CHEMISTRY 111: General Chemistry

Spring 2013

Syllabus

Instructors: 

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Dr. Jeremy Ramsey (labs)  
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Course Schedule:  

Lecture: MWF 11:30 - 12:20 in Heim G-09  
Recitation: Th 7:45 - 8:35 or 1:00 - 1:50 in Heim G-09  
Lab: T 8:45 - 11:35, 2:00 - 4:50, or Th 8:45 - 11:35 in Heim 241

HDB's Office Hours: Monday, Wednesday and Thursday from 2:30 – 3:30 and by appointment.  Please note that I rarely check my work e-mail account when I am away from the office. If you need to reach me outside of regular work hours, feel free to call me at home.

Course Description: A continuation of CHEM 110, with emphasis placed on the foundations of analytical, inorganic, and physical chemistry. Topics include kinetics, general and ionic equilibria, acid-base theory, electrochemistry, thermodynamics and nuclear chemistry. The laboratory treats aspects of quantitative and qualitative inorganic analysis.

Prerequisite: Successful completion of CHEM 110.

Required Text and Materials:  

• Laboratory Notebook (the lab manual will be available on Moodle)  
• Calculator: Casio fx-260  
• Safety glasses or goggles

Optional Materials:  

  Answers to homework problems will be posted on Moodle.  
• "ACS General Chemistry Study Guide"
  To order, go to: http://www4.uwm.edu/chemexams(guides/details_guides.cfm?ID=162
Course Objectives
Upon completion of this course, each student should be able to:

1. Identify types of intramolecular forces, their relative strengths and their effects on physical properties. Interpret phase diagrams and calculate energies associated with phase changes.
2. Express solution concentration in a variety of units. Determine the effect of solute concentration on the colligative properties of the solution.
3. Derive rate laws from experimental data and perform calculations using integrated rate laws. Identify factors that influence the rate of reaction. Understand the relationship between mechanism and the rate law.
4. Describe what is meant by "equilibrium." Write equilibrium expressions and perform equilibrium calculations. Identify how a system at equilibrium will respond when perturbed.
5. Describe acids and bases according to Bronsted-Lowry, Arrhenius and Lewis definitions and explain conjugate acid-base relationships. Conduct pH calculations. Describe how structure influences acid strength.
6. Describe how buffer solutions work and perform buffer calculations. Describe factors that influence the solubility of slightly soluble salts and perform calculations.
7. Describe enthalpy, entropy, and free energy. Determine whether a chemical process will be spontaneous.
8. Describe voltaic and electrolytic cells. Write oxidation-reduction reactions and calculate cell potentials.
9. Demonstrate proficiency with basic laboratory techniques and the ability to work safely in the laboratory environment.

Departmental Objectives
This course helps to fulfill the following Department of Chemistry learning objectives:
- Exhibit proficiency in the major sub-disciplines of chemistry
- Perform wet laboratory techniques as appropriate
- Exhibit integrative, problem-solving skills, such as data manipulation and data interpretation
- Communicate the results of chemical investigations
- Demonstrate responsible conduct in the laboratory

College Mission
The course supports the mission of Lycoming College to provide a distinguished baccalaureate education in the liberal arts and sciences.

Grading Criteria:

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<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>First Assignment</td>
<td>5</td>
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<tr>
<td>Quizzes (8)</td>
<td>120</td>
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<tr>
<td>Exams (3)</td>
<td>300</td>
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<tr>
<td>Final</td>
<td>125</td>
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<tr>
<td>Laboratory</td>
<td>100</td>
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<tr>
<td>Total</td>
<td>650</td>
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Final letter grades will be assigned as follows: >90.0% A, 80.0-89.9% B, 70.0-79.9% C, 60.0-69.9% D, <60.0% F. The ranges given include "+" and "-" grades. Please be aware that you must pass both the lecture and laboratory to receive a passing grade for the course.
Final Grade | Interpretation (from the Lycoming College Catalog)
--- | ---
A | **Excellent:** Signifies superior achievement through mastery of content or skills and demonstration of creative and independent thinking.
B | **Good:** Signifies better-than-average achievement wherein the student reveals insight and understanding.
C | **Satisfactory:** Signifies satisfactory achievement wherein the student’s work has been of average quality and quantity. The student has demonstrated basic competence in the subject area and may enroll in additional coursework.
D | **Passing:** Signifies unsatisfactory achievement wherein the student met only the minimum requirements for passing the course and should not continue in the subject area without departmental advice.
F | **Failing:** Signifies that the student has not met the minimum requirements for passing the course. A failing grade in the course may also result from academic dishonesty or from excessive unexcused absences.

**Quizzes:** Quizzes are an incentive to stay current with the course. They provide you with a means of evaluating your progress and allow you to identify any potential "trouble spots" before the exam. Quiz questions will come from the homework, assigned reading and class notes. The lowest quiz grade will be dropped. The quiz dates are given below.

- January 18 and 25
- February 1, 15 and 22
- March 1 and 22
- April 5 and 19

All are Fridays. Mark them on your calendar!

**Exams:** There will be three mid-semester exams and a final exam. The exam dates are given below.

- Friday, February 8
- Friday, March 15
- Friday, April 12

The final exam will be administered at 1:00 pm on Tuesday, April 23.

The mid-semester exams will consist of multiple choice, short answer and calculation-based questions. The final is the American Chemical Society exam for general chemistry. It is a multiple-choice exam and covers material from Chemistry 110 and 111.

