Chemistry 20: Fundamentals of Chemistry
Summer 2008 – Section 1050

Instructor: Valerie Baggett, Dr. Kenneth Rodriguez

Office: Chem 132

Office Hours: by appointment

Telephone: 310-660-6131 (no messages); 310-990-1201 in emergency

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Class Hours: MTWTh 10:00 – 12:50 pm CHEM 133 lecture
MTWTh 1:00 – 3:05 pm CHEM 166 lab

Course Description: Chemistry 20 is an introductory chemistry course that presents fundamental theories and principles of chemistry applied to inorganic, organic, and biological chemistry; atomic and molecular structure, kinetic-molecular theory, chemical and physical changes, solutions and colloids. The course emphasizes chemical nomenclature, chemical equations, and problem-solving calculations. Chemistry 20 is intended for students who require a basic knowledge of chemistry for use in their daily lives or as a prerequisite for other courses, and who have not previously taken a chemistry course.

Prerequisite: Mathematics 40 or 41B with a minimum grade of C (or by placement exam)

Recommended Preparation: Eligibility for English 2R

Required Materials:
Karen Timberlake, Chemistry: an Introduction to General, Organic and Biological Chemistry, 10th Ed., Benjamin Cummings.

Charles Hendrickson, et al., Laboratory Guide for General, Organic, & Biochemistry, 5th Ed., McGraw-Hill Higher Education (This must be purchased; copies are not acceptable.)

A scientific calculator, capable of doing exponential calculations (exp or EE key).

Safety goggles (Instructor approved)

Optional Materials:
Karen Timberlake, Study Guide with Selected Solutions for the required text.
Grading:

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<thead>
<tr>
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<tbody>
<tr>
<td>Four Exams @ 100 points each</td>
<td>400</td>
<td>(57%)</td>
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<tr>
<td>Six Quizzes @ 15 points each</td>
<td>60</td>
<td>(9%)</td>
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<tr>
<td>Seventeen Labs @ 10 points each</td>
<td>170</td>
<td>(24%)</td>
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<tr>
<td>Final - Practical</td>
<td>70</td>
<td>(10%)</td>
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<tr>
<td>Total Points for Course</td>
<td>700</td>
<td>(100%)</td>
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<tr>
<th>%</th>
<th>Points</th>
<th>Grade</th>
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<tr>
<td>90 - 100</td>
<td>630 - 700</td>
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<tr>
<td>80 – 89</td>
<td>560 - 629</td>
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<td>70 – 79</td>
<td>490 - 559</td>
<td>C</td>
</tr>
<tr>
<td>60 – 69</td>
<td>420 - 489</td>
<td>D</td>
</tr>
<tr>
<td>0 – 59</td>
<td>0 - 419</td>
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**Homework** – The homework is all the odd numbered problems in each chapter, identified as “Questions and Problems”. All of the homework can be handed in before each exam for 5 extra credit points. Partial credit is not given if not all the homework has been completed.

**Labs** – There are 18 scheduled labs. There is no lab scheduled on Thursdays, which will be used to complete labs that were not finished earlier in the week. The pre-lab is to be finished before coming to lab. All labs for the week are due on Thursday.

**Exams** - There are four mid-term exams. If an exam is missed for a legitimate reason, please contact the instructor to arrange for an alternative testing period.

**Final** – A practical final that will be taken in the laboratory.

**Course Objectives:**

By the end of this course, the student will be able to:

1. Be proficient in the ability to use scientific terminology, name and write chemical formulas for inorganic compounds (binary nonmetal compounds, salts and acids), write and classify chemical equations for elementary chemical reactions, and perform stoichiometric calculations involving chemical reactions.

2. Demonstrate a basic understanding of Bohr theory, predict and explain periodic trends of elements in terms of electronic configurations, describe and illustrate the structure and bonding for molecules by constructing Lewis structures, labeling the molecular geometries of the molecule and determining polarity.

