COURSE INFORMATION
AND
ASSIGNMENTS
FOR
CHEMISTRY 102B

Spring 2007
Course Policy for Chemistry 102B

Course Director: Tim Richmond
Office: 2 Chemistry Annex, ph. 244-4221
e-mail: trichmon@uiuc.edu
Office Hours: Monday and Wednesday, 2:00-4:00 p.m.
Course Web Site: http://www.chem.uiuc.edu

REQUIRED MATERIALS:
2. Interactive Course Guide (this book)
4. Electronic calculator with log function

RECOMMENDED:
1. Past Hourly Examinations – Chemistry 102, Fall 2005-Spring 2006

WHEN AND WHERE:
1. There will be two lectures and two discussion sections per week. The lectures are at 9 a.m. on Monday and Wednesday, and the associated discussion sections are on the following Tuesday and Thursday. Major ideas will be introduced in lecture while problem solving and critical discussion of these concepts and homework assignments will take place during discussion sections.

2. Attendance is very important in all facets of the course. One of the easiest ways to learn is to pay attention in lecture and discussion and to take good notes. Some of the techniques and applications covered in 102B are not presented in the text, so lecture notes will be a primary resource. You will be responsible for this information on exams. Also, grades of zero are assigned when quizzes are missed. These have a real and adverse effect on semester grades.

3. Most students are required to take Chem 103, General Chemistry Laboratory, concurrently with Chem 102. This 1 hour lab course provides active demonstration of principles covered in Chem 102B and introduces experimental skills. Details concerning Chem 103 will be discussed during check-in (see the General Chemistry Experiments: Chemistry 103 text for the lab schedule).

GRADING:
- WebCT Homework 70 pts.
- Text Homework (evaluation grade) 30 pts.
- Quizzes (6 total) 100 pts.
- Hour Exams (100 pts. each) 300 pts.
- Final Exam 300 pts.

Total 800 pts.
Quiz totals, hour exam grades and the final exam grade will be scaled so that 90-100 = A, 80-89 = B, 70-79 = C, 60-69 = D and 0-59 = F. At the end of the semester, the course director will sum all the points together (800 total points) and will set overall course grades according to the 90, 80, 70, 60 scale, i.e., 800-720 = A, 689-640 = B, 639-560 = C, 559-480 = D and below 480 = F. With the plus/minus grading system, the grade cut-offs will be set so that 100-93.0 = A, 92.9-90.0 = A-, 89.9-87.0 = B+, 86.9-83.0 = B, 82.9-80.0 = B-, 79.9-77.0 = C+, 76.9-73.0 = C, 72.9-70.0 = C-, 69.9-67.0 = D+, 66.9-63.0 = D, 62.9-60.0 = D- and below 60.0 = F. Note: As explained below, the WebCT homework grade will not be scaled.

**Lon-Capa Homework Grade**: Each week you will have homework sets assigned which we call Lon-Capa homework. These assignments are accessed through Firefox or Internet Explorer, or any Web browser program. The Lon-Capa homework assignments are accessed through the 102 homepage. Sign-on instructions for Lon-Capa will appear after you access the Lon-Capa link on our homepage. The password will be your active directory (AD) password. Included in the syllabus are the due dates for the various homework sets. The Lon-Capa assignment due dates for Chem 102B are always noon Tuesday.

Your Lon-Capa homework grade (70 points) will be determined by how many of the assigned problems in each problem set you complete correctly. Each problem is assigned a point total. You receive full credit for the problems when you successfully answer all of the problems in a problem set correctly (assuming all work is done before the deadline). Any work after the deadline will not earn any credit (no exceptions). The Lon-Capa system will keep a running total of all points earned during the semester. At the end of the semester, we will prorate your total points earned from the Lon-Capa homework sets into a 70 point grade. If you do all assigned problem sets correctly by the deadline then you will earn a 70 (a perfect score) for your Lon-Capa homework grade. If you do 90% of the assigned homework problems correctly then you will earn a 63 for your homework grade, etc. Since students can attempt all problems as many times as they want before the deadline, then all students in the course should have a Lon-Capa homework grade close to or at a perfect score (70).

