Chem 162 L General Chemistry Laboratory II
1 credit (CRN 63265)
T 1:30 - 4:15 PM Imiloa 111 & 131

INSTRUCTOR: Leticia Colmenares, Ph.D.
OFFICE: Imiloa 116
E-MAIL: Leticia@hawaii.edu
OFFICE HOURS: MTW 10:00-11 am (Imiloa 116)
RF 1:00-2:00 pm (online)
TELEPHONE: 236-9120
EFFECTIVE DATE: Spring 2010

WINDWARD COMMUNITY COLLEGE MISSION STATEMENT

Windward Community College is committed to excellence in the liberal arts and career development; we support and challenge individuals to develop skills, fulfill their potential, enrich their lives, and become contributing, culturally aware members of our community.

CATALOG DESCRIPTION

Laboratory experiments illustrating fundamental principles of chemistry. (Offered Spring semester only) (3 hrs. lab.)
Prerequisites: Credit or registration in Chem 162.
WCC: DY

STUDENT LEARNING OUTCOMES

1. Develop an appreciation for the methods of scientific inquiry through computer-based laboratory experiments showing real-time data.
2. Apply knowledge to determine molar mass of unknown substance using freezing point data of solution.
3. Calculate chemical reaction rate and constant using graphing analysis.
4. Predict the effects of concentration and temperature changes on equilibrium mixtures using Le Chatelier’s principle.
5. Determine whether equilibrium is established and calculate equilibrium concentration constants and cell potentials.
6. Apply and articulate the scientific method by preparing lab reports using the standard scientific format. Express in writing core chemistry principles, results of experiments and do critical thinking by synthesizing conclusions based on observations and data.

LEARNING RESOURCES

Required Textbook: Chemistry 162L Laboratory Manual Spring 2010, edited by Colmenares
Chemistry by Zumdahl, 8th edition
Course Website: http://laulima.hawaii.edu (use UH email account login and password)
Other Requirements: Scientific Calculator, Lab goggles and Internet Access
PURPOSE OF THE LABORATORY COURSE

The chemistry laboratory allows the student to understand some of the theories discussed in the lecture more thoroughly. In the laboratory you will be involved with the processes of scientific inquiry used to discover chemical principles. It is the only way for the student to learn the techniques that are so important in research and in most laboratories. The student will discover that doing quality work in the laboratory requires a great deal of patience and care.

GRADING

The final grade will be based on the following scheme:

- 2 Exams ---------------------------------- 30 % of total
- 14 Lab reports (Formal + Informal) -------- 70 % of total
- Total ------------------------------------100 %

The lowest lab report score will be deleted.

Course grades will be assigned as follows:
- A-- 90-100%
- B-- 80-89%
- C-- 70-79%
- D-- 60-69%
- F-- less than 60%.

For grades I, W, Cr, NC-- See college catalog

MODE OF INSTRUCTION

The primary mode of instruction is through the use of hands-on laboratory activities. Each hands-on activity will be preceded by a class discussion based on a pre-lab online homework consisting of a reading assignment and completion of pre-lab questions and problems. The homework and pre-lab may consist of videos, websites and computer programs.

Conduct of the Lab:
- First 30 min Discuss answers to pre-lab assignment problems and questions, review important principles and safety precautions, demonstrate new techniques needed or use of new equipment (in Imiloa 111)
- Remaining time Perform hands-on activity, record observation and data, calculate results
- 10 min Clean-up
- Last 30 minutes Answer Post-lab questions

The activity report may be turned in at the end of the class, or at the latest at the start of the next meeting.

COURSE POLICIES AND TIPS TO SUCCED IN THIS COURSE

1. The Course Content and Schedule (activity titles and corresponding dates) is listed on the last page. Changes in the schedule will be announced in class (or course website) at least a week prior to the affected date. You are responsible for obtaining this information whether
or not you were present during the announcement.

2. **Before class.** Each hands-on activity is described in detail in the Lab Manual. PLEASE be prepared for the activity by reading it thoroughly and do the online Pre-Lab homework before coming to class. This will allow you to become familiar with the experiment and to better understand the calculations involved.

3. Bring your *Lab Manual, scientific calculator, lecture textbook* and a stapler to class at all times.

4. **Safety** is important. Wear your safety goggles and wear closed-toed shoes (preferably sports shoes) to protect from danger of spilling chemicals. Slippers, sandals or similar footwear are not allowed. This will consist 5% of your lab report grade.

5. The *online pre-lab homework* constitutes 10% of the report grade. Please allot two hours for this activity.

6. Please come to class on time. Attendance in the pre-lab discussion will count 5% of the grade. Important background information about the experiment and safety will be discussed in the Pre-Lab discussion. During the Pre-Lab, you are expected to ask questions and take notes.

7. **During lab (Imiloa 131).** Wear safety goggles and close-toed shoes at all times. Sandals or slippers are not allowed. Follow laboratory rules and procedures at all times. Treat all chemicals with respect and wipe up any spill, return all reagents to the proper place, replace lids on bottles and report any accident or problem to the instructor. Follow the directions in the Procedure precisely. Don’t take short cuts nor fake results as these are readily spotted.

