WALTERS STATE COMMUNITY COLLEGE
Course Syllabus

Course: CHEM 101 – Introductory Chemistry
Semester: Fall 2014, Spring 2015, Summer 2015
Instructor: Dr. Matthew Smith, Office NSCI 119, Phone 423-585-6881
E-Mail: Matthew.Smith@ws.edu
Dr. Douglas Hensley, Office WSSC 203, Phone 865-774-5846
E-Mail: Douglas.Hensley@ws.edu
Dr. Lawrence Kennard, Office NSCI 124, Phone 423-585-6878
E-Mail: Lawrence.Kennard@ws.edu
Jaime Parman-Ryans, Office WSGC 257, Phone 423-798-7974
E-Mail: Jaime.Parman@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 instructor’s office door.
FAX: 423-318-2762
Division Secretary: 423-585-6865

Required Textbook:
Basic Chemistry, 4th Edition by Karen Timberlake

Additional Materials:
Scientific Calculator (required)

Catalog Course Description:
Introductory Chemistry will cover topics dealing with elementary concepts, atomic structure,
periodic law, symbols, formula, equations, bonding, gas laws, acids, bases, solutions and

General Education Course Designation: Natural Science (3 semester hours)

Student Learning Outcomes:
Upon completion of this course students will be able to communicate skills related to the
following topics:

1. Measurements - describe metric units, unit conversions, scientific notation and
   significant figures.

2. Atoms and Elements – discuss atomic structure, electron configuration and design of
   periodic table.

3. Compounds and Bonding – discuss covalent and ionic compounds, valence electrons,
   Lewis structure and molecular shapes; demonstrate ability to write and name chemical
   formulas.

4. Chemical Reactions and Quantities - demonstrate ability to balance chemical
   equations, classify and calculate stoichiometric quantities in chemical reactions.
5. **Energy and States of Matter** - describe potential and kinetic energy, heating and cooling curves, endothermic and exothermic processes, and food Calorie.

6. **Gases** - describe the relationships between pressure, volume, temperature and quantity using the combined and ideal gas laws.

7. **Solutions** - calculate molarity and percent concentration; discuss electrolytes, osmosis and solute solubility.

8. **Acids and Bases** – describe acids and bases, conjugate pairs, acid strength and buffers; discuss pH scale and pH calculations

**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 Student Learning Outcomes. Short answer, essay questions, diagrams and multiple-choice questions may be used.

Grading Policy/Evaluation:
Fall and Spring Courses:
   Exams/Homework/Quizzes/Assignments = 75%
   Comprehensive Final Exam = 25%

Summer Courses:
   Exams/Homework/Quizzes/Assignments = 100%

A description of how the professor will divide the exams/homework/quizzes/assignments will be provided to all students on the first day of class.

Grade Scale
A = 90 -100%
B = 80 – 89%
C = 70 – 79%
D = 60 – 69%
F = 0 – 59%

Academic Dishonesty Policy:
Any student who violates the college's academic integrity policy will automatically receive a "0" for that assignment or exam.

Extra Credit:
Each professor has the option to offer the opportunity to earn UP TO 20 additional points through the semester. Examples include, but are not limited to, bonus questions on exams, in class quizzes, attending a scientific event, etc. The instructor’s policy will be explained in detail on the first day of class. In no instance will credit be provided for any activity not related to the scope of the course. The aim of the class is to get a solid understanding of chemistry so that grades reflect our abilities to communicate the material and not a supplementary assignment or task. All students, especially those that feel they are struggling with the material, are strongly encouraged to use office hours, send emails, make appointments for extra help, etc. throughout the semester.

Missed Exam Policy:
Students who are absent on the day of an exam must provide a documentable excuse before a make up exam will be given. The missed exam must be made up before the next lecture exam.

Course Ground Rules

All students attending Walters State Community College, regardless of the time, location, or format 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. The Catalog/Student Handbook and the Timetable of Classes are online at: http://ws.edu

Students must attend the first day of on-ground class or contact the instructor prior to the first class. Failure to do this may result in being dropped from the class. Excessive absences may substantially lower the course grade.
Students enrolled in web courses must follow the course attendance policy defined for online attendance during the first week of class and throughout the term. Failure to do this may result in being dropped from the class during week one OR may result in the accrual of absences which may negatively impact the student’s grade in the course.

Plagiarism, cheating, and other forms of academic dishonesty are prohibited. The minimum penalty for cheating is a “0” (zero) on the examination or assignment. Academic dishonesty may result in an “F” for the course. Additional information can be found in the WSCC Catalog/Student Handbook at: http://ws.edu.

Students with disabilities must register with Student Support Services each semester in the Student Services Building, Room U134 (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 as follows:
- Morristown Campus - Student Services Building Room L107 – (423) 585-6920
- Greeneville Campus – Room 420 - (423) 798-7982
- Sevierville Campus - Marshall-Maples Hall Room 118 – (865) 286-2787
- Claiborne Campus – Room 123A (423) 851-4761

Specific tutoring assistance in mathematics and writing is available in-person and online as follows:
- Morristown Campus – English Learning Lab – HUM 120 – (423) 585-6970
  o https://www.ws.edu/academics/humanities/writing-lab
- Morristown Campus – Mathematics Lab – MBSS 222 - (423) 585-6872
  o http://ws.edu/academics/mathematics/learning-lab

Students who need assistance with computing and technology issues should contact the IET Helpdesk by phone at Morristown: 423-318-2742 Greeneville: 423-798-8186 or Sevierville: 865-286-2789 or on-line access at: http://helpdesk.ws.edu/.

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 Walters State student information system (StarNET) will not be allowed to remain in class or receive credit for this course.

Electronic devices must not disrupt the instructional process or college-sponsored academic activity. Use of electronic devices is prohibited unless use of the device is relevant to the activity and use is sanctioned by the faculty member in charge. Electronic devices that are not relevant to the activity or sanctioned by the faculty member in charge should be set so that they will not produce an audible sound during classroom instruction or other college-sponsored academic activity.

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 Campus (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 at: http://ws.edu

Dual Enrollment students attending on a high school campus should refer to the high school inclement weather cancellations.

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 for any course regardless of format. (See the Walters State Catalog/Student Handbook) If a student misses class, it is his or her responsibility to contact the instructor regarding missed assignments and/or activities and to be prepared for the next class assignment.

All forms of student Financial Aid may be jeopardized or lost due to the lack of Satisfactory Academic Progress in one or multiple courses. Lack of Satisfactory Academic Progress may negatively impact a student’s degree/certificate completion pace and further jeopardize Financial Aid eligibility.

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.

CLASSROOM COURTESY. Being in a college environment it is expected that classroom courtesy will be given to your instructor and classmates in limiting unnecessary talking and communication during class lecture or student presentation. An academic misconduct form will be completed and filed for those who have difficulty following this policy and disrupt class.

The last day to drop a course or withdraw from the college-full term for Fall 2014 term is November 5, 2014.

The last day to drop a course or withdraw from the college-full term for Spring 2015 term is April 2, 2015.

Attachment “A”

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 Bonding

**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. identifies 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:
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 it’s relationship to regulation of body temperature.

E. Energy and States of Matter
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.

Content:
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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 $[H_3O^+]$ and $[OH^-]$ 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.