Chemistry 1 Syllabus

Teacher: Mrs. Alisa Mitchell

Email: alisa.mitchell@tcsedu.net
THS phone: (931)454-2620

School Mission Statement

The Mission of Tullahoma High School is to provide an exemplary educational program that will provide students with the necessary knowledge and skills to be successful, productive citizens.

Course Description: This course is an introduction to the study of matter and energy, and is designed to prepare the successful student for success in AP or college level chemistry classes. Course content includes development of an understanding of chemistry, cultivation of problem-solving and critical-thinking skills related to chemistry, application of chemistry knowledge to decision-making about scientific and technological issues, recognition of the importance of chemistry in daily life, and understanding of benefits as well as limitations of science and technology.

Supplies:
Scientific Calculator
Pencils/Pens
Preferred writing utensil for notes (black or blue ink pens)
loose-leaf notebook paper/graph paper
1 to1½ inch 3-ring binder
5-dividers
colored pencils
*box of tissue
ruler
highlighter
sharpie
markers

Please have these materials no later than Monday, August 6th, 2018.

Lab Fee: There is a $20 lab fee for this course (assessed for all science classes). The lab fee is essential for conducting quality science classes. The more fee money we collect, the more activities we can conduct.

Classroom Rules and Procedures:
*Come to class with the appropriate materials. Items that a student is to bring to class on a daily basis: **3-ring binder** with **paper, dividers**, **pen and pencil, a ruler, colored pencils, scientific calculator, highlighter, and a sharpie.**

*****As soon as you enter the room, you are to get into your assigned seats with cell phone <u>off</u> and placed in the designated area. Earbuds out of ears-do not want to see them. Must put your backpack in your locker-not anywhere in my room or outside my doors. (Safety issue) <u>Please do not bring anything to class that would disrupt the learning environment.</u>***

---

*Tardies: Be in your seat, quiet, and ready to work when the bell rings. ***Cell phones/iPods and other computers are not allowed in class (put these items away before you enter my classroom).*** ***If you do not follow this rule, I will take up the device and write a referral.***

Discipline for Tardiness to class and/or lunch:

1. ***Verbal warning.***
2. ***Contact Parent.***
3. ***Teacher Detention (at teacher discretion).***
   (No later than 1-2 days. Failure to attend detention results in an office referral.)
4. ***Office Referral.***

***Absences**-Excellent attendance is very important in this class. If you miss a lab or activity in which a grade has been taken, **you must see me for make-up work**. <u>A notebook will be placed at the front of the room on the bookshelf.</u> It contains instructions for what was done in the class the day before.

IT IS THE STUDENT'S RESPONSIBILITY TO FIND OUT WHAT WAS MISSED AND TO ENSURE THAT IT IS TURNED IN.

**You are responsible for following ALL THS school rules!
When you turn in a "Make-Up" assignment, you must write "**Make-Up**" assignment at the top of your paper. If you fail to do this, points will be deducted from the assignment. The Late/Make-Up work tray is located on my desk at the back of the room. **YOU MUST TURN IN LATE/MAKE-UP WORK AT THE BEGINNING OF CLASS! If you are working on the assignment in class you will receive a zero!**
Late Work: Points will be deducted for each day late!

***Treat a Substitute Teacher Exactly the Same (with the same respect)** As You Would A Teacher.
(Always do what the Substitute says, even if it does not follow normal classroom procedures.)

Grading: Student nine-weeks' grades will be determined as follows:

35%- Tests and Quizzes
30%- Classwork
15%- Homework
20%- Lab Work/Projects
**Chemistry will have a final exam.

