WALTERS STATE COMMUNITY COLLEGE
Course Syllabus

Course: CHEM 1000 - Basic Chemistry
Semester: Spring 2012
Instructor: Dr. Matthew Smith, Office WSSC 201, Phone 865-774-5846
          E-Mail Matthew.Smith@ws.edu

Course Contact: Dr. Jeff T. Horner, Dean of Natural Science, Office NSCI 126,
                Supervisor: Phone: 423-585-6954, E-Mail: Jeff.Horner@ws.edu
                Office Hours: Office Hours are posted on the instructor’s office door.
                FAX: 423-318-2762
                Secretary: 423-585-6865 (Sherry Woody)

Required Textbook:
Basic Chemistry, 3rd Edition by Karen Timberlake

Additional Materials:
Scientific Calculator (required), Study Guide (strongly suggested)

Catalog Course Description:
A study of fundamental chemical concepts with emphasis on applications to agriculture, biology,
nursing and the technologies. Designed for students who have not had a thorough high school
course in chemistry.
3 hours lecture ----------------------------------------------- 3 Credit Hours

Prerequisites: None

Course Outcomes:
The course syllabus is built around a common core. The subject content for the core is shown as
learning outcomes that are available on eLearn and on the Chemistry Home Page at
www.ws.edu.

Common Core:
A. Measurements
B. Atoms and Elements
C. Compounds and Their Bonds
D. Chemical Reactions and Quantities
E. Energy and States of Matter
F. Gases
G. Solutions
H. Acids and Bases

General Education Course Designation: Natural Science (3 semester hours)
Methods of Instruction:
Lectures and discussion: You are expected to attend class, pay attention, and participate actively in discussions by answering questions, asking questions, and making comments. You will get more out of the lecture if you have read the material in the textbook ahead of time. Always bring your book with you to lecture. Learning Outcomes for students can be found in the Walters State eLearn page for this course and the chemistry section of the Natural Science homepage, Outlines and PowerPoint presentations used in lecture may be available for your review on the Walters State eLearn page for this course.

Reading: The textbook provides a good general introduction to the field of basic chemistry. The book covers most of the topics that are approached in the class. Thus, it will serve to augment lecture and to provide material for discussion. In addition, readings in the book will support the material that you will be studying in labs. The book includes many things which will help you understand the material and study for the tests, including a list of key concepts, chapter summaries, review questions, quizzes, and a list of key terms.

Expectations
Satisfactory performance in college courses generally asks for two hours of study outside of class for each hour in class. This estimate applies to an "average" student expecting an "adequate" (=C) grade. Students aiming higher or those with academic problems should expect to spend more effort than the minimum. Should you procrastinate, not read ahead of time, or expect to cram everything on last days before exams this course may not be for you.

The Student can expect from the teacher:
1. Email response within 24 hours during the normal workweek. Holidays and vacations excluded.
2. Email during the weekend will be answered on Monday.
3. Exams to be graded and returned in a timely manner.
4. Enthusiasm for the subject and encouragement to help you when you need it.
5. A fair grading system, with feedback.
6. Learning that ties concepts into the real world around us.
7. Respect for you as a learner.

Exams and Grading
Chemistry exams will emphasize factual knowledge and assess the achievement of the Learning Outcomes. Short answer, essay questions, diagrams and multiple-choice questions may be used. Exams focus on what happens in class as supplemented and amplified by the readings.

Grading:

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Three Lecture Exams</td>
<td>65%</td>
</tr>
<tr>
<td>Final Exam</td>
<td>25%</td>
</tr>
</tbody>
</table>

Grade Scale
- A = 90-100%
- B = 80-89%
- C = 70-79%
- D = 60-69%
- F = 0-59%
**Course Ground Rules:**
Students should attend the first day of class or contact the instructor prior to the first class. Failure to do this may result in being dropped from the class.

Plagiarism, cheating, and other forms of academic dishonesty are prohibited.

Students with disabilities must register with Student Support Services (CCEN), Room 262 (phone 423-585-6892) if they need any special facilities, services, or consideration.

