COURSE OUTLINE
Chemistry 115
Chemical Principles

Fall Semester 2012

Instructor: Fred King
Room: P-459

Lecture 001/501 8:00 – 8:50 a.m. M W F P119
Lab 311 8:00 – 10:50 a.m. T Th P402
Lab 312 9:00 a.m. – 11:50 a.m. M W P402

(Dr. Jim Boulter)
Lab 531 2:00 p.m. – 4:50 p.m. T Th P402


Laboratory Text: Chemistry 115 Laboratory Manual, University of Wisconsin - Eau Claire

COURSE OBJECTIVES:

Chemistry 115 is the first course in the chemistry sequence. It establishes the foundations for following courses in chemistry, and therefore a solid grasp of the important concepts in 115 is essential for future studies in chemistry. Even for those not continuing in chemistry, this course offers an exposure to scientific thinking, a necessity for all educated people in the complex society of today. This course will build upon the chemistry that you have learned in high school.

BACKGROUND EXPECTED

I expect that each student has the following background:

1. A solid working vocabulary of introductory chemical terms (as discussed in your high school chemistry class). (The Glossary at the back of the textbook will be most helpful to you for reviewing).

2. You should be familiar with the names of the elements and their chemical compounds and their symbolic representation and the common oxidation numbers. You should be familiar with the basic arrangement of the periodic table. There are some review sheets on the web at: http://www.chem.uwec.edu/king/teaching-chem-115-2012.html

3. You should be familiar with the writing and interpretation of chemical equations. Be able to carry out quantitative calculations for chemical reactions. I will review aspects of this topic in lectures.
List of Review Topics

Most of the review material is placed in the first three chapters of the Chem 115 text. It is extremely important that you review this material as early in the course as you can. A few of these items will be touched upon in some lectures – but the presentation will be concise.

The first exam will cover the material assigned for review.

**Introduction**

a. Units and Conversion Factors  
b. Significant Figures  
c. Graphs  
d. Physical and Chemical Properties  
e. Classification of Matter: Substance, Elements, Compounds, Mixtures. Analytical Methods  
f. Scientific Method

**Atoms, Molecules, and Ions**

a. Laws of Definite and Multiple Proportions  
b. Atoms: Protons, Neutrons, Electrons. Atomic Number  
c. Molecules and Ions. Molecular and Ionic Compounds  
d. Atomic Mass, Molecular Mass. Isotopes  
e. Avogadro's Number  
f. Inorganic Nomenclature  
g. Empirical and Molecular formulas

**Chemical Formulas and Equations**

a. Stoichiometry  
b. The Mole  
c. Interpretation of Chemical Equations  
d. Limiting reagent

**Periodic Table**

a. Structure of the Periodic Table

**MAJOR COURSE OBJECTIVES**

This semester I want each student to master to the best of his/her ability, the following principal topics:

1. Develop an understanding of the nature of the chemical bond.  
2. Elementary thermodynamics applied to chemical systems.  
3. Kinetics. Topics 2 and 3 provide answers to two of the two most central questions in chemistry: Will a reaction go? (Thermodynamics). If it will go, how fast? (Kinetics).
4. The nature of chemical equilibrium.
5. Electrochemistry

We will cover other topics in addition to these, but a great deal of chemical thinking is based on the above topics.

**OFFICE HOURS**

These are posted on my door. I am also happy to meet with you at other times by appointment as is necessary.

**STUDY SUGGESTIONS**

In any course, it is particularly advantageous to keep up with the material as it's presented. If you need help with your questions – come and see me as soon as possible. The sooner your questions are answered, the easier it will be for you to move on and master the next section of material.

You will find it particularly valuable to read assigned material before it is covered in lecture.

It is necessary to read each lab experiment in advance of the scheduled lab. There will not be sufficient time in most labs to read the introductory material on each experiment during the scheduled lab period.

Working the assigned questions at the end of each chapter will be critical to your success in this course. If you have some difficulty with a particular section of a chapter, try to make time to do additional problems (beyond the assigned ones) on the sections that cause you the most difficulty.

**REQUIRED ITEMS**

(i) Safety goggles. These must be worn at ALL times when you are doing work in the lab. You need these for the first lab period.
(ii) Padlock, required for your lab drawer in the lab. It is required by the second lab session.

**ATTENDANCE POLICY**

I will record attendance in class as required by university regulations. I will not count attendance as part of the grade. I do reserve the right to include classroom participation as part of the overall evaluation of performance. It is particularly important that every effort be made to attend each scheduled lab. ALL laboratory experiments must be completed to receive a passing grade in the course.

**WORK DUE**

A penalty of -20% may be assessed for late work.
EXAMS and QUIZZES

There will be three exams plus a final exam. The tentative dates for the exams will be September 21, October 26, and November 19.

There will be 5 lecture quizzes during the second half of the semester. If no quizzes are missed, the lowest quiz score will be dropped. Quiz times will be announced a few days in advance.

GRADES

The grade obtained in this course will be a composite of your efforts in exams, quizzes, assignments, laboratory work, and classroom participation.

+ and - grades will be given.