**Moodle:** Announcements, assignments, answer keys for quizzes and exams, and the colloquium schedule will be posted on the course Moodle site. To access the site: go to moodle.lycoming.edu, log in and select CHEM 111 from the Spring 2013 list of courses. The enrollment key is: general. There is a separate Moodle site for the lab. Dr. Ramsey will provide additional information regarding the lab Moodle site at the first lab meeting.
Assignments from the Text: The chapters we will cover are listed below. Detailed reading and homework assignments will be distributed along with the chapter outlines. Homework will not be collected, but the weekly quizzes will be based on the homework assignments.

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Topic</th>
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<tbody>
<tr>
<td>11</td>
<td>Liquids, Solids and Intermolecular Forces</td>
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<tr>
<td>12</td>
<td>Solutions</td>
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<tr>
<td>13</td>
<td>Chemical Kinetics</td>
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<tr>
<td>14</td>
<td>Chemical Equilibrium</td>
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<tr>
<td>15</td>
<td>Acids and Bases</td>
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<tr>
<td>16</td>
<td>Aqueous Ionic Equilibrium</td>
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<td>17</td>
<td>Thermodynamics</td>
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<td>18</td>
<td>Electrochemistry</td>
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<tr>
<td>19</td>
<td>Radioactivity and Nuclear Chemistry (time permitting)</td>
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Attendance Policy:
Regular attendance at lecture is mandatory. Attendance at class means arriving on time, remaining in class for the entire 50 minutes, and participating in class. Missing part of a class (late arrival, early departure, etc.), sleeping, reading, texting, or engaging in disruptive activities during class is equivalent to an absence and is counted as such. Each absence beyond the first three, regardless of the reason, results in a 3-point deduction.

Quizzes: In the event of a missed quiz, a grade of zero will be recorded. Make-up quizzes are not given, however the lowest quiz grade is dropped.

Exams: Missed exams cannot be made-up and a grade of zero will be recorded. Exceptions may be granted only if there are significant extenuating circumstances -- usually a medical or family emergency that can be documented (such as by notification from the Dean). In this case, the grade on the final will be substituted for the missed exam. Please keep in mind that absences due to doctor’s appointments, work conflicts, or simply not feeling well (as opposed to being seriously ill) are not considered exceptional circumstances.

Recitation: Although attendance at recitation is not mandatory, it is strongly recommended. Attendance will be taken at each meeting.

Lab: Regular attendance at the scheduled lab period is mandatory. Any questions regarding lab attendance or scheduling should be directed to Dr. Ramsey.

Policy on Calculators and other Electronic Devices: You will need a calculator for most class meetings, including recitations. The Department of Chemistry has adopted the Casio fx-260 as the calculator that is required for all courses. **Only Casio fx-260 calculators may be used on quizzes and exams** and calculators cannot be shared during quizzes and exams. Cell phones and other electronic devices are not permitted in class
and may not be used in place of a calculator. Using a calculator or device other than the Casio fx-260 on a quiz or exam will result in a significant reduction in the quiz or exam grade.

**Extra Credit:** Extra credit points can be earned by attending departmental colloquia (2 points per colloquium). If you are unable to attend colloquium, you may also earn extra credit by writing a brief research paper on a mutually agreed upon topic (up to 12 points depending on the quality of the paper, the length of paper, and the number and quality of sources). Extra credit papers must be submitted via turnitin.com and will not be accepted after the last day of class. Extra credit is capped at 12 points and a maximum increase of ½ of a letter grade (for example, from a B+ to an A-). Please keep track of the number of colloquia that you attend.

**Academic Honesty:** Be aware that in accordance with the College's policy on academic honesty, any work you submit must be your own. Any instances of plagiarism will be penalized to the fullest extent possible and will be reported to the Provost. This includes looking at another student’s work during a quiz or exam or copying a lab report, in part or in full.

**Academic Support:** If you have a learning disability and choose to request academic accommodations, please contact Mr. Dan Hartsock, Coordinator of Services for Students with Disabilities. His office is in the Academic Resource Center on the third floor of Snowden Library.

**Study Suggestions:** We will cover a lot of material this semester and much of it is fairly challenging. Lectures and in-class exercises are prepared with the assumption that you have studied the assigned material and have completed the homework. I suggest you skim the reading assignment before class. After class, be sure to read and take notes on the assignment; your notes on the reading will be a useful resource when it comes time to study for an exam or quiz. As you read the text, take time to stop and work the "Example" and "For Practice" problems that appear throughout each chapter. If you get stuck, you can review the text and the detailed solutions for the "Example" problems. Finally, a list of end-of-chapter questions and problems will be provided in class along with the outline for each chapter. Be sure to complete the homework problems and give them your best shot before looking at the answer key.

Perhaps the best advice I can give you on how to succeed in this course is: Don't procrastinate! We cover a lot of material and cramming for a night or two before an exam simply will not work. Just like learning a foreign language or becoming proficient at a sport, you need to practice a little each day. **To have a reasonable expectation of earning an A or B in this course, you should, at a minimum: review your notes, read the text, quiz yourself, and work problems every day.** When studying, do so in an environment that is free from disruptions and distractions. Find a quiet place; turn off your phone and any other devices.

And remember, my job is to help you learn chemistry--if you have questions, if you are not sure how to approach a certain type of problem, or if a concept is still a little fuzzy, please ask me about it right away!