Students in need of tutoring assistance are encouraged to contact the Office of Student Tutoring located in the College Center (CCEN), Room 261. The phone number is 423-585-6920.

Students receiving any type of financial aid or scholarship should contact the Financial Aid Office before making any changes to their schedule. Schedule changes without prior approval may result in loss of award for the current term and future terms.

Students who have not paid fees on time and/or are not correctly registered for this class and whose names do not appear on official class rolls generated by the Admissions and Records Office will not be allowed to remain in class or receive credit for this course.

Cellular phone use during classroom interaction is prohibited. Cellular phones must be turned to the non-audible mode until after class, at which time calls can be received or checked. (See the Walters State Catalog/Handbook)

For information related to the cancellation of classes due to inclement weather, please check the college’s Web site at www.ws.edu or call the college’s student information line, 1-800-225-4770, option 1; InfoConnect, (423) 581-1233, option 1045; the Sevier County Campus, (865) 774-5800, option 7; or the Greeneville/Greene County Center for Higher Education, (423) 798-7940, option 4. Also, please monitor local TV and radio stations for weather-related announcements. For additional information on this policy see the college catalog.

In the event of a pandemic or other college declared critical event that impacts the college’s ability to proceed with academic course activities as planned, the college reserves the right to alter this course plan. In the event of a pandemic or other event, please refer to the college’s home web page, www.ws.edu or call InfoConnect, (423) 581-1233 for further information.

Regular class attendance is a student’s obligation. (See the Walters State Catalog/Student Handbook) If for some reason a student misses class, it is his or her responsibility to see the instructor regarding missed assignments and/or activities and to be prepared for the next class. Excessive absences may substantially lower the semester grade. The college requires the instructor to keep accurate records and to report when students are not attending class.

Students are required to supply a #2 pencil for each lecture exam.

The wearing of hats and caps in class is not allowed! Students will be asked to remove their hats and caps.

**STAY AWAKE IN CLASS.** Your mere presence in class is not sufficient—you must be able to actively process the information presented! Sleeping in class is disruptive in two ways: the student who is snoozing is not interested and not participating in the classroom discussion; secondly, sleeping in class is considered to be disrespectful to the teacher and other students. The
penalty for sleeping in class may range from the student being requested to leave the class with a following conference with the instructor, to notification of the Vice-President of Academic Affairs (in the cases of habitual sleepers). If you have a medical condition that prevents you from staying awake in class, please discuss this with the instructor.

**WSCC Catalog Notification Statement:**
All students attending Walters State Community College, regardless of the time and location of the class, must abide by the rules and regulations outlined in the current *Walters State Catalog/Student Handbook* and the current “Walters State Timetable of Classes.” A copy of the Catalog/Handbook and the “Timetable of Classes” may be obtained from the Admissions Office on the Main campus or at any of our off-campus sites. You may also access the Catalog/Handbook on-line at the following web address: [http://www.ws.edu/catalog](http://www.ws.edu/catalog).

**Alternative Teaching Plan**
In the event of a pandemic or other college declared critical event, the lead faculty member for this course will use eLearn to communicate with the students. If the lead faculty member is affected by this event, another member from the teaching team will assume instruction for the course. The course will continue utilizing an online format of instruction and testing.

**ATTENTION:** The Natural Science faculty members are concerned with proper academic advising of students in **ALL** Pre-Professional programs. It is our explicit desire to help you with any advising problems you may encounter.
A. Measurements
Content:
- Units of Measurement
- Scientific Notation
- Measured and Exact Numbers
- Significant Figures in Calculations
- SI and Metric Prefixes
- Problem Solving Using Conversion Factors

Learning Outcomes:
Students should be able to:
1. Write the names and abbreviations for the metric or SI units used in measurements length, volume and mass.
2. Write a number in scientific notation.
3. Determine the number of significant digits in measured numbers.
4. Adjust calculated answers to the correct number of significant figures.
5. Use the numerical values of prefixes to write a metric equality.
6. Write conversion factors for two units that describe the same quantity and use it to change from one unit to another.

