Chem 162 General Chemistry II

3 credits (CRN 62116)
TR 11:30 – 12:45 PM Imiloa 111

INSTRUCTOR: Leticia Colmenares, Ph.D.
OFFICE: Imiloa 116
E-MAIL: Leticia@hawaii.edu
OFFICE HOURS: M 11:30-12:30 pm, T 10:30-11:30 am
TELEPHONE: 236-9120
EFFECTIVE DATE: Fall 2014

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

Second course of a two-course sequence designed to meet the one-year General Chemistry requirement for pre-med, science and engineering majors. Topics include thermochemistry, kinetics, acid-base equilibrium, solubility equilibrium and electrochemistry. Emphasis on problem solving. Concurrent registration in CHEM 162L is required.

Prerequisites: A grade of "C" or better in CHEM 161, credit or concurrent registration in MATH 135, or instructor’s consent.

Co-requisite: Concurrent registration in CHEM 162L.

WCC: DP

STUDENT LEARNING OUTCOMES

1. Predict properties (boiling point, melting point, osmotic pressure, vapor pressure) of solutions based on concentrations.
2. Determine reaction rate law and calculate rate constants and half-life based on experimental data.
3. Calculate the equilibrium concentration of chemicals in solution involved in precipitation, acid-base and redox reactions.
4. Predict spontaneous reactions based on enthalpy and entropy considerations.
5. Determine the electrochemical potential of redox reactions.

COURSE TASKS

• Homework (weekly online and weekly paper-based)
• Daily Quizzes
• Four long exams
• Cumulative Final exam (ACS National Standardized)
1. Grades will be based on the following categories: homework, quizzes & attendance, 4 long exams and a final exam (counted 2 times). Your performance (in %) in each category will be determined. The lowest % will be dropped. The average of the remaining seven categories will determine your course grade, as follows:

<table>
<thead>
<tr>
<th>Average</th>
<th>Course Grade</th>
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</thead>
<tbody>
<tr>
<td>100-90%</td>
<td>A</td>
</tr>
<tr>
<td>89-80%</td>
<td>B</td>
</tr>
<tr>
<td>79-70%</td>
<td>C</td>
</tr>
<tr>
<td>69-60%</td>
<td>D</td>
</tr>
<tr>
<td>below 60%</td>
<td>F</td>
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</tbody>
</table>

Curving might be employed if deemed necessary. The other grades I, W, Cr, NC to be assigned are described in the current college catalog. The NC grade will be assigned only as part of the Cr/NC option except in very unusual circumstances. The last day to change A-F to Cr/NC/audit option (with Admissions & Records) is on Oct 30, 2014. Students requesting for N grade must provide a formal letter of request before the final examination with supporting evidences.

If you drop out from the course without any notice you will get a 'F' grade. To avoid this, please be sure to withdraw officially (through MyUH) by Oct 30, 2014.

2. Homework: There is homework due every meeting. The online homework (masteringchemistry.com) is due every Tuesday (even if it’s a holiday). The paper-based homework is due every Thursday. The assignment schedule will be posted in Laulima Modules.

The paper-based homework must ALWAYS show complete work, even if the problem/question does not specifically ask for it. The paper-based homework is intended to provide practice in writing out mathematical solutions, chemical reactions/equations and reasoning.

Mastering Chem homework: Please go to masteringchemistry.com and register in course ID MCCHEM162FALL2014 and indicate "Tro, Chemistry: A Molecular Approach, 3e as the textbook." You are always allowed to view hints, without penalty. You have bonus points when you don’t used hints. You are allowed to rework the problems after due date however, the new score is not saved. Late submission is penalized 10% per day, but the total overall penalty is capped at 50%.

The paper-based homework is due at the beginning of the class period. Late homework will not be accepted. If you are not coming to class, you may turn in the homework by email, but it must be received before the start of class.

3. Attendance & Quizzes. There is a quiz in every class meeting. There are only 1-3 questions per quiz. Please prepare a half sheet of paper for the quiz every meeting.

4. There will be four long exams, each of which will cover approximately one-fourth of the
course. Each will last for about 90 min. Some of these will be conducted in the WCC Testing Center.

5. The **final exam** (ACS Standardized Exam) will **cover all topics** (cumulative) 2 hrs. long. This is the National ACS Standardized exam (70 multiple-choice questions). The dates of these assessments are given in the Course Schedule (see last page). All these exams will be closed book.

6. You are required to attend at least 5 **supplemental instruction (SI) sessions** during the semester. You will be deducted points for not meeting the minimum. You will get extra credit points for going beyond the minimum.