3. Use the Kinetic Molecular Theory to explain the behavior of gases, perform calculations involving the gas laws, and relate intermolecular forces to observed properties of solids, liquids and gases.
4. Explain solubility in terms of properties of both solute and solvent, determine concentrations of solutions quantitatively and experimentally, give qualitative and quantitative descriptions of solution colligative properties as a function of solute type and solute concentration, classify solutes as strong, weak, or nonelectrolytes, and write net ionic equations for chemical equations.

5. Compare and contrast Arrhenius and Bronsted-Lowry acid theories, write acid-base reactions, and determine pH and understand how a buffer works.

6. Determine oxidation numbers for oxidation reduction reactions, and identify the element oxidized and the element reduced in redox reactions.

7. Use the common and IUPAC systems to name simple examples of various classes of organic compounds, draw structural formulas of simple examples of various classes of organic compounds, write equations for selected reactions of organic compounds and draw structural formulas which illustrate a knowledge of structural isomerism and geometric isomerism.

8. Demonstrate an understanding of chirality by drawing Fisher projections of enantiomers which contain one chiral carbon, draw open chain and ring structural formulas for the common monosaccharides, describe the linkage between monosaccharide units in terms of the bonding involved, state the functions of the common di- and polysaccharides, draw the general structural formula of a fatty acid and a triglyceride, draw a general ring structure found in steroids, draw the general structural formula for a zwitterion and explain how this structure can function as a buffer, draw the structural formulas of at least three amino acids at physiological pH, explain the geometry of a peptide bond by using resonance structure, state the features which characterize the primary, secondary, and tertiary structure of a protein, and define denaturation as it applies to a biological system.

9. Learn fundamental chemistry techniques in the laboratory, including a titration and use of a pH meter; become proficient in the use of balances and common laboratory glassware, such as burets, pipets, and volumetric flasks; illustrate basic principles of gases, solutions, acids and bases, and oxidizing and reducing agents through experimental procedures.
Expectations of Students:

1. Students will be in class at 10:00 am every day, will stay for the whole class, and will
   attend every class and laboratory.

2. Student will notify the instructor if they are going to miss class. This can be done in
   person, by e-mail, or by a phone call in an emergency situation.

3. Students will be prepared when they come to class and lab.

4. Students will complete the lab during the scheduled time.

5. PowerPoint presentations are available to students, if they bring a flash drive.

6. Students will do the assigned homework. Students will do at least 2 hours of
   homework every evening after class, plus additional time on the weekends.

7. Students will not disrupt the class with cell phones, late arrivals, excessive noise,
   eating and drinking, etc.

8. Students will clean up their own messes.

9. Students will not cheat or plagiarize.

10. Students will ask questions in class, of other students, and of the instructor.

11. Students will form study groups and help each other learn.

12. Students will use e-mail for questions.

13. Students will follow laboratory safety procedures, including wearing goggles, no food
    or drink, and wearing closed-toe shoes.

