

## **Chem 151L Elementary Survey of Chemistry Lab**

1 credit (CRN 64355)

T 1:00 to 3:45 PM Imiloa 111 & 131

**INSTRUCTOR:** Derek S. Birkmire PhD

**OFFICE:** Imiloa 118

**E-MAIL:** birkmire@hawaii.edu

**OFFICE HOURS:** T 12:00-1:00 PM

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**EFFECTIVE DATE:** Spring 2017

### **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**

Experiments introducing laboratory techniques and illustrating chemical principles; supplemented by films, demonstrations, and problem sessions. (3 - 3/4 hrs. lab.)

*Prerequisites: Credit or registration in CHEM 151.*

*WCC: DY Fall 2012*

### **STUDENT LEARNING OUTCOMES**

1. Identify/locate laboratory safety equipment and apply laboratory safety procedures.
2. Assemble apparatus to perform common laboratory techniques to verify basic chemistry laws on gases, chemical stoichiometry, preparation of solutions, chemical equilibrium and others.
3. Use molecular models and technology to investigate chemistry concepts.
4. Make and record accurate observations, precise measurements and calculations applying rules on significant figures.
5. Develop hypotheses, use critical thinking to process results and identify sources of error.
6. Apply and articulate the scientific method by preparing a lab report using the standard scientific format.

### **LEARNING RESOURCES**

Required Textbook: Chemistry 151L Laboratory Manual by Colmenares Fall 2012

Optional: General, Organic & Biochemistry, 4<sup>th</sup> ed. H. Stephen Stoker

Course Website: <http://laulima.hawaii.edu> (use UH email account login and password) 2

Other Requirements: Scientific Calculator  
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:

13 Lab reports (including 3 Formal) -----70 % of total

2 Long Tests -----30 % of total

Total -----100 %

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 review *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

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. 3

2. **Before class.** Each hands-on activity is described in detail in the Lab Manual. **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, 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 review your pre-lab quiz. The **Pre-Lab** and quiz constitutes **10% of the report grade**. If you arrive late,  $\frac{1}{2}$  a point will be deducted from your lab score.

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 4

precautions, chemical transfer, clean-up and waste disposal techniques and procedures are not followed.

12. **After the lab. Complete your calculations before leaving the lab session when possible.** 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. A *formal* laboratory report is required for Experiments on *Chemical Formula, Boyle's Law and Equilibrium*, 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://lulima.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 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. Withdrawal with a "W" must be done by March 31.

20. 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](mailto:lemke@hawaii.edu), or you may stop by Hale 'Akoakoa 213 for more information. 5

## COURSE CONTENT AND SCHEDULE

Please refer to this table for the schedule of activities (and NOT the Laboratory Manual).

### *Date\* Activity Title*

Jan 10	1- Laboratory Safety, Equipment & Procedures
Jan 17	2- Measurements: Length, Mass, Volume, & Density
Jan 24	3- Endothermic and Exothermic Reactions (Computer-based Lab)
Jan 31	4- Properties and Separation of Chemical Substances
Feb 7	5- Types of Chemical Reactions
Feb 14	6- Periodic Trends
Feb 21	7- Chemical Bonds, Models & Shapes
Feb 28	8- <i>Determining the Chemical Formula of Magnesium Oxide**</i>
Mar 7	<b>Midterm Exam</b> (Activities 1-7)
Mar 14	9- Chemical Stoichiometry
Mar 21	10- <i>Boyle's Law**</i> (Computer-based Lab)
Mar 28	<b>Spring Holiday</b>
Apr 4	11 -Solutions: Preparation and Properties
Apr 11	12- <i>Chemical Equilibrium &amp; Le Chatelier's Principle**</i>
Apr 18	13- Acids, Bases, pH Indicators and Buffers
Apr 25	14- Forensic Detective Activity
May 2	<b>Final Long Exam</b> (Activities 7-14)

### **& Check-out**

**\*Subject to change**

**\*\* Require formal lab report**