### LEARNING RESOURCES

**Required Notes:** Chemistry 162 Lecture Notes Summer 2013 by Colmenares (sold at WCC Bookstore)

**Course Website:** [http://laulima.hawaii.edu](http://laulima.hawaii.edu) (use UH email account login and password)

**Access** to Masteringchemistry.com for online homework and tutorials (purchase access key from WCC Bookstore or online).

**Other Requirements:** **Scientific Calculator and Internet access**

**Supplemental Instruction** after every class period.

**Chem 162L** lab activities will enrich many topics in the lecture.

**Optional:** Any General Chemistry Textbook

(available at WCC Library Circulation Call # QD)

### HOW TO STUDY FOR THIS COURSE

Nothing is more important to your academic success than strong study skills. On average, you should spend about **seven hours per week outside** the classroom to study for this course.

1. Prepare for each class by familiarizing yourself with the **lecture slides** in the **Lecture Notes** and watching the **online videos in the course website**. Make marginal notes on the slides. Identify and define unfamiliar terms. Reading beforehand will help you to listen more actively in class and give an advanced indication of any difficulties that you can then clarify in the lecture. Do all **Learning Checks (REACT problems)**.

2. Use the **Chem 162 Instructor Notes** during class. Take **notes** during the lecture. Bring your **calculator** at all times. Ask **questions** if you do not understand.

3. **Participate** in all the in-class and inquiry-based **group activities**.

4. **Review** your notes soon after class. Attend the **supplemental instruction sessions** held **after** the lecture in the classroom. This is a good place to edit your notes, find and fill in missing points, and get tips on how to solve your homework and review for quizzes and exams. Be sure to summarize the main point of the lecture in a few sentences.

5. Watch the videos and multimedia on the course website, do all the interactive problems,
and the online tutorials.

6. Do additional **practice exams and other review problems** in your Lecture Notes, Modules (Laulima) and Study Area (Mastering Chemistry).

7. Please plan on spending **at least 7 hours per week outside of class**. Here is how your time will be allocated during most weeks:
   - 2-3 hours reading chapter notes, tutorials and DVD/flash drive text.
   - 1-2 hours participating in SI sessions
   - 3-4 hours doing homework and practice problems

**OTHER POLICIES**

1. The topics and exam schedule are found in the **Course Schedule** on the last page.

2. It is expected that you have the required **mathematics skills** for the course. Please check the math review section in the appendix in the instructor notes. (i.e. algebraic equations, exponential notations, significant figures, proportionality, percentages, logarithm). Another place to review this is in Masteringchemistry **Study Area**. Please let me know immediately if you have any problems with any of these.

3. If you are **absent**, the quiz you missed will be counted as **zero**. There is no makeup for missed quizzes.

4. **Missed Exam**. Only one missed **long exam** (with requisite doctor’s note, police report or obituary notice) can be made up, if you notify the instructor in advance or on the day of the exam. There will be no make-up for the final exam.

5. **Extra Credit**. You can earn extra credit up to a **maximum of 20 points =2% of total grade**. For example, attendance in a chemistry forum with a written summary of the topic is 4 points. The forum schedule will be posted at [http://www.wcc.hawaii.edu/chemistry_forum](http://www.wcc.hawaii.edu/chemistry_forum). Other opportunities include participation in chemistry outreach projects, and attending beyond the minimum number of SI sessions.

6. You have access to your scores and grades 24/7 in **Laulima gradebook**.

7. Communicating with instructor. If you use “email,” please ALLOW 24 HOURS for responses to emails or messages. In emergencies, please call at 236-9120. Please utilize my office hours in Imiloa 116, or you may schedule a special appointment.

8. **Don't cause or tolerate distractions**. Move or tactfully ask those making noise to be quiet.

9. **Disruptive behavior** leads to loss of learning time. Examples are activated beepers and cell phones, checking /sending text messages, making offensive remarks, eating or drinking in the classroom, packing of books, making noise, leaving class early, sleeping in class, prolonged chattering, reading other materials not relevant to this class, etc. If a student takes part in disruptive behavior, the instructor reserves the right to exclude immediately the student from that class meeting, and will be marked
absent.

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

11. An "F" will be assigned to students involved in **cheating** systems.

12. Any class announcement pertaining to changes in schedule will be made at least a week prior to the affected date. However, **you are responsible** for knowing these changes, whether or not you were in class for the announcement. If you were late or missed class please borrow notes from your classmate and SI leader.