**Text Homework (evaluation grade)**: Assigned homework problems listed in this syllabus are located at the end of each chapter and include many even and odd numbered problems. The odd numbered problems have extended solutions explained in the Partial Solutions Guide for the Zumdahl text (required text). The grade for text homework will be based solely on the even numbered problems. Students are required to turn these in on the dates that quizzes are given during their discussion section (dates will be announced later). The text homework grade is based on the completeness of the assignment with regards to the even numbered problems only (Show all work and calculations please). Assignments will be graded out of 5 points, giving a total of 30 points possible contributing to the student’s overall grade. Late homework will be awarded a maximum of 2 points within one week, and 1 point after that. It is suggested that you work on the daily assigned homework problems before your discussion sections so that difficult problems can be brought to your TA’s attention for the class to work through. We will post detailed solutions to all even numbered assigned problems in the Learning Center (212 Chemistry Annex); ask the head proctor in 212 CA for the 102B homework solutions booklet for which there are two copies on reserve. Also available in the Learning Center are tutors from 9
am - 4 pm Monday-Friday for you to ask questions. Note: your TA will not be checking your work for correctness; it is your responsibility to ensure the quality of what you turn in.

**Quiz Grade:** During the semester, you will take six ~30 minute quizzes on dates to be announced. The purpose of the quizzes is to help you prepare for hour exams (content and time management). At the end of the semester, the scores on the six quizzes for each section will be scaled in order to insure consistency in grading. The end result of scaling is to insure that each section has the same percentage of As, Bs and Cs in the scaled 100 point quiz grade. Note: All missed quizzes will result in a grade of zero, unless excused by your TA or by the course director. In order to receive an excused grade, you must have a documented excuse or a letter from the Emergency Dean stating the reason for your absence. If you receive an excused quiz grade, then an average grade of all your other quizzes will be assigned for the excused grade.

**HOUR EXAMS:**

1. The dates of the three hour examinations are: Tuesday, February 13, Tuesday, March 13 and Tuesday, April 24. All exams are from 7:00-8:10 p.m. in rooms to be announced later. Conflict exams will be held at 5:35 p.m. on the same dates. You must sign up for conflict exams in advance outside 101 Chemistry Annex and bring a picture ID to the exam. The **FINAL EXAM** for Chemistry 102B is Saturday, May 5 from 8:00-11:00 a.m.

2. No alternate make-up exams will be given. If you must miss both the exam and the conflict, contact your TA or Tim Richmond immediately. Your exam score will be prorated if you have a valid, documented excuse. (See University regulations at [http://www.admin.uiuc.edu/policy/code/article_1/a1_1-501.html](http://www.admin.uiuc.edu/policy/code/article_1/a1_1-501.html)). After the exams, solutions will be posted in the Learning Center, Room 212, Chemistry Annex.

**TO DO WELL IN THIS COURSE:**

- The text reading material should be read in full as all the material assigned in the table below is admissible for tests. Maximizing achievement in this course will require staying current in the material and performing many example problems in the text. The end of each chapter contains many problems including those assigned as text homework. Each student should master these problems, as similar questions will need to be worked in an efficient manner on quizzes and tests.

- Group work is encouraged during discussion sections and outside of class. However, group work should not be used as a tool to finish homework assignments, but rather for students to work together in learning the material so that each individual can become proficient in the subject matter.

- It is recommended for each student to attend all classes, however, in the event that a student will miss a class, it is their responsibility to obtain all handouts and material presented from that class. In addition, conflicts for any exams, homework, or quizzes will only be allowed with official university excuse presented to me ahead of time. A university guide is given on the following website. [http://www.admin.uiuc.edu/policy/code/article_1/a1_1-501.html](http://www.admin.uiuc.edu/policy/code/article_1/a1_1-501.html)
• After reviewing the course calendar please inform me if there are any conflicts with religious observances that I may have overlooked. This should be done as early in advance as possible so that the most convenient accommodation can be arranged.

• Arrive to class on time and prepared with materials and willingness to participate in discussions and lectures. Bring questions about homework problems to discussion sections.

• The discipline of chemistry and of this course in particular demand that you take responsibility for your own learning. Major learning takes place during study and problem solving; the instructors are here to guide your efforts, but you must supply the initiative and hard work.