14. Students will enjoy this class, learn a lot of chemistry, and will get an amazing grade.
# Proposed Lecture and Lab Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture</th>
<th>Lab</th>
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<tbody>
<tr>
<td>June 16</td>
<td>Intro</td>
<td>Safety Video</td>
</tr>
<tr>
<td></td>
<td>Chapter 1 - Measurements</td>
<td>Metric Lab</td>
</tr>
<tr>
<td>June 17</td>
<td>Chapter 1</td>
<td>Ex. 2 – Preparing Graphs / App I</td>
</tr>
<tr>
<td>June 18</td>
<td>Chapter 3 – Atoms and Elements</td>
<td>Lab Check In</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ex. 1 – Measurement and Density</td>
</tr>
<tr>
<td>June 19</td>
<td>Chapter 3</td>
<td>Laboratory Burner</td>
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<td></td>
<td></td>
<td>Review</td>
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<tr>
<td>June 23</td>
<td>Chapter 4 - Bonds</td>
<td>Candle Lab</td>
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<tr>
<td></td>
<td></td>
<td>Ionic Molecules</td>
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<tr>
<td>June 24</td>
<td>Chapter 4</td>
<td>Ex. 9 – Covalent Molecules</td>
</tr>
<tr>
<td>June 25</td>
<td>Test 1 (1, 3, 4)</td>
<td>Energy Lab - foods</td>
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<tr>
<td></td>
<td>Chapter 2 - Energy</td>
<td></td>
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<tr>
<td>June 26</td>
<td>Chapter 2</td>
<td>Review</td>
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<tr>
<td></td>
<td>Chapter 5 - Reactions</td>
<td></td>
</tr>
<tr>
<td>June 30</td>
<td>Chapter 5</td>
<td>Ex 7 – Simple Chemical Reactions</td>
</tr>
<tr>
<td>July 1</td>
<td>Chapter 6 - Gases</td>
<td>Penny Lab</td>
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<tr>
<td>July 2</td>
<td>Chapter 6</td>
<td>Ex. 13 – The Combined Gas Law</td>
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<td></td>
<td>Chapter 7 - Solutions</td>
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<tr>
<td>July 3</td>
<td>Chapter 7</td>
<td>Review</td>
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<tr>
<td>July 7</td>
<td>Test 2 (5, 2, 6, 7)</td>
<td>Ex. 15 – Acids, Bases, pH</td>
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<td>Chapter 8 – Acids and Bases</td>
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<td>July 8</td>
<td>Chapter 8</td>
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<tr>
<td>July 9</td>
<td>Chapter 10 - Alkanes</td>
<td>Ex. 14 – Acid-Base Titration</td>
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<tr>
<td>July 10</td>
<td>Chapter 10</td>
<td>Review</td>
</tr>
<tr>
<td>July 14</td>
<td>Chapter 11 - Alkenes</td>
<td>Ex. 17 – The Properties of Hydrocarbons</td>
</tr>
<tr>
<td>July 15</td>
<td>Chapter 12 – Oxygen and Sulfur</td>
<td>Ex. 16 – The Structure of Hydrocarbons</td>
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<tr>
<td>July 16</td>
<td>Test 3 (8, 10, 11, 12)</td>
<td>Ex. 19 – Preparation of Esters and Soaps</td>
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<tr>
<td></td>
<td>Chapter 13 – Other Organic</td>
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<tr>
<td>July 17</td>
<td>Chapter 14 - Carbohydrates</td>
<td>Review</td>
</tr>
<tr>
<td>July 21</td>
<td>Chapter 15 - Lipids</td>
<td>Ex. 22 – Organic Functional Groups- knowns</td>
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<td>July 22</td>
<td>Chapter 16 – Amino Acids</td>
<td>Ex. 22 – Organic Functional Groups- unknowns</td>
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<tr>
<td>July 23</td>
<td>Chapter 17 – Nucleic Acids</td>
<td>Ex. 23 – Detection of Fats, Carbohydrates an Proteins Check-Out</td>
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<tr>
<td>July 24</td>
<td>Test 4 (13, 14, 15, 16, 17)</td>
<td>Final Practicum</td>
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**Rubric for Scoring Lab Reports**

<table>
<thead>
<tr>
<th>Timeliness</th>
<th>Pre-Lab</th>
<th>Data Collection</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>-</td>
<td>All data collected and accurate observations were written.</td>
<td>All questions were answered accurately.</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>Most of the data were collected, and/or some written observations</td>
<td>Most questions were answered accurately.</td>
</tr>
<tr>
<td>2</td>
<td>Pre-lab questions answered completely</td>
<td>Some data collected, and/or some observations</td>
<td>Some questions were answered accurately.</td>
</tr>
<tr>
<td>1</td>
<td>Pre-lab questions answered partially</td>
<td>Limited data collected, and/or limited observations</td>
<td>Few questions were answered accurately.</td>
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<tr>
<td>0</td>
<td>Pre-lab questions not answered</td>
<td>No data or observations</td>
<td>No questions were answered.</td>
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<tr>
<td>-1</td>
<td>Pre-lab not completed at start of lab</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-2</td>
<td>Lab not turned in on time</td>
<td>-</td>
<td>-</td>
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Acknowledgement of Syllabus:

By signing and returning this sheet, I acknowledge that I have read the El Camino College Chemistry 20-1050 Syllabus for Summer 2008 and that I have understood all of its contents.

Signature ___________________________ Printed full name ___________________________