Course: CHEM 1011 - Introductory Chemistry Lab
Semester: Spring 2012
Instructor: Dr. Matthew Smith, Office WSSC 201, Phone 865-774-5846
E-Mail Matthew.Smith@ws.edu

Course Supervisor: Dr. Jeff T. Horner, Dean of Natural Science, Office NSCI 126
Contact: 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
Secretary: 423-585-6865 (Sherry Woody)

Required Textbook:
Catalyst: Custom WSCC Laboratory Manual for Basic and Introductory Chemistry. Prentice Hall

Additional Materials:
Acid/Base Resistant glasses (required), apron and rubber gloves (recommended).

Catalog Course Description:
An introductory laboratory course with experiments and exercises which correspond to lecture material in CHEM 1010.
3 hours lab --------------------------------------------- 1 Credit Hour

Prerequisites: None

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

Common Core:
A. Laboratory Safety
B. Measurement and Significant Figures
C. Conversion Factors in Calculations
D. Density and Specific Gravity
E. Atomic Structure
F. Electron Configuration and Periodic Properties
G. Compounds and Their Formulas
H. Energy and Specific Heat
I. Chemical Reactions and Equations (Optional)
J. Reaction Rates and Equilibrium
K. Moles and Chemical Formulas
L. Gas Laws
M. Solutions, Electrolytes and Concentration
N. Testing for Cations and Anions (optional)
O. Acids, Bases, pH and Buffers
P. Acid-Bas Titration
**General Education Course Designation:** Natural Science (1 semester hour)

**Instructional and Evaluation Methods:**
1. There will be a lab lecture to go over the experiment, with an emphasis paid on safety and proper waste disposal. The students will then conduct an experiment and receive a grade based on technique and experimental results turned in on the data sheet.
2. There will be lab quizzes. The quizzes will focus on activities and results obtained from the laboratory exercises and assess the achievement of the learning outcomes prescribed for this course. There will be a comprehensive final exam and clean-up on the last lab day. Final evaluation will consist of experimental analysis, quizzes and final exam.
3. Your attendance is essential to your success. You are required to attend each laboratory session in its entirety; each failure to do so without an acceptable excuse will result in a zero for that lab. If you cannot attend your normal laboratory section you may avoid the penalty by arranging in advance to attend a different section that week; however, this requires the advance consent of both lab instructors. It is your responsibility to make sure your regular lab instructor is aware that you attended a different section.

**Grading:**
1. Laboratory Experiments 60%
2. Three Quizzess 20%
3. Final Exam 20%

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<tr>
<th>Grade</th>
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<tr>
<td>A</td>
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**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.

Safety:
1. There will be NO food, drink or tobacco products in the laboratory.
2. NO opened-toe shoes can be worn during lab. You will not be allowed to stay in the laboratory if the lab exercise uses any sort of glassware or chemicals.
3. NO purses, bags or coats on top of the student tables.
4. NO visitors in the laboratory without prior approval of the instructor.

Your Right to Know:
Tennessee Law requires that you are provided notice that some of the laboratory exercises involve contact with chemicals which have been identified with potential health hazards. These chemicals include, but are not limited to: acetone, chloroform, formalin, acids and bases. While every effort has been made to make the materials as safe as possible these chemicals are toxic and you must be responsible for their safe handling. If you feel you may be at a higher risk then normal, if pregnant for example, we recommend you consult your physician.
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.

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.
Attachment “A”

A. Laboratory Safety
   Content:
   Working Safety
   Commitment to Safety
   Visual Guide to Lab Equipment
   Graphing Experimental Data

   Learning Outcomes:
   Students should be able to:
   1. understand the importance of standard laboratory safety.
   2. follow standard laboratory safety guidelines.
   3. recognize common lab equipment.
   4. graph results from experiments.

B. Measurement and Significant Figures
   Content:
   Measuring Length
   Measuring Volume
   Measuring Mass

   Learning Outcomes:
   Students should be able to:
   1. identify metric units used in laboratory measurement.
   2. correctly read devices used in laboratory measurements.
   3. state the correct number of significant figures in a measurement.

C. Conversion Factors in Calculations
   Content:
   Rounding Off
   Significant Figures in Calculations
   Conversion Factors for Length
   Conversion Factors for Volume
   Conversion Factors for Mass
   Percent by Mass
   Converting Temperature

   Learning Outcomes:
   Students should be able to:
   1. round off a calculated answer to the correct number of significant figures.
   2. determine the area of a rectangle and the volume of a solid by direct measurement.
   3. determine metric and metric-to-U.S.-unit equalities and corresponding conversion factors.
   4. use conversion factors in calculations to convert units of length, volume and mass.
   5. convert a Celsius temperature to Fahrenheit, Kelvin and Rankine Scale.
D. Density and Specific Gravity
Content:
- Density of a Solid
- Density of a Liquid
- Specific Gravity
- Graphing Mass and Volume
Learning Outcomes:
Students should be able to:
1. calculate the density of a substance from measurements of its mass and volume.
2. calculate the specific gravity of a liquid from its density.
3. determine the specific gravity of a liquid using a hydrometer.

