# CHAMINADE UNIVERSITY OF HONOLULU
# CH 204L GENERAL AND ANALYTICAL CHEMISTRY LABORATORY II
# Spring Semester 2002

**Lab Sections:** 01 MTh 2:00-4:50 pm **Henry Hall 43**
**02 TuF 2:00-4:50 pm Henry Hall 43**

**Instructor:** **Janet Jensen**
**Office:** **Henry Hall 24**
**Phone:** 735-4858
**email:** jjensen@chaminade.edu

**Office Hours: MWF 9:30-10:30 am, TuTh 12:00-1:00 pm, or by appointment**

**Required Materials:**

- **scientific calculator**
- **safety glasses and covered footwear**
- **composition style notebook**
- **gloves (optional)**

**Course Description and Objectives:**

**This laboratory course accompanies the CH204 lecture course and is a continuation of CH203L. Students will perform experiments in the lab with class discussion of the techniques used and the expected results. The purpose of this course is to continue the development of the students' laboratory skills and to utilize these methods in the analysis of several unknown samples.**

Grading:

**The course grade will be based on laboratory reports (70%), quizzes** (20%), **and attendance (5%). The lab reports will be evaluated for completion and accuracy of the information required. There will be four quizzes given over the semester; the dates and the material covered will be announced in class.**

**The following grading scale will be used to determine the final grades:**
**A 90-100%** **B 80-89%** C 65-79% D 40-64% **Fail below 40%**

**Attendance:**

**If a student is absent for a scheduled lab, it may be possible to attend the other lab section in order to perform the experiment. It is the student's responsibility to contact the instructor so arrangements can be made. If no attempt is made to make up the missed work, a score of zero will be given for that experiment.**

# Laboratory Write-Up

1. Your name, the name of your partner if applicable, the date the experiment was completed.
2. Title of experiment.
3. Abstract: maximum of five sentences. What you did, how you did it, and your results.

   Example:

   > The chloride content of a solid sample was determined gravimetrically. A weighed quantity of the sample was dissolved and the chloride was precipitated as silver chloride. The precipitate was filtered, washed, dried, and weighed. The sample was found to contain 48.17(0.05)96 chloride.

   Note that the first sentence of the abstract IS your old friend from English class, the topic sentence.

   Note also that the abstract:

   - summarizes the principle findings of the work reported in the paper
   - usually is read first, but written last to ensure that it reflects accurately the content of the paper of experiment
   - will state briefly the problem or purpose of the research when that information is not adequately contained in the title
   - will indicate the experimental or theoretical plan used
   - will accurately summarize the principle findings
   - will point out the major conclusions

   The abstract is not a substitute for the original paper, but must contain sufficient information to allow a reader to ascertain their interest. It should be concise and the nomenclature meaningful.
4. Any chemical equations.
5. All data in tabular form and graphs.
6. Sample calculations and error analysis if appropriate

CH 204L Error Analysis

accuracy how close the experimental value is to the true value

*precision* reproducibility, the consistency of your results

***error*** difference between the **true value** and the experimental result

***percent*** *error*= $\frac{|\text{true value} - \text{exp value}|}{\text{true value}} \times 100$

*mean* average value $\bar{X} = \frac{\text{sum of results } (x_1 + x2 + x_3 + \ldots)}{\text{number of trials (n)}}$

***range*** difference between the largest and smallest result

*average* ***deviation*** $\Delta \bar{x} = \frac{\sum_{i=1}^{n} |x_i - \bar{x}|}{n}$

***standard deviation*** $s = \sqrt{\frac{\sum_{i=1}^{n} (x_i - \bar{x})^2}{n-1}}$

***relative*** *average* ***deviation*** = $\frac{\Delta \bar{x}}{\bar{x}}$

***relative standard*** **deviation** = $\frac{s}{\bar{X}}$

Tentative Schedule for CH204L

| Week | Dates | Experiment |
|---|---|---|
| 1 | Jan 14-18 | Lab check-in<br>EDTA Titration of Ca/Mg in Limestone |
| | | |
| 2 | Jan 21-25 | M holiday. EDTA Titration cont. |
| | | |
| 3 | Jan 28-Feb 1 | Gravimetric Determination of Chloride |
| | | |
| 4 | Feb 4-8 | Chloride cont. |
| | | S ectro hotometric Determination of Mn in Steel |
| | | |
| 5 | Feb 11-15 | Mn in Steel cont. |
| | | |
| 6 | Feb 18-22 | M holiday |
| | | Determination of an Ion Formula |
| | | |
| 7 | Feb 25-Mar 1 | Introduction to Kinetics |
| | | SO vs. Sn2 Reaction Mechanisms |
| | | |
| 8 | Mar 4-8 | Reaction Mechanisms cont. |
| | | |
| 9 | Mar 11-15 | Le Chatelier's Principle |
| | | |
| 10 | Mar 18-22 | Dissociation Constant of a Weak Acid |
| | | |
| | Mar 25-29 | SPRING BREAK |
| | | |
| 11 | Aril 1-5 | H Titration of Amino Acids |
| | | |
| 12 | Aril 8-12 | H Titration cont. |
| | | |
| 13 | Aril 15-19 | Redox Reactions |
| | | |
| 14 | Aril 22-26 | Redox cont. |
| | | Coordination Chemist |
| | | |
| 15 | Aril 29-Ma 3 | Coordination Che mist cont. |
| | | Lab Exam |

Copies of the laboratory procedures will be handed out in class prior to the scheduled experiment.