**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. **Also, inform your instructor ASAP.**

**COURSE CONTENT AND TENTATIVE SCHEDULE**

Holidays:  Sep 1 (M), Nov 4 (T) Nov 11 (T), Nov 27 (R), Nov 28 (F)

Important Dates:  **Last day for withdrawal**, CR/NC Oct 30 (R)

**Last day of instruction**, Dec 11 (R)

<table>
<thead>
<tr>
<th>Date*</th>
<th>Chapter</th>
<th>SLO and Topics</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/26</td>
<td>Introduction</td>
<td>Review</td>
</tr>
<tr>
<td>8/28</td>
<td>11- Liquids, Solis &amp; Intermolecular Forces</td>
<td>Dispersion, Dipole-dipole forces, Hydrogen bonding, heating curve, phase diagrams, properties of liquids, unit cell, types of solids, types of solids, semiconductors</td>
</tr>
<tr>
<td>9/9</td>
<td>12-Solution Properties</td>
<td>Predict properties (boiling point, melting point, osmotic pressure, vapor pressure) of solutions based on concentrations. Solvation, factors affecting solubility, enthalpy and entropy of solution, Henry's law.</td>
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<tr>
<td>9/18</td>
<td>Midterm 1</td>
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<tr>
<td>9/23</td>
<td>13- Chemical Kinetics</td>
<td>Determine reaction rate law and calculate rate constants and half-life based on experimental data. Reaction mechanism, activation energy, catalyst, intermediate, Arrhenius equation, collision theory</td>
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<tr>
<td>10/2</td>
<td>14- Chemical Equilibrium</td>
<td>Characteristics of equilibrium, Equilibrium constant, K, Le Chatelier’s principle, equilibrium calculations, reaction quotient, Q.</td>
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<tr>
<td>Date</td>
<td>Assignment/exam calendars</td>
<td>Description</td>
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<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>10/9</td>
<td>*</td>
<td>Assignment/exam calendars may be changed due to institutional, weather or class problems.</td>
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<tr>
<td>10/14</td>
<td><strong>Midterm 2</strong></td>
<td>Strong and weak acids and bases, conjugate acid/base, pH, salts and oxides, convert Convert between: $[H_3O^+]$, pH, [OH-] and pOH. Calculate $K_a$ (or $K_b$), % ionization, pH, or $[H^+]$ for a weak acid or weak base solution. Predict whether a salt solution will be acidic, basic or neutral.</td>
</tr>
<tr>
<td>10/21</td>
<td><strong>15- Acids &amp; Bases</strong></td>
<td>Calculate the equilibrium concentration of chemicals in solution involved acid-base reactions. Common-ion effect, Titrations, Buffers, pH curves, indicators. Calculate the equilibrium concentration of chemicals in solution involved in precipitation reactions. Calculate solubility, $K_{sp}$, predict whether precipitation occur.</td>
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<tr>
<td>10/30</td>
<td><strong>Midterm 3</strong></td>
<td>Predict spontaneous reactions based on enthalpy and entropy considerations. Second Law of Thermodynamics, Free energy, Third Law of Thermodynamics. Calculate $\Delta G^\circ$ from $K$ and perform the reverse operation: $\Delta G^\circ = -RT \ln K$</td>
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<tr>
<td>11/6</td>
<td><strong>17- Spontaneity, Entropy and Free Energy</strong></td>
<td>Predict spontaneity, Entropy and Free Energy Predict spontaneous reactions based on enthalpy and entropy considerations. Second Law of Thermodynamics, Free energy, Third Law of Thermodynamics. Calculate $\Delta G^\circ$ from $K$ and perform the reverse operation: $\Delta G^\circ = -RT \ln K$</td>
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<tr>
<td>11/18</td>
<td><strong>18- Electrochemistry</strong></td>
<td>Determine the electrochemical potential of redox reactions. Electrochemical cells, electrolysis, anode/cathode, cell potentials, volts, coulombs. Interconvert $E^\circ$, $\Delta G^\circ$ and $K$ for redox reactions, Use the Nernst Equation.</td>
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<tr>
<td>12/4</td>
<td><strong>Midterm 4</strong></td>
<td>Balancing nuclear equations, types of radiation, review first order reaction, half life, radiocarbon dating</td>
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<tr>
<td>12/9</td>
<td><strong>19- Nuclear Chemistry</strong></td>
<td>Balancing nuclear equations, types of radiation, review first order reaction, half life, radiocarbon dating</td>
</tr>
<tr>
<td>12/11</td>
<td><strong>Review</strong></td>
<td>Balancing nuclear equations, types of radiation, review first order reaction, half life, radiocarbon dating</td>
</tr>
<tr>
<td>12/18</td>
<td><strong>FINAL EXAM Thursday 11:30-1:30 P.M.</strong></td>
<td>Final Exam Thursday 11:30-1:30 P.M. Final Exam Thursday 11:30-1:30 P.M.</td>
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