E. Atomic Structure
Content:
- Physical Properties of Elements
- Periodic Table
- Subatomic Particles
- Isotopes
Learning Outcomes:
Students should be able to:
1. write the correct symbols or names of some elements.
2. describe some physical properties of the elements you observe.
3. categorize an element as a metal or nonmetal from its physical properties.
4. given the complete symbol of an atom, determine its mass number, atomic number, and the number of protons, neutrons and electrons.

F. Electron Configuration and Periodic Properties
Content:
- Flame Tests
- Electron Configuration
- Graphing a Periodic Property: Atomic Radius
Learning Outcomes:
Students should be able to:
1. describe the color of a flame produced by an element.
2. use the color of a flame to identify an element.
3. write the electron configuration for an element.
4. draw a graph of atomic diameter against atomic number.
5. interpret the trends in atomic radii within a family and a period.

G. Compounds and Their Formulas
Content:
- Electron-Dot Structures
- Ionic Compounds and Formulas
- Ionic Compounds with Transition Metals
- Ionic Compounds with Polyatomic Ions
- Covalent (Molecular) Compounds
- Electron Dot Structures and Molecular Shape
Learning Outcomes:
Students should be able to:
1. compare physical properties of a compound with the properties of the elements that formed it.
2. identify a compound as ionic or covalent.
3. determine the subscripts in the formula of a compound.
4. write the electron-dot structure for an atom and an ion.
5. write a correct formula and name of an ionic or covalent compound.
6. write a correct formula and name of a compound containing a polyatomic ion.

H. Energy and Specific Heat
Content:
Specific Heat of a Metal
Learning Outcomes:
Students should be able to:
1. distinguish between a calorie, kilocalorie and nutritional Calorie.
2. use the specific heat of water to calculate heat lost or gained.

I. Chemical Reactions and Equations
Content:
Magnesium and Oxygen
Learning Outcomes:
Students should be able to:
1. observe physical and chemical properties associated with chemical changes.
2. give evidence for the occurrence of a chemical reaction.
3. write a balanced equation for a chemical reaction.
4. identify a reaction as a combination, decomposition, replacement or combustion reaction.

J. Reaction Rates and Equilibrium (optional)
Content:
Exothermic and Endothermic Reactions
Rates of Reactions
Reversible Reactions
Iron (III)-thiocyanate Equilibrium
Learning Outcomes:
Students should be able to:
1. identify a reaction as exothermic or endothermic.
2. identify the factors that affect the rate of a reaction.
3. observe that chemical reactions are reversible.
4. discuss factors that cause a shift in equilibrium.

K. Moles and Chemical Formulas
Content:
Finding the Simplest Formula
Formula of a Hydrate
Learning Outcomes:
Students should be able to:
1. use the mole conversion factors to convert grams to moles and moles to grams.
2. experimentally determine the simplest formula of an oxide of magnesium.
3. calculate the percent water in a hydrated salt.
4. determine the formula of a hydrate.

L. Gas Laws
Content:
Boyle’s Law
Learning Outcomes:
Students should be able to graph the relationship between the pressure and volume of a gas.

M. **Solutions, Electrolytes and Concentration**
Content:
- Polarity of Solutes and Solvents
- Electrolytes and Conductivity
- Electrolytes in Body Fluids
- Concentration of a Sodium Chloride Solution

Learning Outcomes:
Students should be able to:
1. observe the solubility of a solute in polar and nonpolar solvents.
2. determine the effect of particle size, stirring and temperature on the rate of solution formation.
3. identify an unsaturated and a saturated solution.
4. compare the conductivity of strong electrolytes, weak electrolytes and nonelectrolytes.
5. list the electrolytes and their concentrations (mEq/L) in intravenous solutions.
6. calculate the mass/mass percent and mass/volume percent concentrations for a NaCl solution.
7. calculate the molar concentration of the NaCl solution.

N. **Testing for Cations and Anions (optional)**
Content:
- Tests for Positive Ions (Cations)
- Tests for Negative Ions (Anions)
- Writing the Formula of Your Unknown Salt
- Testing Consumer Products for Some Cations and Anions

Learning Outcomes:
Students should be able to:
1. determine the presence of a cation or anion by a chemical reaction.
2. determine the presence of some cations and anions in an unknown salt.

O. **Acids, Bases, pH and Buffers**
Content:
- pH Color Using Red Cabbage Indicator
- Measuring pH
- Effect of Buffers on pH

Learning Outcomes:
Students should be able to:
1. prepare a naturally occurring dye to use as a pH indicator.
2. measure the pH of several substances using cabbage indicator and a pH meter.
3. calculate pH from the \([H^+]\) or the \([OH^-]\) of a solution.
4. calculate the molar concentration and percentage of a acetic acid in vinegar.
5. observe the changes in pH as acid or base is added to buffered and unbuffered solutions.
6. calculate pH from the \([H^+]\) or the \([OH^-]\) of a solution.

P. **Acid-Base Titration**
Content:
- Acetic Acid in Vinegar
- Titration of an Antacid
- Properties of Soap and Detergents

Learning Outcomes:
Students should be able to:
1. prepare a sample for titration with a base.
2. set up a buret and use proper titration technique in reaching an endpoint.
3. calculate the molar concentration and percentage of acetic acid in vinegar.
4. determine the acid-absorbing capacity of a commercial antacid.