IMPORTANT RESOURCES:

• The course website may be accessed by going to http://www.chem.uiuc.edu/. Follow the link to “course websites” and then to “102B”. Please see your TA or myself if you have difficulty accessing the website. Important: The course website will serve as the main place for announcements made in class and information for the course such as handouts and exam keys. This is also the route used to access your electronic homework.

• The Chemistry Learning Center, located in Chem Annex 212 contains many resources including solutions guides, peer tutors, other chemistry texts, and supplemental information put on hold for this course. You will also be able to access electronic homework and the course website from this location.

• Please take advantage of your TA and instructor office hours, including availability by appointment if you are busy during office hours. Tim Richmond’s office hours are 2-4pm M/W in Chem Annex 2.

• There are many resources made available at the Division of Disabilities and Educational Resources here on campus. http://www.disability.uiuc.edu/services/ If you need accommodations for any sort of disability, please bring this to my attention with a face to face meeting.

DETAILS FOR WEEK 1:

1. The first lecture is Wednesday, January 17.

2. The first meeting of 102A discussion sections will be on Thursday, January 18.

3. The first WebCT homework sets (called Homework 1A, 1B, 2A, 2B, and 2C) are due by noon Tuesday, January 30.
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<thead>
<tr>
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<td>Noon Tuesday, February 6</td>
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<td>Noon Tuesday, February 13</td>
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<td>Noon Tuesday, April 17</td>
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<td>13</td>
<td>Noon Tuesday, April 24</td>
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### CALENDAR - CHEMISTRY 102A
#### Spring 2007

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<tr>
<th>Week</th>
<th>January</th>
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|      | May     | 7  | 8  | 9  | 10 | 11 |

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HE = Hour Exams  
S/F = Classes start/finish in Chem 102B  
FINAL = Saturday, May 5, 8:00-11:00 a.m.

Course Director: Tim Richmond, 2 Chem Annex, 244-4221, trichmon@uiuc.edu  
Office Hours: 2:00 p.m.- 4:00 p.m, Monday and Wednesday, or by arrangement
### WEEK 1  
(January 16-19)

<table>
<thead>
<tr>
<th><strong>Lecture:</strong> Wednesday</th>
<th><strong>Discussion:</strong> Thursday</th>
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</thead>
<tbody>
<tr>
<td>Topics:</td>
<td>Introduction, Classification of Matter, Significant Figures</td>
</tr>
</tbody>
</table>

Reading: Zumdahl*, Chapter 1.1-1.2, 1.5, 1.9, Appendix A1.1  
Interactive Course Guide, pp. 5-19

Learn: The names and symbols of the first 36 elements on the periodic chart and those in the groups (columns) beginning with Li, Be, Cu, Zn, O, F and He.

Problems: Zumdahl, Chapter 1: 17-19, 24, 27, 29, 67, 69-72

Review Questions: Zumdahl, Chapter 1: 1-3, 9

### WEEK 2  
(January 22-26)

<table>
<thead>
<tr>
<th><strong>Lecture:</strong> Monday</th>
<th><strong>Discussion:</strong> Tuesday</th>
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<tbody>
<tr>
<td>Topics:</td>
<td>Measurements - Units, Significant Figures, Dimensional Analysis, Density, Atomic Theory</td>
</tr>
</tbody>
</table>

Reading: Zumdahl, Chapter 1.3-1.6, 1.8; 2.1-2.4

Problems: Zumdahl, Chapter 1: 20-22, 31-33, 35, 37, 38, 45-47, 56-59, 62, 64, 65, 78, 79  
Chapter 2: 9, 15(a,b)

Review Questions: Zumdahl, Chapter 1: 1-3, 9  
Chapter 2: 1(a.b)

<table>
<thead>
<tr>
<th><strong>Lecture:</strong> Wednesday</th>
<th><strong>Discussion:</strong> Thursday</th>
</tr>
</thead>
<tbody>
<tr>
<td>Topics:</td>
<td>Subatomic Particles, Isotopes, Nomenclature, Periodic Table, The Mole, Atomic Weight, Molar Mass</td>
</tr>
</tbody>
</table>