B. Atoms and Elements
Content:
- Elements and Symbols
- The Periodic Table
- The Atom
- Atomic Number and Mass Number
- Isotopes and Atomic Mass
- Electron Energy Levels
- Subshells and Orbitals
- Electron Configurations

Learning Outcomes:
Students should be able to:
1. Use periodic table to identify the chemical group and the period of an element
2. Use the periodic table to determine whether an element is a metal or nonmetal.
3. Describe the location in an atom for a proton, a neutron and an electron.
4. Describe the subatomic particles.
5. Explain why sometimes when clothes are removed from the dryer they cling together.
6. State the number of protons, neutrons and electrons if given the atomic number and the mass number of an atom.
7. Give the number of protons, electrons and Name common chemical elements if given the correct chemical symbol.
8. Give the chemical symbol if given a common chemical element.
9. Use the neutrons in the isotope of an element.
10. Write the number of electrons in energy levels or shells for common elements.
11. Describe the types of subshells and orbitals in atoms.
12. Define a noble gas and give their location or group on the periodic table.
13. Calculate the average atomic mass of an element.
C. **Compounds and Their Bonds**

Content:
- Valence Electrons
- Octet Rule and ions
- Ionic Compounds
- Naming and Writing Ionic Formulas
- Covalent Bonds
- Naming and Writing Formulas of Covalent Compounds
- Bond Polarity
- Polyatomic ions
- Shapes of Molecules
- Polar and Nonpolar molecules

Learning Outcomes
Students should be able to:
1. identify the valence electrons of elements.
2. write the electron-dot structure for common elements.
3. state the octet rule.
4. describe ionization energy of an atom.
5. state the relationship between ionization energy and loss of valence electrons in metal and nonmetals.
6. identify ions, cations, and anions.
7. give the occurrence, function and source of common ions in the body.
8. describe the effect on the body of too little or too much of common ions.
9. write ionic formulas from ionic charges of positive and negative ions.
10. write the correct name for ionic formulas or compounds.
11. write the formulas given the name of the ionic compound.
12. describe covalent bonds and molecules.
13. diagram the electron-dot structure for a covalent molecule.
14. identify single, double and triple covalent bonds and describe how each is formed.
15. name and write formulas of covalent compounds
16. name and write the formula of common polyatomic ions.
17. predict the three-dimensional structure of a molecule.
18. classify a molecule as polar or nonpolar.

D. **Chemical Reactions and Quantities**

Content:
- Energy
- Measuring Heat
- Energy and Nutrition
- States of Matter
- Attractive Forces Between Particles
- Melting and Freezing
- Boiling and Condensation
- Heating and Cooling Curves

Learning Outcomes:
Students should be able to:
1. classify energy as potential or kinetic.
2. describe various forms of energy.
3. identify the SI unit of energy.
4. define a calorie.
5. describe how Caloric values of food are determined.
6. calculate how many Calories are in a serving of food if given the grams of carbohydrate, fat and protein.
7. describe the relationship between food intake and energy output in weight loss or gain.
8. describe the attractive forces between ions, polar molecules and nonpolar molecules.
9. identify changes of state as melting, freezing or sublimation.
10. describe the change of state between gas and liquid and calculate the energy involved.

E. **Energy and States of Matter**

Content:
- Chemical Changes
- Chemical Reactions
- Balancing a Chemical Equation
- Chemical Reactions

Learning Outcomes:
Students should be able to:
1. write a balanced chemical equation from the formulas of the reactants and products for a reaction.
2. identify a reaction as a combination, decomposition, replacement or combustion reaction.
3. define oxidation-reduction reactions.
4. describe the endothermic reaction in a Cold Pack used to reduce swelling from an injury.
5. describe the exothermic reaction in a Hot Pack used to relax muscles.
6. describe the factors that affect the rate of a reaction.
7. describe chemical equilibrium and its relationship to regulation of body temperature.