Your Responsibilities as my student are:

1. To abide by school and class rules at all times.
2. Follow the 5 P's:
    a. **Be Prompt**. Everything will run smoothly, if you arrive in class and are seated, working when the bell rings.
    b. **Be Prepared**: Bring your necessary supplies. You will not be allowed to return to your locker, and you will not participate effectively in your learning without materials.
    c. **Be Polite**: The world is much more pleasant when we are all respectful to ourselves and others.
    d. **Be Persistent**: Never, ever quit working hard in this classroom. I will not be idle, and I never expect you to be, either.
    e. **Be proud to be a Wildcat! THS is an excellent school!**

Discipline: If you choose to *disrupt class or your behavior is disrespectful*, the following sequence of interventions will occur:

1. A verbal warning. (Depending on the severity of the behavior.)
2. Call Parent.
3. Teacher detention (on my schedule).
4. Office Referral.

****SEVERE disruptions/disrespect: Students will be sent immediately to the office.**

Chronic late work will not be accepted. Points will be deducted for ALL late work. I notify you in plenty of time. You cannot get behind and expect to do well in my class or on the EOC.

Notebook: You are required to keep a notebook with all of your work for this class. You need to be able to access materials upon request.
(I recommend that you have a notebook for each class you take at THS.)

CHEMISTRY I: ACADEMIC STANDARDS

CHEM1.PS1: Matter and Its Interactions

1) Understand and be prepared to use values specific to chemical processes: the mole, molar mass, molarity, and percent composition.
2) Demonstrate that atoms, and therefore mass, are conserved during a chemical reaction by balancing chemical equations.
3) Perform stoichiometric calculations involving the following relationships: mole-mole; mass-mass; mole-mass; mole-particle; and mass-particle. Show a qualitative understanding of the phenomenon of percent yield, limiting, and excess reagents in a chemical reaction through pictorial and conceptual examples. (states of matter liquid and solid; excluding volume of gasses)
4) Use the reactants in a chemical reaction to predict the products and identify reaction classes (synthesis, decomposition, combustion, single replacement, double replacement).
5) Conduct investigations to explore and characterize the behavior of gases (pressure, volume, temperature), develop models to represent this behavior, and construct arguments to explain this behavior. Evaluate the relationship (qualitatively and quantitatively) at STP between pressure and volume (Boyle's law), temperature and volume (Charles's law), temperature and pressure (Gay-Lussac law), and moles and volume (Avogadro's law), and evaluate and explain these relationships with respect to kinetic-molecular theory. Be able to understand, establish, and predict the relationships between volume, temperature, and pressure using combined gas law both qualitatively and quantitatively.
6) Use the ideal gas law, PV = nRT, to algebraically evaluate the relationship among the number of moles, volume, pressure, and temperature for ideal gases.

7) Analyze solutions to identify solutes and solvents, quantitatively analyze concentrations (molarity, percent composition, and ppm), and perform separation methods such as evaporation, distillation, and/or chromatography and show conceptual understanding of distillation. Construct an argument to justify the use of certain separation methods under different conditions.

8) Identify acids and bases as a special class of compounds with a specific set of properties.

9) Draw models (qualitative models such as pictures or diagrams) to demonstrate understanding of radioactive stability and decay. Understand and differentiate between fission and fusion reactions. Use models (graphs or tables) to explain the concept of half-life and its use in determining the age of materials (such as radiometric dating).

10) Compare alpha, beta, and gamma radiation in terms of mass, charge, and penetrating power. Identify examples of applications of different radiation types in everyday life (such as its applications in cancer treatment).

11) Develop and compare historical models of the atom (from Democritus to quantum model) and construct arguments to show how scientific knowledge evolves over time, based on experimental evidence, critique, and alternative interpretations.

12) Explain the origin and organization of the Periodic Table. Predict chemical and physical properties of main group elements (reactivity, number of subatomic particles, ion charge, ionization energy, atomic radius, and electronegativity) based on location on the periodic table. Construct an argument to describe how the quantum mechanical model of the atom (e.g., patterns of valence and inner electrons) defines periodic properties. Use the periodic table to draw Lewis dot structures and show understanding of orbital notations through drawing and interpreting graphical representations (i.e., arrows representing electrons in an orbital).

