 90\%$  A

Pre-lab and Post-lab Questions 25%	
Experimental Worksheets 65%	80%-89.9% B
Safety, technique, preparation 10%	70%-79.9% C
	60%-69.9% D
	< 60% NC

Late papers will be graded down according to the following scheme: two days late, -20%; one week late, -40%; two weeks late, you get NO points. We will accept NO EXCUSES for late laboratory reports.

Cheating will not be tolerated. Anyone found cheating will be dealt with according to the UAH Student Handbook.

Laboratory techniques and safety practices. These points are based upon the observations of the teaching assistant as to how you conduct yourself in the laboratory (Are you handling noxious chemicals in the fume hood? Are you cleaning up spills on the bench or on the balances? Are you wearing safety glasses? Are you using the equipment and glassware properly?).

Punctuality, lab preparation, etc. These points are based upon the observations of the teaching assistant as to whether you are prepared to carry out the day's experiment (Did you come to the laboratory on time and prepared to do the experiment?).

Pre-lab questions will be collected by your instructor at the beginning of class. If you are tardy, your pre-lab questions will not be collected or graded for that session (although you should still have them finished in order to have permission to participate in the lab); a grade of zero will be recorded. Three tardinesses will count as one unexcused absence.

Quizzes, announced or unannounced, may be given throughout the semester at the discretion of the instructor.

If you have an unavoidable absence, **CONTACT THE INSTRUCTOR AS SOON AS POSSIBLE**. A day will be scheduled at the end of the term to carry out make-ups for excused absences; you ***must*** discuss the labs to be made up with your instructor ***before*** this day. You must provide documentation as to the cause of the absence in order to be eligible to make up a lab either during the term or on the make up day. An instructor must be present for a student to make up a lab. Adequate notice must be provided to the stockroom to ensure materials can be prepared. The instructor will tell you when the experimental worksheet will be due for the make-up session. Unexcused absences cannot be made up, the worksheet will not be graded, and a grade of zero will be recorded. ***After two unexcused absences, you will receive a grade of "NC" for the course.***

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**Glassware:** Laboratory glassware is expensive. When experiments are carried out using glassware, some things will get broken and we expect that. However, excessive breakage, or breakage resulting from carelessness are unacceptable laboratory practices---poor laboratory technique, and will be graded accordingly. When you break glassware be sure to dispose of it correctly in the broken glass container, not just in a trash can. For broken thermometers, be sure to clean up the any mercury mess as well as the glass.

**Safety:** Because flammable liquids and corrosive and health-damaging chemicals are frequently encountered in the laboratory; unsafe laboratory practices cannot and will not be tolerated. Anyone observed violating safety rules, which may result in damage to their own health (for example, not wearing safety glasses, handling noxious chemicals outside the hood, etc.), will be reprimanded and graded down on technique. No food or drinks are allowed in the laboratory. All books, coats, backpacks, etc. must be placed on the shelves in the front area of the laboratory. If the safety violation threatens the health or safety of others, the violator will be asked to leave the laboratory. Student refusing to leave will be removed by campus police. Know where the fire extinguisher, safety shower, and eyewash fountain are located.

**Chemical Waste Disposal:** In order to avoid environmental contamination, laboratory chemicals must be disposed of properly. All wastes should be placed in appropriately labeled containers. If you are not sure where to dispose of any waste ask your instructor. Do not pour anything down the sink without explicit instructions to do so. Solid chemical waste is placed in the appropriate chemical waste bucket, **NOT IN THE TRASH CAN**. Broken glass is placed into the broken glass container, place only broken glass in the broken glass container. Never put solids, organic wastes, or heavy-metal salts down the drain!

**Schedule:**

Week Experiment # Experiment

- 1 Introduction, lab drawer assignment, Lab Safety
- 2 1 Colligative Properties: Molecular Weight Determination
- 3 2 Kinetics of the Reaction Between Iodide and Persulfate
- 4 3 Determination of the Equilibrium Constant for an Iron Complex
- 5 4 Measure of pH of Solutions
- 6 5 Preparation and Properties of Buffers
- 7 6 Gravimetric Determination of Sulfate
- 8 7 Electrochemistry: The Nernst Equation
- 9 8 Qualitative Analysis of Anions
- 10 9 Mystery of of the Thirteen Test Tubes
- 11 10 Synthesis of an Iron Complex
- 12 11 Percent Water and Percent Iron in an Iron Complex
- 13 Clean Up and Check out, Make-ups

**Complaint Procedure:** If you have difficulties or complaints related to this course, your first action usually should be to discuss them with your instructor. If such a discussion would be uncomfortable for you or fails to resolve your difficulties, you should speak to Mary Setzer, Chemistry Stockroom Manager, phone: 824-3259, email: <msetzer@chemistry.uah.edu>. If you still are unsatisfied, you should contact Professor James K. Baird, Chair of the Chemistry Department. His telephone number is 824-2416

and his email address is <chemch@email.uah.edu>. If you remain unsatisfied, you should discuss the matter with Professor Debra Moriarity, Associate Dean of the College of Science. Dean Moriarity's telephone number is 824-6605 and her email address is <moriard@email.uah.edu>.

Special Needs Students: If you have special needs for this class, which require a modification of seating or other class procedures, you must discuss them fully with the instructor during the first week of class.

Withdrawing from the lab: Withdrawal is not official until it has been processed by the Records Office. Failure to attend lab without an official withdrawal will result in a grade of "NC".