F. **Gases**

Content:
- Kinetic Theory
- Gas Pressure
- Boyle’s Law
- Charles’ Law
- Gay-Lussac’s Law
- Combined Gas Law
- Avogadro’s Law
- Ideal Gas Law
- Dalton’s Law

Learning Outcomes:
Students should be able to:
1. describe the kinetic theory of gases.
2. explain how a barometer works.
3. explain why a baseball travels further in Denver than in Tampa in terms of atmospheric pressure.
4. use the pressure-volume relationship (Boyle’s law) to determine the new pressure or volume of a certain amount of gas at a constant temperature.
5. use the temperature-volume relationship (Charles’ law) to determine the new temperature or volume of gas at a constant pressure.
6. use the temperature-pressure relationship (Gay-Lussac’s law) to determine the new temperature or pressure of certain amount of gas at a constant volume.
7. use the combined gas law to find the new pressure, volume or temperature of a gas when changes in two of these properties are given.
8. test Avogadro’s law and its application to blowing up a balloon or an automobile tire developing a leak.
9. define “STP conditions” as used in determining volume of gas.
10. use the ideal gas law to solve for P, V, T or n of a gas when given three of the four values in the ideal gas equation.
11. use partial pressure (Dalton’s law) to calculate the total pressure of a mixture of gases.
12. use partial pressures to explain gas exchange within the lungs.
13. explain using partial pressures why a person with severe emphysema sometimes uses a portable oxygen tank.

G. **Solutions**

Content:

- Properties of Water
- Solutes and Solvents
- Electrolytes and Nonelectrolytes
- Equivalents
- Solubility
- Percent Concentration
- Molarity
- Colloids and Suspensions
- Osmosis and Dialysis

Learning Outcomes:

Students should be able to:
1. describe hydrogen bonding hypothesis and surface tension of water molecules.
2. demonstrate the surface tension of water molecules.
3. identify the solute and solvent in various types solutions.
4. identify strong, weak or nonelectrolyte solutions.
5. define *equivalent* (Eq) as used in electrolyte concentration of a solution.
6. determine how many grams of chloride a patient receives in 1250 mL of Ringer’s solution containing 155 mEq Cl⁻.
7. define solubility.
8. distinguish between an unsaturated and saturated solution.
9. identify some factors affecting solubility.
10. explain the relationship of solubility levels, formation of solid products and development of conditions such as gout and kidney stones.
11. calculate the percent concentration of a solute in a solution.
12. calculate the molarity of a solution.
13. identify a mixture as a solution, a colloid or a suspension from its properties.
14. define Osmosis.
15. describe changes in concentration of solute and solvent in the processes of osmosis and dialysis.
16. distinguish between isotonic, hypotonic and hypertonic solutions.
17. state how kidney dialysis is similar to osmosis.
H. Acids and Bases

Content:
- Common Ion Effect
- Acids and Bases
- Conjugate Acid-Base Pairs
- Strength of Acids and Bases
- Dissociation Constants
- Ionization of Water
- The pH Scale
- Reactions of Acid and Bases
- Acidity of Salt Solutions
- Buffers
- Dilution
- Acid-Base Titration

Learning Outcomes:

Students should be able to:
1. give definitions of an acid, base and salt.
2. state the standard naming guidelines for acids and bases.
3. identify conjugate acid-base pairs for Bronsted-Lowery acids and bases.
4. write equations for the dissociation of strong and weak acids and identify the direction of reaction.
5. explain the difference between a strong acid and a weak acid.
6. write the equilibrium expression for a weak acid or weak base.
7. use the ion product of water to calculate the $[\text{H}_3\text{O}^+]$ and $[\text{OH}^-]$ in an aqueous solution.
8. use the pH scale to determine if a solution is acidic, basic or neutral.
9. calculate the pH of solutions.
10. identify the characteristics of acid rain and give the damaging effects of acid rain.
11. write balanced equations for reactions of acids and bases.
12. state the basic compounds in antacids and why they are not damaging to the intestinal wall.
13. predict whether a salt will form an acidic, basic or neutral solution.
14. describe the role of buffers in maintaining the pH of a solution.
15. describe the role of buffers in the blood and how acidosis or alkalosis develops.
16. calculate the molarity or volume of an acid or base from titration information.