13) Use the periodic table and electronegativity differences of elements to predict the types of bonds that are formed between atoms during chemical reactions and write the names of chemical compounds, including polyatomic ions using the IUPAC criteria.
14) Use Lewis dot structures and electronegativity differences to predict the polarities of simple molecules (linear, bent, trigonal planar, trigonal pyramidal, tetrahedral). Construct an argument to explain how electronegativity affects the polarity of basic chemical molecules.
15) Investigate, describe, and mathematically determine the effect of solute concentration on vapor pressure using the solute's van 't Hoff factor on freezing point depression and boiling point elevation.

CHEM1.PS2: Motion and Stability: Forces and Interactions

1) Draw, identify, and contrast graphical representations of chemical bonds (ionic, covalent, and metallic) based on chemical formulas. Construct and communicate explanations to show that atoms combine by transferring or sharing electrons.
2) Understand that intermolecular forces created by the unequal distribution of charge result in varying degrees of attraction between molecules. Compare and contrast the intermolecular forces (hydrogen bonding, dipole-dipole bonding, and London dispersion forces) within different types of simple substances (only those following the octet rule) and predict and explain their effect on chemical and physical properties of those substances using models or graphical representations.
3) Construct a model to explain the process by which solutes dissolve in solvents, and develop an argument to describe how intermolecular forces affect the solubility of different chemical compounds.
4) Conduct an investigation to determine how temperature, surface area, and stirring affect the rate of solubility. Construct an argument

to explain the relationships observed in experimental data using collision theory.

CHEM1.PS3: Energy

1) Contrast the concepts of temperature and heat in macroscopic and microscopic terms. Understand that thermal energy is a form of energy and temperature is a measure of average kinetic energy of a group of particles.
2) Draw and interpret heating and cooling curves and phase diagrams. Analyze the energy changes involved in calorimetry by using the law of conservation of energy quantitatively (use of $q = mc\Delta T$) and qualitatively.
3) Distinguish between endothermic and exothermic reactions by constructing potential energy diagrams and explain the differences between the two using chemical terms (e.g. activation energy). Recognize when energy is absorbed or given off depending on the bonds formed and bonds broken.
4) Analyze energy changes to explain and defend the law of conservation of energy.

CHEM1.PS4: Waves and Their Applications in Technologies for Information Transfer
1) Using a model, explain why elements emit and absorb characteristic frequencies of light and how this information is used.

Schedule: Chemistry 1 Syllabus

Week	Standard(s)	Objective(s)	Topic(s)
1	All 4 Chemistry Academic Standards.	SPI 3221 Inq.1 Select a description or scenario that reevaluates and/or extends a scientific finding. SPI 3221 Inq.2 Analyze the components of a properly designed scientific investigation. SPI 3221 Inq.3 Determine appropriate tools to gather precise and accurate data. SPI 3221 Inq.4 Evaluate the accuracy and precision of data. SPI 3221 Inq.5 Defend a conclusion based on scientific evidence. SPI 3221 Inq.6 Determine why a conclusion is free of bias.	*extension of scientific finding *parts of experimental design *appropriate scientific tools *accuracy and precision *defending conclusion with scientific evidence *eliminating bias *formulating hypotheses *control, constant, independent, dependent *qualitative, quantitative data *reading laboratory equipment *metric units and conversion *significant figures *using graphs and tables *percent error *sources of experimental error *evaluation of different explanations for identical outcomes *experimental design

		SPI 3221 Inq.7 Compare conclusions that offer different, but acceptable explanations for the same set of experimental data.	
2	All Chemistry Academic Standards.	SPI 3221.2.1 Distinguish among elements, compounds, and mixtures. SPI 3221.2.4 Identify properties of matter (e.g., physical: density, boiling point, melting point, or chemical: ability to rust or tarnish, be sour) or changes in matter (e.g., physical: phase change, shape, color, or chemical: formation of a gas or precipitate).	*elements, compounds, and mixtures *homogeneous vs. heterogeneous *solutions, colloids, and suspensions identification *solute vs. solvent *solid, liquid, and gaseous solutions *classification of properties (chemical/physical) *changes in matter (chemical/physical)
3	Chemistry Core Idea PS3: Energy	SPI 3221.2.5 Compare and contrast heat and temperature changes (endothermic / exothermic) in chemical (e.g., combustion) or physical (e.g., phase transformations)	*heat vs temperature change *endothermic vs. exothermic *phase changes *specific heat calculations (enthalpy)-heat of solvation, heat of reaction,heat of

