Ganado Unified School District
(CHEMISTRY II/Grade 11th and 12th)

PACING Guide SY 2021 - 2022

Timeline	AZ Science Standards	Crosscutting Concepts and Background Information	Learning Goals and Topics
Quarter 1	**P1: All matter in the Universe is made of very small particles.** **Plus HS+C. P1U1.1** Develop and use models to demonstrate how changes in the number of subatomic particles (protons, neutrons, electrons) affect the identity, stability and properties of the element. **Plus HS+C. P1U1.2** Obtain, evaluate and communicate the qualitative evidence supporting claims about how atoms absorb and	**Crosscutting Concepts:** Patterns; Cause and Effect; Scale, Proportion and Quantity; System and System Models; Energy and Matter; Structure and Function; Stability and Change **Background Information:** Each **atom** has a charged substructure consisting of a **nucleus**, which is made of **protons** and **neutrons,** surrounded by electrons. The **periodic table** orders elements horizontally by the number of protons in the atom's nucleus and places those similar **chemical properties** in columns. The repeating patterns of this table reflect patterns of **outer electron states**. The structure and	**Structures and Properties of Matter** - Atomic Structure - Electrons in Atoms - The Behavior of Gases

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	emit energy in the form of the electromagnetic radiation. **Plus HS+C. P1U1.3** Analyze and interpret data to develop and support an explanation for the relationships between kinetic molecular theory and gas laws	interactions of matter at the bulk scale are determined by electrical forces within and between atoms. **Stable** forms of matter are those in which the electric and magnetic field energy is minimized. Atoms of each element emit and absorb characteristic frequencies of light, and nuclear transitions have distinctive gamma ray wavelength. These characteristics allow identification of the presence of an element, even in microscopic quantities.	
Quarter 2	**P1: All matter in the Universe is made of very small particles.** **Plus HS+C. P1U1.4** Develop and use models to predict and explain forces within and between molecules.	**Crosscutting Concepts:** Patterns; Cause and Effect; Scale, Proportion and Quantity; System and System Models; Energy and Matter; Structure and Function; Stability and Change **Background Information:** **Chemical processes**, their **rates**, and whether or not **energy** is **stored** or **released** can be understood in terms of the **collisions** of **molecules**	**Chemical Reactions** - Ionic and Metallic Bonding - Covalent Bonding - Chemical Names and Formulas - Chemical Reactions

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	Plus HS+C. P1U1.5 Plan and carry out investigations to test predictions of the outcomes of various reactions, based on patterns of physical and chemical properties.	and the rearrangements of **atoms** into new molecules, that are matched by changes in **kinetic energy**. In many situations, a dynamic and condition-dependent balance between a **reaction** and the reverse reaction determines the numbers of all types of molecules present. The fact that atoms are **conserved**, together with knowledge of the **chemical properties** of the elements involved, can be used to describe and predict chemical reactions.	
Quarter 3	**P1: All matter in the Universe is made of very small particles.** **Plus HS+C. P1U1.6** Construct an explanation, design a solution, or refine the design of a chemical system in equilibrium to maximize production.	**Crosscutting Concepts:** Patterns; Cause and Effect; Scale, Proportion and Quantity; System and System Models; Energy and Matter; Structure and Function; Stability and Change **Background Information:** **Chemical processes**, their **rates**, and whether or not **energy** is **stored** or **released** can be understood in terms of the **collisions** of	**Chemical Reactions** - Chemical Reactions - Stoichiometry - Reaction Rates and Equilibrium - Oxidation – Reduction Reactions

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	Plus HS+C. P1U1.7 Use mathematics and computational thinking to determine stoichiometric relationships between reactants and products in chemical reactions.	**molecules** and the rearrangements of **atoms** into new molecules, that are matched by changes in **kinetic energy**. In many situations, a dynamic and condition-dependent balance between a **reaction** and the reverse reaction determines the numbers of all types of molecules present. The fact that atoms are **conserved**, together with knowledge of the **chemical properties** of the elements involved, can be used to describe and predict chemical reactions.	
Quarter 4	**P1: All matter in the Universe is made of very small particles.** **Essential HS. P1U1.8** Engage in argument from evidence regarding the ethical, social, economic and/or political benefits and liabilities of fission, fusion, and radioactive	**Crosscutting Concepts:** Patterns; Cause and Effect; Scale, Proportion and Quantity; System and System Models; Energy and Matter; Structure and Function; Stability and Change **Background Information:** Scientific understanding can help to identify implications of certain applications but decisions about whether certain actions should be taken will	**Nuclear Processes and Applications of Chemistry** - Nuclear Radiation - Nuclear Transformations - Fission and Fusion - Radiation in Your Life

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		require **ethical and moral judgements** which are not provided by knowledge of science. There is an important difference between the understanding that science provides about, for example, the need to preserve biodiversity, the factors leading to climate change and the adverse effects of harmful substances and lifestyles, and the actions that may or may not be taken in relation to these issues. Opinions may vary about what action to take but arguments based on scientific evidence should not be a matter of opinion. The total number of neutrons plus protons does not change in any **nuclear process**. Strong and weak nuclear interactions determine nuclear stability and processes. Spontaneous radioactive decays follow a characteristic exponential decay law. