

FALL 2019

CHEM 1406

INTRODUCTORY CHEMISTRY

- **INSTRUCTOR:** TRACY DAWSON; tracy.dawson@plainviewisd.org; Room 116/120; 806-293-6005.
- **OFFICE HOURS:** MONDAY-THURSDAY 4:00-5:00 AT PHS ROOM S84 (BY APPOINTMENT ONLY)
- **TEXT:** Chemistry – An Introduction to General, Organic and Biological Chemistry. Timberlake 13th ed. , Chemistry 1406 Lab Manual
- **REQUIRED MATERIALS.** The textbook, laboratory manual, and a scientific calculator (not a graphing calculator). You may not use your cell phone as a calculator during exams or quizzes. Goggles (available at the bookstore) must be worn in the laboratory – own a pair and have them with you when attending the lab.

COURSE DESCRIPTION and PURPOSE. Survey course introducing chemistry. Topics may include inorganic, organic, biochemistry, food/physiological chemistry, and environmental/consumer chemistry. Designed for allied health students and for students who are not science majors. Basic laboratory experiments supporting theoretical principles presented in lecture; introduction of the scientific method, experimental design, data collection and analysis, and preparation of laboratory reports. Semester Hours: 4 Lecture Hours: 3 Lab Hours: 3 Note: This course may not be substituted for CHEM 1411.

COURSE OBJECTIVES. CHEM 1406 provides (1) basic chemical knowledge for people living in a world of advancing technology, (2) understanding of the basic chemical nature of our world, and (3) a laboratory experience designed to enhance their appreciation of science and of the role of the clinical laboratory in the hospital.

CORE OBJECTIVES. CHEM 1406 addresses: (1) Communication – to include effective written, oral, and visual communication, (2) Critical Thinking Skills – to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information, (3) Empirical and Quantitative Skills – to include the manipulation and analysis of numerical data or observable facts resulting in informed conclusions, (4) Teamwork Skills – to include the ability to consider different points of view and to work effectively with others to support a shared purpose or goal.

CLASS ATTENDANCE AND PARTICIPATION. Lecture and laboratory attendance is mandatory. If you miss 5 classes throughout the semester you may be dropped from the course. If you miss 3 consecutive classes for any reason you may be dropped from the course. Class participation, in and of itself, is not a grade requirement. I encourage you to ask questions during class. You are expected to take notes and to be attentive to instruction.

CHEATING AND CLASSROOM ETIQUETTE. Cheating will not be tolerated. Turn your cell phone off before you enter the classroom for lecture. Once my lecture starts I require that there be no extemporaneous talking or distractions.

METHOD OF EVALUATION. Grades will be assigned on the following basis: 100-89 A, 88-78 B, 77-66 C, 65-53 D, 52-0 F.

Students will be evaluated by means of weekly quizzes, lecture exams and performance in the laboratory. Typically, weekly quizzes will be given during the first lab session and lab exercises will be conducted during the second lab session of each week. There will be three hour exams and a final exam. Each hour exam will cover $\sim\frac{1}{4}$ th of the class material. The final will be semi-comprehensive covering the final $\sim\frac{1}{4}$ th of class material and include questions from material presented earlier in the semester. Each hour exam will make up 15% of your grade; the final will make up 25% of your grade. The remaining 30% of your grade will be determined from your performance on the weekly quizzes and your performance the laboratory. There will be no make-up opportunities for quizzes or labs. If you find that you cannot sit an exam for a valid reason (as determined by me) you must let me know as soon as possible before the exam. If you do not sit the exam without having first contacted me, you will be scored a zero for that exam with no opportunity for make-up. It is imperative that you keep up with the material throughout the course of the semester.

Exam Schedule

EXAM 1.	September 16th Chapters 2,3	Semi-cumulative Final: December 9th, 5:30 pm
EXAM 2.	October 14 th Chapters 4,6,7	
EXAM 3.	November 11th Chapters 8, 9, 10	

(November 14th - last day to drop a course)

Week of:	Projected coverage of material (+/-)	
Aug. 25th	Chapter 2	Chemistry and Measurements
Sept. 2nd	Chapter 3	Matter and Energy
8th		
15th		
23rd		
30th	Chapter 6	Ionic and Molecular Compounds
October 7th		
14th	Chapter 7	Chemical Quantities and Reactions
21st	Chapter 8	Gases
28th		
November 4th	Chapter 9	Solutions
11th	Chapter 10	Acids and Bases and Equilibrium
18th		
25th	Chapters 11-15	Organic Chemistry (selected topics)
December 2nd	Finals week	
December 9th		

CHEM1406 Schedule

Week 1.	August	26 28	Lab safety/CHP, Syllabus, Grouping, Lecture Lecture
Week 2.	September	02 04	Labor Day. Experiment 2. Measurements.
Week 3.	September	09 11	Quiz 1 Experiment 3. Density
Week 4.	September	16 18	Quiz 2, EXAM I REVIEW LECTURE EXAM I, no lab. (ch 2,3)
Week 5.	September	23 25	Quiz 3 An Introduction to Vernier Experiment 4. Heat of Fusion for Ice
Week 6.	September October	30 02	Quiz 4. Experiment 5. Atoms and Molecules
Week 7.	October October	07 09	Quiz 5 Experiment 7. Determining Mole Ratios
Week 8.	October	14 16	Quiz 6, EXAM II review LECTURE EXAM II, no lab. (ch 4,6,7)
Week 9.	October	21 23	Quiz 7 Experiment 14 Chemical Reactions
Week 10.	October October	28 30	Quiz 8 Experiment 9 Boyles Law.
Week 11.	November	04 06	Quiz 9 Open Lab.
Week 12.	November	11 13	Quiz 10, EXAM III review LECTURE EXAM III, no lab. (ch 8,9,10)
Week 13.	November	18 20	Grade review, Nov. 14th last day to drop. Experiment 11 Household Acids&Bases.
Week 14.	November	25 27	Quiz 11 Thanksgiving
Week 15.	December	02 04	Experiment. 13. Organic Models. FINAL EXAM review
Week 16.	December	09	Final Exam

Student Learning Outcomes/Competencies

Measurements

- Write the names and abbreviations for the units used in measurements of length, volume, and mass; write a number in scientific notation.
- Determine the number of significant figures in measured numbers.
- Adjust calculated answers to the correct number of significant figures.
- Use the numerical values of prefixes to write a metric equality.
- Write a conversion factor for two units that describe the same quantity.
- Use conversion factors to change from one unit to another.
- Calculate the density or specific gravity of a substance, and use the density or specific gravity to calculate the mass or volume of a substance.

Energy and Matter

- Identify energy as potential or kinetic.
- Given a temperature, calculate a corresponding temperature on another scale.
- Use specific heat to calculate heat loss or gain, temperature change, or mass of a sample.
- Identify the physical state of a substance as a solid, liquid, or gas.
- Describe the changes of state between solids, liquids, and gases; calculate the energy involved.

Atoms and Elements

- Classify matter as pure substances or mixtures.
- Given the name of an element, write its correct symbol; from the symbol, write the correct name.
- Use the periodic table to identify the group and the period of an element and decide whether it is a metal, nonmetal, or metalloid.
- Describe the electrical charge and location in an atom for a proton, a neutron, and an electron.
- Given the atomic number and the mass number of an atom, state the number of protons, neutrons, and electrons.
- Give the number of protons, electrons, and neutrons in the isotopes of an element and to know how to calculate the average atomic masses of the elements.
- Given the name or symbol of one of the first 20 elements in the periodic table, write the electron arrangement and use it to explain the periodic law.
- Use the electron arrangement of elements to explain periodic trends.

Compounds and Their Bonds

- Using the octet rule, write the symbols of the simple ions for the representative elements.
- Using charge balance, write the correct formula for an ionic compound.
- Given the formula of an ionic compound, write the correct name; given the name of an ionic compound, write the correct formula.
- Write the name and formula of a compound containing a polyatomic ion.
- Given the formula of a covalent compound, write its correct name; given the name of a covalent compound, write its formula.
- Use electronegativity to determine the polarity of a bond.
- Predict the three-dimensional structure of a molecule and classify it as polar or nonpolar.

Chemical Reactions and Quantities

- Identify a change in a substance as a chemical or a physical change.
- Write a balanced chemical equation from the formulas of the reactants and products for a reaction.
- Identify a reaction as a combination, decomposition, replacement, or combustion reaction.
- Define the terms *oxidation* and *reduction*.
- Use Avogadro's number to determine the number of particles in a given number of moles.
- Determine the molar mass of a substance and use molar mass to convert between grams and moles.
- Given a quantity in moles of reactant or product, calculate the moles of another substance in the reaction.

- Given the mass in grams of a substance in a reaction, calculate the mass in grams of another substance in the reaction.
- Describe endothermic and exothermic reactions and factors that affect the rate of a reaction.

Gases

- Describe the kinetic theory of gases and the properties of gases.
- Describe the units of measurement used for pressure and change from one unit to another.
- 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.
- Use the temperature-volume relationship (Charles' law) to determine the new temperature or volume of a certain amount of gas at a constant pressure.
- Use the temperature-pressure relationship (Gay-Lussac's law) to determine the new temperature or pressure of a certain amount of gas at a constant volume.
- Describe the relationship between the amount of a gas and its volume and use this relationship in calculations concerning gases in chemical reactions conducted at STP.
- Use partial pressures to calculate the total pressure of a mixture of gases.

Solutions

- Identify the solute and solvent in a solution. Describe the formation of a solution.
- Identify solutes as electrolytes or nonelectrolytes.
- Define *solubility*; distinguish between an unsaturated and a saturated solution.
- Calculate the percent concentration of a solute in a solution; use percent concentration to calculate the amount of solute or solution.
- Calculate the molarity of a solution; use molarity to calculate the moles of solute or the volume needed to prepare a solution.
- Describe the dilution of a solution.
- Given the volume and molarity of a solution, calculate the amount of another reactant or product in the reaction.
- Identify a mixture as a solution, a colloid, or a suspension. Describe osmosis and dialysis.

Acids and Bases

- Describe and name acids and bases.
- Identify conjugate acid-base pairs for Brønsted-Lowry acids and bases.
- Write equations for the dissociation of strong and weak acids and bases.
- Use the ion product of water to calculate the $[H_3O^+]$ and $[OH^-]$ in an aqueous solution.
- Calculate pH from $[H_3O^+]$; given the pH, calculate $[H_3O^+]$ and $[OH^-]$ of a solution.
- Write balanced equations for reactions of acids and bases.
- Describe the role of buffers in maintaining the pH of a solution.

Organic Chemistry

- Identify properties characteristic of organic or inorganic compounds.
- Write the IUPAC names and structural formulas for alkanes, alkenes, and alkynes.
- Write the IUPAC names for alkanes with substituents.
- Identify the properties of alkanes and write a balanced equation for combustion.
- Write the structural formulas and names for cis-trans isomers of alkenes.
- Identify and name alcohols and ethers; classify alcohols as primary, secondary, or tertiary.
- Describe some properties of alcohols, phenols, and ethers.
- Identify compounds with the carbonyl group as aldehydes and ketones.
- Compare the boiling points and solubility of aldehydes, ketones, alkanes and alcohols.
- Identify chiral and achiral carbon atoms in an organic molecule.
- Describe the boiling points, solubility, and ionization of carboxylic acids in water.
- Describe some properties of amines.
- Classify a monosaccharide as an aldose or ketose and indicate the number of carbon atoms.
- Draw the D or L configurations of glucose, galactose and fructose.
- Draw and identify the cyclic structures of monosaccharides.
- Describe the monosaccharide units and linkages in disaccharides.

- Describe the structural features of amylose, amylopectin, glycogen, and cellulose.
- Describe the classes of lipids.
- Write structures of fatty acids and identify as saturated or unsaturated.
- Describe the characteristics of glycerophospholipids.
- Describe the structures of steroids.
- Describe the composition and function of the lipid bilayer in cell membranes.
- Classify proteins by their functions in the cells.
- Draw the structure for an amino acid. Write the zwitterion of an amino acid.
- Draw the structure of a dipeptide. Identify the structural levels of a protein.
- Describe how enzymes function as catalysts and give their names.
- Describe the role of an enzyme in an enzyme-catalyzed reaction.
- Describe the effect of temperature, pH, concentration of a substrate, and inhibitors on enzyme activity.

Diversity Statement

In this class, the teacher will establish and support an environment that values and nurtures individual and group differences and encourages engagement and interaction. Understanding and respecting multiple experiences and perspectives will serve to challenge and stimulate all of us to learn about others, about the larger world and about ourselves. By promoting diversity and intellectual exchange, we will not only mirror society as it is, but also model society as it should and can be.

Disabilities Statement

Students with disabilities, including but not limited to physical, psychiatric, or learning disabilities, who wish to request accommodations in this class should notify the Disability Services Office early in the semester so that the appropriate arrangements may be made. In accordance with federal law, a student requesting accommodations must provide acceptable documentation of his/her disability to the Disability Services Office. For more information, call or visit the Disability Services Office at Levelland (Student Health & Wellness Office) 806-716-2577, Reese Center (Building 8) 806-716-4675, or Plainview Center (Main Office) 806-716-4302 or 806-296-9611.

Non-Discrimination Statement

South Plains College does not discriminate on the basis of race, color, national origin, sex, disability or age in its programs and activities. The following person has been designated to handle inquiries regarding the non-discrimination policies: Vice President for Student Affairs, South Plains College, 1401 College Avenue, Box 5, Levelland, TX 79336. Phone number 806-716-2360.

Title IX Pregnancy Accommodations Statement

If you are pregnant, or have given birth within six months, Under Title IX you have a right to reasonable accommodations to help continue your education. To activate accommodations you must submit a Title IX pregnancy accommodations request, along with specific medical documentation, to the Director of Health and Wellness. Once approved, notification will be sent to the student and instructors. It is the student's responsibility to work with the instructor to arrange accommodations. Contact Crystal Gilster, Director of Health and Wellness at 806-716-2362 or email cgilster@southplainscollege.edu for assistance.