Windward Community College Mission Statement

Windward Community College offers innovative programs in the arts and sciences and opportunities to gain knowledge and understanding of Hawai‘i and its unique heritage. With a special commitment to support the access and educational needs of Native Hawaiians, we provide O‘ahu’s Ko‘olau region and beyond with liberal arts, career and lifelong learning in a supportive and challenging environment — inspiring students to excellence.

Catalog Description

Laboratory experiments illustrating fundamental principles of chemistry (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 Fall 2011, edited by Colmenares
Chemistry DVD Notes by K. Trivedi
Course Website: http://laulima.hawaii.edu (use UH email account login and password)
Other Requirements: Scientific Calculator, Lab goggles and Internet Access
Lab requirements: closed shoes and goggles
Lab attire: A lab gown is required if you wear shorts or low-waist pants/skirts or dress.

**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></th>
<th>Percentage</th>
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<tbody>
<tr>
<td>13 Activities</td>
<td>70% of total</td>
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<tr>
<td>Midterm + Final Exam</td>
<td>30% of total</td>
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<tr>
<td>Total</td>
<td>100%</td>
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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 and N — 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 50 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. If submitted late, a penalty will be imposed.
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 and in **Assignments** on Laulima 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(LM). **Be prepared** for the activity by reading **thoroughly** the background and pre-lab material on Laulima and take the online quiz. 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 and lecture textbook** to class at all times.

3. **Pre-lab Period (Imiloa 111).** You will take your **pre-lab quiz** on Laulima the day before the lab. The Pre-Lab and quiz constitutes **10% of the report grade.** Answers to the Pre-Lab problems and questions will be discussed individually with the instructor at the beginning of the lab period.

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. 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. If you arrive late, ½ a point will be deducted from your lab score.

5. Some experiments require the use of **laptop computers** from the metal lab cart. This will be wheeled out of the Imiloa AV room before the class and returned there after class.

6. **During lab (Imiloa 131).** Wear **safety goggles and close-toed shoes at all times.** Sandals or slippers are not allowed. **You will NOT be permitted in the lab** if you are not wearing close-toed shoes. 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. Point deductions will be applied to data with incorrect precision.

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. Lab reports will not be accepted via email. 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. Hence, the student should not allow anybody to copy one’s work.

14. Formal Laboratory Reports. A formal laboratory report is required for Experiments on Rate Law Determination of the Crystal Violet Reaction, Chemical Equilibrium and LeChatelier’s Principle and Titration Curves of Strong and Weak Acids and Bases while an informal lab report is required for all the other experiments. Formal reports should follow the standard format (see sample formal report in Laulima course website). The rubric for grading the formal lab reports and tips on how to write a formal report are found in your Lab Manual.

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. 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 return them to the instructor immediately after reviewing them. Graded labs will be returned to you to study a week before each 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**

Holidays: Sep 3 (M), Nov 12 (M), Nov 22 (R), Nov 23 (F)
Important Dates: **Last day for withdrawal**, CR/NC Oct 29 (M)
**Last day of instruction**, Dec 6 (R)

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<tr>
<th>Date</th>
<th>Activity</th>
<th>Notes</th>
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<tr>
<td>Aug 22</td>
<td>Laboratory Safety, Equipment &amp; Procedures</td>
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<td>Aug 29</td>
<td>Intermolecular Forces</td>
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<td>Sep 5</td>
<td>Dry Ice and Phase Diagrams</td>
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<td>Sep 12</td>
<td>Separating Mixtures Using Chromatography</td>
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<td>Sep 19</td>
<td>Using Freezing Point Depression to Find Molecular Weight</td>
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<td>Sep 26</td>
<td>Make Your Own Demo</td>
<td>Presentation in Class</td>
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<td>Oct 3</td>
<td>Rate Order Graphing Lab</td>
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<td>Oct 10</td>
<td>Rate Law Determination of the Crystal Violet Reaction</td>
<td><strong>Formal Lab Report</strong></td>
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<td>Oct 17</td>
<td>Midterm Exam (Experiment 1-7)</td>
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<td>Oct 24</td>
<td>The Determination of an Equilibrium Constant</td>
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<td>Oct 31</td>
<td>Chemical Equilibrium and Le Chatelier’s Principle</td>
<td><strong>Formal Lab Report</strong></td>
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<td>Nov 7</td>
<td>Acid Dissociation Constant, Ka</td>
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<td>Nov 14</td>
<td>Buffers</td>
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<td>Nov 21</td>
<td>Titration Curves of Strong and Weak Acids and Bases</td>
<td><strong>Formal Lab Report</strong></td>
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<td>Nov 28</td>
<td>Establishing a Table of Reduction Potentials</td>
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<td>Dec 5</td>
<td><strong>Final Long Exam (Experiment 8-14)</strong></td>
<td>&amp; Check-out</td>
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*Subject to change due to lecture alignment, etc.*