		processes. SPI 3221.2.6 Investigate similarities and differences among solids, liquids and gases in terms of energy and particle spacing.	formation, heat of phase change *particle spacing diagrams *phase diagrams
4	Chemistry Core Idea PS1.A: Structure and Properties of Matter And… Chemistry Core Idea:PS4.1	SPI 3221.1.1 Compare and contrast the major models of the atom (i.e., Bohr, and the quantum mechanical model). SPI 3221.1.2 Interpret the periodic table to describe an element's atomic makeup.	*comparison/contrast of major models - Bohr, Chadwick, Dalton, Planck, Rutherford,Thomson *Bohr vs. Quantum Mechanical Model *Drawing Bohr Models H-Ar *atomic absorption and emission (ground vs. excited states) *number of protons, neutrons, and e- in atoms *Isotopes and ions *Formation of ions (cation/anion) and charge *Lewis dot structures
5	Chemistry Core Idea PS1.B: Types of Interactions	SPI 3221.1.4 Determine the Lewis electron dot structure or number of valence electrons for an atom of any main-group element from its atomic number or	*electron location in quantum mech. model *electron clouds (particularly s and p) *relative energies of orbitals *electrons in s,p,d,f

		position in the periodic table. SPI 3221.1.5 Represent an electron's location in the quantum mechanical model of an atom in terms of the shape of electron clouds (s and p orbitals in particular), relative energies of orbitals, and the number of electrons possible in the s, p, d and f orbitals.	orbitals *orbital notation *electron configuration *orbital shape and size
6	Chemistry Core Idea PS1.A: Structure and Properties of Matter	SPI 3221.1.2 Interpret the periodic table to describe an element's atomic makeup. SPI 3221.1.3 Describe the trends found in the periodic table with respect to atomic size, ionization energy, or electronegativity. SPI 3221.1.4 Determine the Lewis electron dot structure or number of valence electrons for an atom of any main-group element from its	*atomic makeup based on location on periodic table *trends-atomic size, ionization energy, electroneg. *Lewis structure based on location on PT *metal, nonmetal, metalloid *# of subatomic particles based on PT position *charges of main-group elements *sequencing based on trends *Lewis dot structure based on PT position

		atomic number or position in the periodic table.	
7	Chemistry Core Idea PS2.B: Chemical Reactions	SPI 3221.3.1 Analyze ionic and covalent compounds in terms of their formation (electron transfer versus sharing), names, chemical formulas (e.g., molecular: H_2O, CO_2, NH_3; empirical: NaCl, $CaBr_2$, $Al(NO_3)_3$), percent composition, and molar masses.	*names and formulas-ionic, covalent, polyatomic
8	Chemistry Core Idea PS2.B: Types of Interactions	SPI 3221.3.1 Analyze ionic and covalent compounds in terms of their formation (electron transfer versus sharing), names, chemical formulas (e.g., molecular: H_2O, CO_2, NH_3; empirical: NaCl, $CaBr_2$, $Al(NO_3)_3$), percent composition, and molar masses.	*Identify bond types-ionic, covalent *electron transfer vs. sharing *bond models
9	Chemistry Core Idea PS1.B: Chemical Reactions Chemistry Core Idea PS3.D: Energy in Chemical Processes	SPI 3221.3.2 Determine the reactants, products, and types of different chemical reactions: composition, decomposition,	*identifying reactants and products *types of reactions *Predicting Products *Balancing Equations *Mole Ratios *Activity Series

	and Everyday Life	double replacement, single replacement, combustion. SPI 3221.3.3 Predict the products of a chemical reaction (e.g., composition and decomposition of binary compounds). SPI 3221.3.4 Balance a chemical equation to determine molar ratios.	*Solubility Table to determine products
10	Chemistry Core Idea PS3.1: Definitions of Energy And…. Chemistry Core Idea PS.1: Structure and Properties of Matter	SPI 3221.2.2 Identify properties of a solution: solute and solvent in a solid, liquid or gaseous solution; procedure to make or determine the concentration of a solution in units of ppm, ppb, molarity, percent composition, factors that affect the rate of solution. SPI 3221.2.3 Classify a solution as saturated, unsaturated, or supersaturated based on its composition and temperature and a solubility graph.	*Compare/Contrast solids, liquids, gases *Kinetic Energy and States of Matter