Reading: Zumdahl, Chapter 2.4-2.8; 3.1-3.4

Chapter 3: 20, 21, 27, 29, 30, 33, 34, 51, 55-57, 107

Review Questions: Zumdahl, Chapter 2: 4-10  
Chapter 3: 1-4

*Chemistry by Zumdahl & Zumdahl (Seventh Edition)*
WEEK 3
(January 29-February 2)

**Lecture: Monday**
Topics: Formula Calculations - Percent Composition, Empirical and Molecular Formulas

Reading: Zumdahl, Chapter 3.5-3.6

Problems: Zumdahl, Chapter 3: 22, 23, 63-65, 67-70, 72, 75, 76, 79, 80, 111, 113-115, 117, 123, 137

Review Questions: Zumdahl, Chapter 3: 5, 6

**Lecture: Wednesday**
Topics: Chemical Reactions, Stoichiometry - Mole and Mass Relations, Limiting Reagents

Reading: Zumdahl, Chapter 3.7-3.10

Problems: Zumdahl, Chapter 3: 24-26, 81, 82, 85, 86, 88-91, 94, 97-101, 104-106, 119, 121, 126

Review Questions: Zumdahl, Chapter 3: 7-10

WEEK 4
(February 5-February 9)

**Lecture: Monday**
Topics: Solutions: Concentration Units, Electrolytes, Reactions in Solution

Reading: Zumdahl, Chapter 4.1-4.6

Problems: Zumdahl, Chapter 4: 9-11, 13, 17, 18, 20, 21, 23, 25, 27, 29, 31, 32, 35, 37, 39, 41-43, 46, 56*, 57*, 80, 81, 88

Review Questions: Zumdahl, Chapter 4: 1-7

*For Exercises 4.56 and 4.57, only give the balanced molecular equations.

**Lecture: Wednesday**
Topics: Solution Stoichiometry, Thermochemistry

Reading: Zumdahl, Chapter 4.7-4.8, 6.1-6.2
Note: The reading assignment in 6.1-6.2 goes into too much detail.

Problems: Zumdahl, Chapter 4: 12-14, 48, 49, 51, 53, 63-65, 82-84, 86, 89, 91, 93, 107, 110, 111

Chapter 6: 32-36

Review Questions: Zumdahl, Chapter 4: 8
### WEEK 5  
*(February 12-16)*

<table>
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<tr>
<th><strong>Lecture: Monday</strong></th>
<th><strong>Discussion: Tuesday</strong></th>
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<tbody>
<tr>
<td>Topics:</td>
<td>Catch up in lecture, and optional review for Hour Exam I in discussion section.</td>
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</table>

**HOUR EXAM I: 7:00 pm TUESDAY, 2/13** *(Location to be announced.)*

<table>
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<tr>
<th><strong>Lecture: Wednesday</strong></th>
<th><strong>Discussion: Thursday</strong></th>
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<tbody>
<tr>
<td>Topics:</td>
<td>Gases - P, V, T Relationships, Ideal Gas Law, Stoichiometry, Partial Pressures</td>
</tr>
<tr>
<td>Reading:</td>
<td>Zumdahl, Chapter 5.1-5.5, Appendix A1.3</td>
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<td>Review Questions:</td>
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### WEEK 6  
*(February 19-23)*

<table>
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<tr>
<th><strong>Lecture: Monday</strong></th>
<th><strong>Discussion: Tuesday</strong></th>
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<tbody>
<tr>
<td>Topics:</td>
<td>Kinetic Molecular Theory, Real Gases</td>
</tr>
<tr>
<td>Reading:</td>
<td>Zumdahl, Chapter 5.6-5.9</td>
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<tr>
<td>Problems:</td>
<td>Zumdahl, Chapter 5: 23, 24(b,d), 26, 81-86, 88, 112, 113</td>
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<td>Review Questions:</td>
<td>Zumdahl, Chapter 5: 6-10</td>
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<tr>
<th><strong>Lecture: Wednesday</strong></th>
<th><strong>Discussion: Thursday</strong></th>
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<tbody>
<tr>
<td>Topics:</td>
<td>Electromagnetic Radiation, Atomic Spectra, The Bohr Model, The Quantum Mechanical Model</td>
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<tr>
<td>Reading:</td>
<td>Zumdahl, Chapter 7.1-7.5</td>
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<tr>
<td>Problems:</td>
<td>Zumdahl, Chapter 7: 15-18, 26, 28, 33, 35-38, 41, 43, 45, 47, 50-53, 113-115</td>
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## WEEK 7
*(February 26-March 2)*