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# Spring Semester 2002

**Lecture: MWF 11:00-11:50 am, Henry Hall 33**
**Instructor: Janet Jensen**
**Office: Henry Hall 24**
**Phone: 735-4858**
**email: jjensen@chaminade.edu**
**Office Hours: MWF 9:30-10:30 am, TuTh 12:00-1:00 pm**
**or by appointment**

**Required Text: Kotz and Treichel,** *Chemistry and Chemical Reactivity*,
**Saunders College Publishing,** 4th ed. 1999.

**Other Materials: Scientific calculator**
**Student solutions manual for text (optional)**

**Course Description and Objectives:**

**CH 204 is the second half of a two semester, college level general chemistry course. In class, we will discuss the basic concepts of chemistry with an emphasis on problem solving. Students should bring writing materials and a calculator to each class meeting.**

**Upon successful completion of this course, the student should be able to:**

- **determine orbital hybridization for simple molecules**
- **perform gas law calculations**
- **discuss the properties of solids and liquids**
- **calculate an equilibrium constant**
- **calculate an ionization constant**
- **calculate a solubility product constant**
- **perform pH calculations**
- **explain the relationship between free energy, entropy and enthalpy**
- **balance redox reactions**
- **explain the difference between voltaic and electrolytic cells**
- **calculate standard electrode potentials**
- **complete and balance nuclear equations**
- **explain the difference between nuclear fission and fusion**

Homework: Homework problems from each chapter covered will be assigned in class. There will be two types of problems: required and suggested. Only the required problems are to be turned in for credit. The suggested problems will help the student grasp the concepts covered in lecture. It is very important that you work all of the problems assigned to test your understanding of the material.

Quizzes: There will be ten short quizzes given this semester. Each will be worth 20 points and will cover recent lecture material. The scheduled quiz dates are: 1/28, 2/8, 2/15, 2/25, 3/11, 3/22, 4/5, 4/12, 4/19, 4/26. Any changes will be announced in class.

Midterm Exam: There will be one midterm exam given on Monday, March 4th. It will be worth 100 points and students will be responsible for all lecture material up to this point in the course.

Final Exam: The final exam is scheduled for Wednesday, May 8th from 10:30 to 12:30. This exam will be cumulative, covering all of the material presented in class.

Attendance: At the end of the semester I will award attendance points based on the number of unexcused absences for each student. Excused absences due to illness or family emergency will not affect your attendance points. If you miss a lecture, please send me an email or leave a phone message explaining your absence. If you miss a quiz or the midterm, a written explanation should be turned in or you may receive a score of zero. Any student who does not take the final exam will fail the course.

Course Grades: The course grades will be based on the following point total and scale: Any changes will be announced in class.

- Homework 75
- Attendance 25
- Quizzes 200
- Midterm exam 100
- Final exam 200

600 total points

| GRADE | TOTAL POINTS | PERCENTAGE |
|---|---|---|
| A | 540-600 | 90-100 |
| B | 480-539 | 80-89 |
| C | 390-479 | 65-79 |
| D | 300-389 | 50-64 |
| Fail | below 300 | below 50 |

CH 204 Schedule Spring 2002
Any changes will be announced in class

| Date | Chapter | | Date | Chapter |
|---|---|---|---|---|
| 14-Jan | re-test, review | | 11-Mar | Quiz 5, Ch 16 |
| 16-Jan | Ch 9, polarity | | 13-Mar | Ch 16 |
| 18-Jan | class cancelled | | 15-Mar | Ch 16 |
| | | | | |
| 21-Jan | holiday | | 18-Mar | Ch 17 |
| 23-Jan | Ch 10 | | 20-Mar | Ch 17 |
| 25-Jan | Ch 10 | | 22-Mar | Quiz 6, Ch 17 |
| | | | | |
| 28-Jan | Quiz 1, Ch 10 | | Mar 25 to 29 | Spring Break |
| 30-Jan | Ch 10 | | | |
| 1-Feb | Ch 12 | | 1-Apr | Ch 18 |
| | | | 3-Apr | Ch 18 |
| 4-Feb | Ch 12 | | 5-Apr | Quiz 7, Ch 18 |
| 6-Feb | Ch 12 | | | |
| 8-Feb | Quiz 2, Ch 13 | | 8-Apr | Ch 18 |
| | | | 10-Apr | Ch 19 |
| 11-Feb | Ch 13 | | 12-Apr | Quiz 8, Ch 19 |
| 13-Feb | Ch 13 | | | |
| 15-Feb | Quiz 3, Ch 14 | | 15-Apr | Ch 19 |
| | | | 17-Apr | Ch 20 |
| 18-Feb | holiday | | 19-Apr | Quiz 9, Ch 20 |
| 20-Feb | Ch 14 | | | |
| 22-Feb | Ch 14 | | 22-Apr | Ch 20 |
| | | | 24-Apr | Ch 21 |
| 25-Feb | Quiz 4, Ch 15 | | 26-Apr | Quiz 10, Ch 21 |
| 27-Feb | Ch 15 | | | |
| 1-Mar | Ch 15 | | 29-Apr | Ch 21 |
| | | | 1-May | Ch 24 |
| 4-Mar | Midterm Exam | | 3-May | post-test |
| 6-Mar | Ch 15 | | | |
| 8-Mar | Ch 15 | | 8-May | Final Exam |
| | | | | 10:30 -12:30 |
| | | | | |