11	Chemistry Core Idea PS1.C: Nuclear Processes	SPI 3221.3.5 Convert among the following quantities of a substance: mass, number of moles, number of particles, molar volume at STP. SPI 3221.3.6 Identify and solve stoichiometry problems which interconvert volume of gases at STP, moles, and mass.	*empirical/molecular formulas *Percent Composition *Molar Mass *Mole Conversions-molar mass, number of moles molar volume, number of particles
12	Chemistry Core Idea PS1.A: Structure and Properties of Matter	SPI 3221.3.5 Convert among the following quantities of a substance: mass, number of moles, number of particles, molar volume at STP. SPI 3221.3.6 Identify and solve stoichiometry problems which interconvert volume of gases at STP, moles, and mass.	*problems with gas volume, moles, and mass *stoichiometric calculations: mole-gram, gram-gram/mole-volume *Theoretical yield *percent yield
13	Chemistry Core Idea PS1.B: Chemical Reactions	SPI 3221.2.7 Predict how changes in volume, temperature, and pressure affect the behavior of a gas.	*effect of vol., temp., and press. change on gases *graphing and interpreting gas experiment data *Gas Law

			Calculations
14	Chemistry Core Idea PS1.B: Chemical Reactions	SPI 3221.3.5 Convert among the following quantities of a substance: mass, number of moles, number of particles, molar volume at STP. SPI 3221.3.6 Identify and solve stoichiometry problems which interconvert volume of gases at STP, moles, and mass.	*Calculations with gas volume, moles, and mass *Stoichiometry Calculations with STP
15	Chemistry Core Ideas PS1.B: Chemical Reactions	SPI 3221.2.2 Identify properties of a solution: solute and solvent in a solid, liquid or gaseous solution; procedure to make or determine the concentration of a solution in units of ppm, ppb, molarity, percent composition, factors that affect the rate of solution. SPI 3221.2.3 Classify a solution as saturated, unsaturated, or supersaturated based on its composition and temperature and	*properties of solutions *units of concentration-ppm, ppb ,molarity, molality, percent composition *preparing solutions *rate of solution *saturated, unsaturated, supersaturated *solubility graphs *Dilution *colligative properties-molality & freezing/boiling pt.

		a solubility graph. SPI 3221.3.6 Identify and solve stoichiometry problems which interconvert volume of gases at STP, moles, and mass.	
16	Chemistry Core Idea PS1.B: Chemical Reactions	SPI 3221.3.7 Classify substances as acids or bases based on their formulas and how they react with litmus and phenolphthalein.	*classifying acids/bases-formula, reaction with litmus and phenolphthalein *predicting products of neutralization
17	Chemistry Core Idea PS1.C: Nuclear Processes	SPI 3221.3.8 Describe radioactivity through a balanced nuclear equation and through an analysis of the half-life concept.	*nuclear equations *analysis of half-life *thermal changes in nuclear reactions *alpha/beta mass and properties *determining half-life with graph or equation *balancing fission/fusion equations *benefits/hazards of nuclear energy
18	All Chemistry I Standards	All Chemistry I Objectives	Review and Final Exam

Important Note: You WILL have homework in this class. It is not possible to learn chemistry without actively involving yourself in studying the material. Do not expect to pass if you do not complete homework in a timely manner.*

**I understand the rules and procedures explained by this Course Syllabus for Mrs. Mitchell.

STUDENT SIGNATURE: _____

PARENT SIGNATURE:_____DATE:_____