**Chem 162 L General Chemistry Laboratory II**
1 credit (CRN 62064)
T 1:30 - 4:15 PM Imiloa 111 & 131

**INSTRUCTOR:** Bernardine Reeves  
**OFFICE:** Imiloa 121A  
**E-MAIL:** Leticia@hawaii.edu  
**OFFICE HOURS:** T 11:00-11:30, Th 11:00-11:30  
**TELEPHONE:** 236-9120  
**EFFECTIVE DATE:** Spring 2008

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**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.*

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**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

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**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.

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**LEARNING RESOURCES**

Course Website: [Laulima](#) (use UH email account login and password)  
Other Requirements: Scientific Calculator 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:

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>2 Long Tests</td>
<td>30%</td>
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<tr>
<td>Lab reports (Formal + Informal)</td>
<td>70%</td>
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<tr>
<td>Total</td>
<td>100%</td>
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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 homework consisting of a reading assignment and completion of pre-lab questions and problems. During the discussion, videos, websites and computer programs may be utilized.

Conduct of the Lab:

- **First 30 min**
  - Discuss answers and grade 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 is due at the start of the next meeting.

COURSE POLICIES AND TIPS TO IMPROVE LAB SKILLS

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 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. Be prepared for the activity by reading thoroughly the scheduled activity and do the Pre-Lab homework
before coming to class. This will allow you to become familiar with the experiment and to better understand the calculations involved. Bring your Lab Manual, scientific calculator, lecture textbook and a stapler to class at all times.

3. **Pre-lab Period (Imiloa 111).** Answers to the Pre-Lab problems and questions will be tackled first thing in class. You will correct each other’s Pre-Lab work. To earn points, the Pre-Lab section should bear the name and signature of the student correcting it. The Pre-Lab constitutes 10% of the report grade. If you arrive late, the Pre-Lab section will count as ‘zero’.

4. **Important background information** about the experiment and safety will be discussed in the Pre-Lab discussion. If the chemistry concept or theory is entirely new to the class, the instructor will give a short discussion prior to grading the Pre-Lab homework. During the Pre-Lab, you are expected to ask questions regarding the procedure and calculation. However, if you have a lot of questions, get help from your study group, a tutor or from the instructor during office/consultation hours prior to coming to class.

5. Some experiments require the use of laptop computers in the metal cart in the AV room. This will be wheeled out of the Imiloa AV room before the class and returned there after class. Be prepared to act as computer monitor on a rotating basis.

6. **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.

7. 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.

8. **Inappropriate 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.

9. 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.

10. 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.

11. 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.

12. **After the lab. Complete your calculations as soon as possible** after the laboratory. 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. 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 posted at http://webct.hawaii.edu.

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 and you are to put these in a folder. The folder stays in the lab until prior to the Exam. **Monitor your class performance by keeping a record of your scores.**

17. **Make-up.** No make-up is allowed and the student gets “zero” for the missed lab activity.

18. **Attendance** will be checked at the beginning of each Pre-Lab session. If you are absent, you will not get a grade for the experiment done on that date.

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, 3/20 (Th)**; **Last day of instruction, 5/7 (W)**  
Holidays: 1/21 (M), 2/18 (M), 3/7 (F), 3/21 (F), 3/24-28 (F)

<table>
<thead>
<tr>
<th>Date*</th>
<th>Experiment Title</th>
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<tbody>
<tr>
<td>Jan 13</td>
<td>Laboratory Safety, Equipment &amp; Procedures</td>
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<tr>
<td>Jan 20</td>
<td>Crystal Structures and Types of Solids</td>
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<td>Jan 27</td>
<td>Dry Ice and Phase Diagrams</td>
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<td>Feb 3</td>
<td>Using Freezing Point Depression to Find Molecular Weight</td>
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<td>Feb 10</td>
<td>Ion Chromatography*</td>
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<td>Feb 17</td>
<td>The Rate and Order of a Chemical Reaction</td>
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<td>Feb 24</td>
<td><em>Rate Law Determination of the Crystal Violet Reaction</em>**</td>
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<tr>
<td>Mar 3</td>
<td>The Determination of an Equilibrium Constant</td>
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**Mar 10** | Midterm Exam (Experiment 1-7)  
Mar 17     | *Chemical Equilibrium and Le Chatelier’s Principle**  
March 31  | Acid Dissociation Constant, $K_a$  
Apr 7     | Buffers                                    
Apr 14    | *Titration Curves of Strong and Weak Acids and Bases*  
Apr 21    | Titration of an Unknown Diprotic Acid       
Apr 28    | Establishing a Table of Reduction Potentials |

**May 5** | Final Long Exam (Experiment 8-13)  
& Check-out

*Subject to change  
** Require formal lab reports