CHEMISTRY 111: General Chemistry  
Spring 2015 Syllabus

Instructors  
Dr. Holly Bendorf (lecture)  
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 or Th 8:45 - 11:35 or Th 2:00 - 4:50 in Heim 241

HDB's Office Hours: Mondays 9:00-10:00 am, Tuesdays 5:00-6:00 pm, Thursdays 2:00-3:00 pm and by appointment. If you need to reach me outside of regular work hours, feel free to call my home phone number. Please note that I rarely check e-mail when I am away from the office.

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: Completion of CHEM 110 with a grade of C- or better.

Required Text and Materials  
• "Chemistry" 2nd edition, by Gilbert, Kirss, Foster, and Davies.  
• Laboratory Notebook (the lab manual will be available on Moodle)  
• Calculator: Casio fx-260  
• Composition book, for collected homework assignments.  
• Safety glasses or goggles  
• Lab breakage deposit of $10. Be sure to bring your safety glasses and lab deposit to the first lab meeting.

Optional Materials  
• Solutions Manual for "Chemistry"  
• "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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<tr>
<th>Component</th>
<th>Points</th>
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<tbody>
<tr>
<td>First Assignment</td>
<td>5</td>
</tr>
<tr>
<td>Homework Notebook</td>
<td>40</td>
</tr>
<tr>
<td>Quizzes (6)</td>
<td>90</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>660</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 (top and bottom 2% of range, respectively). 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 intended as an incentive to stay current with the course material. 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, reading assignments and class notes. The first quiz will include topics from CHEM 110 that are of particular relevance for CHEM 111. The best 6 quiz grades will count toward the final grade in the course.

**Quiz Dates**
All are Mondays. Mark them on your calendar!
- January 19, 26
- February 2, 23
- March 2, 30
- April 6

**Exams:** There will be three mid-semester exams and a final exam. The exam dates are:
- Wednesday, February 11
- Wednesday, March 18
- Wednesday, April 15

The final exam will be administered at 1:00 pm on Thursday, April 30.

Quizzes and exams will include open-ended and/or multiple choice questions on concepts and theories in addition to calculation-based problems. While it is important that you can do the calculations; these are meaningless if you don’t understand the concepts behind them. Resist the temptation to memorize algorithms for solving each type of problem. Working to understand the theory will pay dividends in terms of your performance in this course and in future chemistry courses. The conceptual questions at the end of each chapter will help you in this respect.

The final is the American Chemical Society exam for general chemistry. It is a multiple-choice exam that emphasizes understanding of concepts over calculations 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 2015 list of courses. The enrollment key is: inorganic. 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. Chapter outlines with reading and homework assignments will be posted on Moodle. Homework will be periodically collected as described below. Many of the quiz and exam questions will be derived from the homework.

<table>
<thead>
<tr>
<th>Week</th>
<th>Chapter</th>
<th>Topic</th>
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<tbody>
<tr>
<td>1-2</td>
<td>10</td>
<td>Intermolecular Forces</td>
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<tr>
<td>2-3</td>
<td>11</td>
<td>Solutions</td>
</tr>
<tr>
<td>3-4</td>
<td>12</td>
<td>Solids</td>
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<tr>
<td>5-6</td>
<td>14</td>
<td>Chemical Kinetics</td>
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<tr>
<td>7-8</td>
<td>15</td>
<td>Chemical Equilibrium</td>
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<tr>
<td>9-11</td>
<td>16</td>
<td>Acids and Bases; Solubility Equilibria</td>
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<tr>
<td>12-13</td>
<td>18</td>
<td>Thermodynamics</td>
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<tr>
<td>13-14</td>
<td>19</td>
<td>Electrochemistry</td>
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<tr>
<td>14</td>
<td>21</td>
<td>Radioactivity and Nuclear Chemistry (selected topics)</td>
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Homework Notebook: Chapter outlines (posted on Moodle) will list two sets of problems for each section. The first set of problems will be for practice; answers for these problems are in the back of the textbook and in the solutions manual. The second set of problems will be collected and should be completed, with all work shown, in a composition notebook. I will collect the notebook five times during the semester. Bring this notebook with you to class EVERY DAY, as I will not announce when I am collecting notebooks ahead of time. Notebooks will be due BEFORE the start of class and late notebooks will not be accepted. Homework will be spot-checked and graded on a ten-point scale for effort and overall quality. The best four homework grades (out of five) will count.

Attendance Policy: I expect you to attend lecture and recitation and I will take attendance every day. When attending class, you must arrive on time, remain in class for the entire 50 minutes, and participate in class. Arriving late, leaving early, sleeping, reading, texting, or talking during class is distracting to the other students and to me. Students who engage in such behavior will be asked to leave the class.

Exams: There are no make-up exams. In the event of a missed exam, 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.
Quizzes: There are no make-up quizzes. In the event of a missed quiz, a grade of zero will be recorded. The lowest quiz grade is dropped, so one quiz can be missed without a negative impact on the final course grade.

Recitation: You may attend either recitation section. Please be sure to sign the attendance sheet.

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. You must remove the cover from the calculator and stow it in your backpack BEFORE the start of a quiz or exam. Cell phones, tablets and other electronic devices are not permitted in class and may not be used in place of a calculator. These MUST be turned-off and put INSIDE your backpack or purse during class. Using a calculator or device other than the Casio fx-260 on a quiz or exam will result in a zero on the quiz or exam.

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 earn extra credit by writing a brief research paper on a mutually agreed upon topic (up to 10 points depending on the quality of the paper, the length of paper, and the number and quality of sources). Extra credit papers will not be accepted after the last day of class. Extra credit is capped at 10 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 as I will not total-up the number of colloquia attended by each student until the end of the semester.

Academic Honesty: 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 homework or a lab report, in part or in full. The full College policy can be found in the Student Handbook.

Learning Differences and Disabilities: Lycoming College provides academic support for students who have been diagnosed with learning, physical, or psychological disabilities. If you have a diagnosed disability and which to seek academic accommodations, please contact the Assistant Dean of Academic Services, Jilliane Bolt-Michewicz.

Study Suggestions: We will cover a lot of material 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 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 answer the Concept Test questions. Work the Sample Exercises and Practice Exercises. If you get stuck, you can review the text and the detailed solutions to the
Sample Exercises. Don’t forget to check Moodle for the chapter outline with the reading and homework assignments. Be sure to complete the practice problems and give them your best shot before checking the solutions manual.

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:

1. Show up to class.
2. Actively participate (take notes, work sample problems, ask/answer questions).
3. Study without interruption approximately 2 hours outside of class for every 1 hour in class. This includes taking notes on the reading, reviewing your class notes, and working problems. It does NOT include time spent with a tutor (and you should always read and attempt the homework on your own before meeting with a tutor).
4. Spread your study time out over the entire week.
5. Test yourself by working problems/answering questions without consulting the book, your notes or the solutions manual.

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!