8. In the lab, you are to work in pairs. Work cooperatively and maintain a positive attitude. Treat it as an opportunity to learn and do not simply rush through an experiment in order to get out of the laboratory as quickly as possible. **Maintain a positive attitude and work cooperatively** with other students and the laboratory instructor. Be alert and maintain presence of mind.

9. **Inappropriate and disruptive behavior** such as activated beepers and cell phones, making offensive remarks, prolonged chattering, etc. will not be tolerated. Do not use cell phones in the classroom or in the laboratory. Please step outside if you need to make a call.

10. When recording a measurement, it is expected that the value reflect the precision of the instrument used (never round-off) and affix the correct unit. Record all your data neatly in ink and with units. Do not erase original data. If you make a mistake just put a line thru them. Point deductions will be applied to data with incorrect precision.

11. Do a quick calculation to check if results are reasonable before dismantling the setup. **Repeat the experiment** if you make a mistake. Consult the instructor to discuss the probable causes of error before doing the repeat.

12. Use laboratory time efficiently and bear in mind that the experiment should be done at least ten minutes before the end of class for cleanup activity. Leave your laboratory station in
good order when you are finished for the day. Points will be *deducted* when safety precautions, chemical transfer, clean-up and waste disposal techniques and procedures are not followed.

13. **After the lab.** Complete your calculations as soon as possible after the laboratory. Turn in your report if you are done by the end of the period. If you wish to continue working on your report after the class period is over, please use the Tutor Room in Imiloa 112. Do not procrastinate and wait until the night before the next laboratory to write your report. Remember you will need to prepare for the new one as well.

13. **Laboratory reports.** You are expected to turn in an *individual* report at the beginning of next class. Please answer all the questions and present all data and calculations. Deductions of two to three points for every omission will be implemented.

   You are expected to discuss results, calculations and interpretations with your laboratory partner and classmates, but calculations and answers in the report should be completely *your own work*. Copying someone else’s work or answers is cheating. Students involved in *cheating* will be assigned a grade of “F” and will be reported to the Dean.

14. **A formal** laboratory report is required for Experiments on *Rate Law Determination*, *Chemical Equilibrium* and *Titration Curves* while an *informal* lab report is required for all the other experiments. *Formal reports* should follow the standard format. The *rubric for grading* the formal lab reports and tips on *how to write a formal report* are found in your Lab Manual. A sample formal lab report is accessible at Laulima.

15. **Late Reports.** If submitted one week after the due date, the lab report (only for labs the student was present) will be given a grade of **70% if complete** and **65% if less than complete**. The grade assigned will be **zero** if submitted much later.

16. **The graded lab report** will be returned to you in the following lab session. Keep these reports in a safe place. These will be your primary review materials for the exam. **Monitor your class performance by keeping a record of your scores on the table of contents page of the Lab Manual.**

17. **Make-up.** No make-up is allowed and the student gets “zero” for the missed lab activity. You cannot turn in a lab report for a missed activity.

18. **Attendance** will be checked at the beginning of each Pre-Lab session.

19. If you have any *special learning needs*, including hearing/visual impairment, please inform the instructor as soon as possible.

**DISABILITIES ACCOMMODATION**

If you have a physical, sensory, health, cognitive, or mental health disability that could limit your ability to fully participate in this class, you are encouraged to contact the Disability Specialist Counselor to discuss reasonable accommodations that will help you
succeed in this class. Ann Lemke can be reached at 235-7448, lemke@hawaii.edu, or you may stop by Hale ‘Akoakoa 213 for more information.

COURSE CONTENT AND SCHEDULE

Important Dates: Last day for withdrawal, 3/22 (M); Last day of instruction, 5/5 (W)
Holidays: Mar 22-26 Spring Break

<table>
<thead>
<tr>
<th>Date*</th>
<th>Experiment Title</th>
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<tbody>
<tr>
<td>Jan 12</td>
<td>Laboratory Safety, Equipment &amp; Procedures</td>
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<tr>
<td>Jan 19</td>
<td>Vapor Pressure of Liquids (see handout)</td>
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<td>Jan 26</td>
<td>Dry Ice and Phase Diagrams</td>
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<td>Feb 2</td>
<td>Using Freezing Point Depression to Find Molecular Weight</td>
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<td>Feb 9</td>
<td>Ion Chromatography</td>
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<td>Feb 16</td>
<td>The Rate and Order of a Chemical Reaction</td>
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<td>Feb 23</td>
<td>Rate Law Determination of the Crystal Violet Reaction**</td>
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<tr>
<td>Mar 2</td>
<td>The Determination of an Equilibrium Constant</td>
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<td>Mar 9</td>
<td>Midterm Exam (Experiment 1-7)</td>
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<td>Mar 16</td>
<td>Chemical Equilibrium and Le Chatelier’s Principle**</td>
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<td>Mar 30</td>
<td>Acid Dissociation Constant, Ka</td>
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<td>Apr 6</td>
<td>Buffers</td>
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<td>Apr 13</td>
<td>Titration Curves of Strong and Weak Acids and Bases</td>
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<td>Apr 20</td>
<td>Titration of an Unknown Diprotic Acid</td>
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<td>Apr 27</td>
<td>Establishing a Table of Reduction Potentials</td>
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<td>May 4</td>
<td>Final Long Exam (Experiment 8-14) &amp; Check-out</td>
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*Subject to change due to lecture alignment, etc.
** Require formal lab reports