

# Wyoming Department of Education Required Virtual Education Course Syllabus

## Sheridan County School District # 1

Program Name	Sheridan County School District #1 Virtual School	Content Area	SC
Course ID	AC03101	Grade Level	10 - 12
Course Name	General Chemistry	# of Credits	1
SCED Code	03101	Curriculum Type	Acellus

### COURSE DESCRIPTION

Acellus General Chemistry provides students with a basic introduction to chemistry. Students are introduced to various forms of matter. They learn about the basic components of the atom and electron orbitals. They will become familiar with the Periodic Table and learn how to use it to predict properties of specific elements. They will learn about chemical bonding, practice stoichiometry, and learn basic reactions. A brief introduction of organic chemistry is also included. Acellus General Chemistry is A-G Approved through the University of California.

### WYOMING CONTENT AND PERFORMANCE STANDARDS

STANDARD #	BENCHMARK (Standard/Indicator) <a href="#">Use the Standards and Benchmarks as Spreadsheets</a>
HS-PS1-1	Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms.
HS-PS1-2	Construct an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trends in the periodic table, and knowledge of the patterns of chemical properties, and revise, as needed.
HS-PS1-3	Plan and conduct an investigation to gather evidence to compare the structure of substances at the macroscopic scale to infer the strength of electrical forces between particles.
HS-PS1-4	Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy.
HS-PS1-5	Apply scientific principles and use evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs.
HS-PS1-6	Evaluate the design of a chemical system by changing conditions to produce increased amounts of products at equilibrium, and refine the design, as needed.
HS-PS1-7	Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction.
HS-PS1-8	Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay.

### SCOPE AND SEQUENCE

UNIT OUTLINE	STANDARD#	OUTCOMES OBJECTIVES/STUDENT CENTERED GOALS
Unit 1 – Introduction to Chemistry		This unit discusses why we study chemistry, the characteristics of matter, the scientific method, SI units and prefixes, and conversions between SI units for temperature. Additionally, this unit addresses derived units for volume and density, scientific notation for addition, subtraction, multiplication, and division, unit conversion in dimensional analysis, data analysis, significant figures and rounding, and calculations using significant figures in addition, subtraction, multiplication, and division.

Unit 2 – Matter, the Atom, the Periodic Table	HS-PS1-1; HS-PS1-2; HS-PS1-8	This unit discusses states and properties of matter, physical versus chemical changes, elements versus compounds, and types of mixtures. The organization of the atom, what makes atoms different, quantum theory as it relates to the atom, and electronic configuration are also addressed. This unit also delves into the modern periodic table, electronic configuration and periodicity, and periodic trends.
Unit 3 – Chemical Bonding	HS-PS1-2; HS-PS1-3	Students learn about chemical bondingThis unit discusses valence electrons, ionic bonds and compounds, properties and formulas of ionic compounds, and names of ions and ionic compounds. This unit also discusses covalent bonds, single and multiple covalent bonds, the strength of covalent bonds.
Unit 4 – Naming Compounds, Lewis Structures	HS-PS1-2	This unit covers the names of binary molecular compounds, naming acids, and Lewis Structures for covalent compounds and polyatomic ions.
Unit 5 – Chemical Reactions	HS-PS1-2; HS-PS1-4; HS-PS1-5; HS-PS1-6	This unit discusses valence shell electron pair repulsion (VSEPR), electronegativity, and polarity. This unit also covers chemical reactions, balancing chemical equations, types of chemical reactions, and reactions in water.
Unit 6 – The Mole	HS-PS1-2	This unit discusses what a mole is, how to convert moles to particles and to mass, the mole ratios of compounds, percent composition calculations, and empirical and molecular formula calculations.
Unit 7 – Stoichiometry	HS-PS1-2; HS-PS1-5; HS-PS1-7	This unit discusses chemical reactions in terms of stoichiometric calculations, including mole to mole, mole to mass, mass to mole, mass to mass, and percent yield.
Unit 8 – Solids, Liquids, and Gases		This unit discusses gases in terms of behavior, units, and the kinetic-molecular theory, and in terms of Dalton's Law of Partial Pressures. Also covered are liquids, solids, and the intermolecular forces that determine the state of matter.
Unit 9 – Gas Laws	HS-PS1-5; HS-PS1-6	This unit covers the laws that pertain to gases, including Boyle's, Charles's, and Gay-Lussac's laws, as well as the Combined Gas Law and the Ideal Gas Law.

Unit 10 – Mixtures and Solutions		This unit discusses heterogeneous and homogeneous mixtures, as well as concentration as percent by mass, percent by volume, molarity, dilution of molar solutions, molality, and mole fractions. Also covered are solvation in ionic and molecular compounds, solubility, and colligative properties.
Unit 11 – Acids and Bases	HS-PS1-5	This unit discusses the Arrhenius, Bronsted-Lowry, and Lewis Models, the strength of acids, weak acid ionization constants, the strength of bases, weak base ionization constant, hydrogen ions, ion product constant, pH and pOH, pH and H <sup>+</sup> calculations, pOH and OH <sup>-</sup> calculations, pH and pOH calculations, and pH and pOH strong acids and bases. Further discussion covers neutralization reactions for acids and bases.
Unit 12 – Organic Chemistry		This unit discusses hydrocarbons, including alkanes, drawing structures, straight-chain alkanes, and branched-chain alkanes.