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<tr>
<td>Topics:</td>
<td>Orbitals and Electronic Structure, The Periodic Table</td>
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<tr>
<td>Reading:</td>
<td>Zumdahl, Chapter 7.7-7.11</td>
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<tr>
<td>Problems:</td>
<td>Zumdahl, Chapter 7: 14, 20, 21, 27, 58, 62, 64, 67, 68, 71, 73-75, 79-82, 84, 108, 122</td>
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<td>Chapter 8: 34, 35</td>
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<td>Chapter 21: 15, 16</td>
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<td>Review Questions:</td>
<td>Zumdahl, Chapter 7: 6-8</td>
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<th>Lecture: Wednesday</th>
<th>Discussion: Thursday</th>
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<tbody>
<tr>
<td>Topics:</td>
<td>Periodic Properties, Introduction to Bonding</td>
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<tr>
<td>Reading:</td>
<td>Zumdahl, Chapter 7.12-7.13, 8.1-8.4</td>
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<td>Problems:</td>
<td>Zumdahl, Chapter 7: 22, 23, 85, 87, 89, 90, 92-94, 121, 123, 124, 136</td>
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<td>Chapter 8: 13, 15, 17, 23, 29-33, 36-39, 41, 105</td>
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<td>Zumdahl, Chapter 7: 9, 10</td>
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<td>Chapter 8: 1, 2</td>
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## WEEK 8
*(March 5-9)*

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<th>Lecture: Monday</th>
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<tr>
<td>Topics:</td>
<td>Lewis Structures, Nonoctets, Resonance</td>
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<tr>
<td>Reading:</td>
<td>Zumdahl, Chapter 8.9-8.12</td>
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<tr>
<td>Problems:</td>
<td>Zumdahl, Chapter 8: 20, 67-75, 78-80, 109, 112</td>
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<td>Handouts book, p. 60: Complete the Lewis structures for the organic compounds listed on the bottom of this page.</td>
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<td>Zumdahl, Chapter 8: 5, 6</td>
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<tr>
<td>Topics:</td>
<td>VSEPR, Polarity</td>
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<td>Problems:</td>
<td>Zumdahl, Chapter 8: 16, 22, 89-999, 101-104, 114(a,b), 115, 128, 130</td>
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<td>Zumdahl, Chapter 8: 8-10</td>
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WEEK 9
(March 12-16)

Lecture: Monday  Discussion: Tuesday
Topics: Catch up in lecture, and optional review for Hour Exam II in discussion section.

HOUR EXAM II: 7:00 pm TUESDAY, 3/13 (Location to be announced.)

Lecture: Wednesday  Discussion: Thursday
Topics: Hybrid Orbitals, Delocalization
Reading: Zumdahl, Chapter 9.1, 9.5
Problems: Zumdahl, Chapter 9: 6, 7, 9, 10, 14-20, 25, 26, 29, 30, 33, 34, 51, 52, 55, 56, 70
Review Questions: Zumdahl, Chapter 9: 1-4, 10

SPRING BREAK, MARCH 19-23

WEEK 10
(March 26–30)

Lecture: Monday  Discussion: Tuesday
Topics: Intermolecular Forces and Physical Properties
Reading: Zumdahl, Chapter 10.1-10.2, 10.8 (vapor pressure discussion only)
Problems: Zumdahl, Chapter 10: 5, 10-12, 18, 19, 23, 29, 30(a,d-g), 31-35, 97, 99
Review Questions: Zumdahl, Chapter 10: 1, 2

Lecture: Wednesday  Discussion: Thursday
Topics: Chemical Equilibrium
Reading: Zumdahl, Chapter 13.1-13.4
Problems: Zumdahl, Chapter 13: 9, 10, 17-19, 22, 23, 25, 29-32, 37, 38
Review Questions: Zumdahl, Chapter 13: 1-5
WEEK 11
(April 2-6)

Lecture: Monday  Discussion: Tuesday
Topics: Equilibrium Calculations, LeChatelier's Principle

Reading: Zumdahl, Chapter 13.5-13.7
Note: For Section 13.6, concentrate on the pages that discuss treating systems that have small equilibrium constants.