Grading breakdown of points for 001

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<thead>
<tr>
<th></th>
<th>Points</th>
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<tbody>
<tr>
<td>Exams (lecture)</td>
<td>300</td>
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<tr>
<td>Quizzes (lecture)</td>
<td>100</td>
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<tr>
<td>Assignments</td>
<td>130</td>
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<tr>
<td>Laboratory work</td>
<td>220</td>
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<tr>
<td>Final Exam (comprehensive)</td>
<td>250</td>
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<tr>
<td>Course Total</td>
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Grading breakdown of points for 501

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<td>Quizzes (lecture)</td>
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<tr>
<td>Assignments</td>
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<tr>
<td>Project</td>
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<tr>
<td>Laboratory work</td>
<td>220</td>
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<tr>
<td>Final Exam (comprehensive)</td>
<td>250</td>
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<td>Course Total</td>
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TENTATIVE LECTURE SCHEDULE

<table>
<thead>
<tr>
<th>Topic Number</th>
<th>TOPIC</th>
<th>Section in Text</th>
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<tbody>
<tr>
<td>1</td>
<td>Introduction: Stoichiometry</td>
<td>Chapters 1-3 for self review.</td>
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<td></td>
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<td>Chap. 3, Stoichiometry</td>
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<td>2</td>
<td>Thermochemistry</td>
<td>Chap. 6, Energy Relationships in Chemical Reactions</td>
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<tr>
<td>Chapter</td>
<td>Topic</td>
<td>Related Chapters</td>
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<tr>
<td>3</td>
<td>Atomic Structure</td>
<td>Chap. 7, The Electronic Structure of Atoms</td>
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<td>4</td>
<td>Periodic Table</td>
<td>Chap. 8, The Periodic Table</td>
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<tr>
<td>5</td>
<td>Ionic and Covalent Bonding</td>
<td>Chap. 9, Chemical Bonding I: The Covalent Bond</td>
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<tr>
<td>6</td>
<td>Molecular Geometry</td>
<td>Chap. 10, Chemical Bonding II: Molecular Geometry and Hybridization of Atomic Orbitals</td>
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<tr>
<td>7</td>
<td>Liquids and Solids</td>
<td>Chap. 12, Intermolecular Forces and Liquids and Solids</td>
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<td>8</td>
<td>Chemical Equilibrium</td>
<td>Chap. 15, Chemical Equilibrium</td>
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<td>9</td>
<td>Acid-base theory and reactions</td>
<td>Chap. 16, Acid and Bases</td>
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<tr>
<td>10</td>
<td>Ionic equilibrium; Aqueous Equilibria</td>
<td>Chap. 17, Acid-Base Equilibria and Solubility Equilibria</td>
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<tr>
<td>11</td>
<td>Chemical Thermodynamics</td>
<td>Chap. 18, Thermodynamics</td>
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<tr>
<td>12</td>
<td>Oxidation-Reduction</td>
<td>Chap.19, Redox Reactions and Electrochemistry</td>
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<tr>
<td>13</td>
<td>Electrochemistry (as time permits)</td>
<td>Chap.19, Redox Reactions and Electrochemistry</td>
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<tr>
<td></td>
<td><strong>The following topics will be discussed</strong></td>
<td><strong>partly or exclusively in the lab.</strong></td>
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<tr>
<td>13</td>
<td>Electrochemistry - Cells</td>
<td>Chap. 19, Redox Reactions and Electrochemistry</td>
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The University suggests that course outlines include the following information that may be of value to students in the class.

Services for Students with Disabilities Office

Any student who has a disability and is in need of classroom accommodations, please contact the instructor and the Services for Students with Disabilities Office in Old Library 2136 at the beginning of the semester.

Students who are non-native speakers of English may request extended test-taking time (time and a half). To determine eligibility, English proficiency is evaluated by the Academic Skills Center (for U. S. permanent residents/citizens) or by the Department of Foreign Languages (for international students). Students approved for the accommodation are given a verification form to present to their course instructors. Students must provide verification during each semester at least one week before the test for which accommodation is needed. Verification is valid for one semester. The accommodation policy does not apply to other forms of evaluation (e.g., papers, projects, group presentations) or to situations in which students must demonstrate clinical or similar skills.

Liberal Education Learning Goals are addressed in the course

1. Knowledge of the Natural World
2. Creative and Critical Thinking
3. Effective Communication

Academic integrity

I expect each student will do the work of the class with academic integrity.

Classroom behavior

a. Turn off cell phones when you come to class.
b. Computer use in class should be connected with the class, and not with other outside work.
c. If you need to leave the lecture early for good cause, sit at the front of the class, and as a courtesy to the instructor, explain your need to leave early.
d. Constantly coming late to class is a sign of bad manners. If you miss the safety instructions at the start of a lab, you will be asked to come to lab at another time.
e. The class this semester will be large. Carrying out conversations in the middle of the lecture shows a lack of respect to other students in the class.

f. If you are showing signs of the flu, stay home and get some rest. Send me an email to let me know your situation.

g. Don’t come to lecture to sleep in class. Stay home in bed – it will be more comfortable.

h. Show respect for other people in the class, and expect the same from others. Include the instructor in this group.