Review Questions: Zumdahl, Chapter 13: 6-10

Lecture: Wednesday  Discussion: Thursday
Topics: Introduction to Acids and Bases,
       pH Calculations: Strong Acids, Strong Bases

Reading: Zumdahl, Chapter 14.1-14.4, Appendix A1.2

Problems: Zumdahl, Chapter 14: 17, 21, 22, 27-29, 31-38, 41, 43, 45-48, 50, 51, 77, 79, 81, 82, 125, 126
Review Questions: Zumdahl, Chapter 14: 2-4
WEEK 12
(April 9-13)

Lecture: Monday
Topics: Weak Acids, Weak Bases
Reading: Zumdahl, Chapter 14.5-14.6, 14.12, Appendix A1.4
Problems: Zumdahl, Chapter 14: 23, 53, 56, 57, 65-71, 75, 83, 84, 91, 92

Discussion: Tuesday

Review Questions: Zumdahl, Chapter 14: 5, 6

Lecture: Wednesday
Topics: Polyprotic Acids, Salts, Acid-Base Properties of Oxides
Reading: Zumdahl, Chapter 14.7, 14.8, 14.10
Problems: Zumdahl, Chapter 14: 19, 24, 26, 34, 36, 74, 76, 94, 95(b), 99-105, 107, 108, 111, 117, 118, 129, 130, 135, 138, 141, 155
Chapter 5: 93, 94

Discussion: Thursday

Review Questions: Zumdahl, Chapter 14: 7-9

WEEK 13
(April 16-20)

Lecture: Monday
Topics: Buffers
Reading: Zumdahl, Chapter 15.1-15.3
Problems: Zumdahl, Chapter 15: 14, 15, 21, 22, 33-36, 39-41, 44-48, 118
Review Questions: Zumdahl, Chapter 15: 1-3

Discussion: Tuesday

Lecture: Wednesday
Topics: Titration Curves
Reading: Zumdahl, Chapter 15.4 (with review of Chapter 4.8 on acid-base titrations)
Problems: Zumdahl, Chapter 15: 51, 53-55, 57*, 63, 124, 125, 126*, 127, 129, 132
*For Exercises 15.57 and 15.126, only calculate the pH at 0.0, 10.0, 12.5, 20.0, 25.0 and 30.0 mL of NaOH added, then sketch the titration curve.

Discussion: Thursday

Review Questions: Zumdahl, Chapter 15: 4, 5
WEEK 14  
(April 23-27)

**Lecture: Monday**  
Topics: Catch up in lecture, and optional review for Hour Exam III in discussion section.

**Discussion: Tuesday**  
Topics: Catch up in lecture, and optional review for Hour Exam III in discussion section.

**HOUR EXAM III: 7:00 pm WEDNESDAY, 4/24** (Location to be announced.)

**Lecture: Wednesday**  
Topics: Titration Curves

**Discussion: Thursday**  
Topics: Titration Curves

**Reading:** Zumdahl, Chapter 15.4

**Problems:**  
Zumdahl, Chapter 15: 16, 17, 52, 56*, 59*, 61, 64, 130, 143, 144  
Handouts book, Polyprotic Acid Titrations: Problems 1 and 2  
*For Exercises 15.56 and 15.59, only calculate the pH at the initial, half-way and equivalence points, then sketch the titration curves.

Review Questions:  
Zumdahl, Chapter 15: 6

WEEK 15  
(April 30 - May 2)

**Lecture: Monday**  
Topics: Oxidation-Reduction Reactions

**Discussion: Tuesday**  
Topics: Oxidation-Reduction Reactions

**Reading:** Zumdahl, Chapter 4.9-4.10

**Problems:**  
Zumdahl, Chapter 4: 15, 16, 67, 69, 71, 73, 94

Review Questions:  
Zumdahl, Chapter 4: 9, 10

**Lecture: Wednesday**  
Topics: Review for Final

**FINAL EXAM:**  
Saturday, May 5, 8:00am-11:00 am (Location to be announced.)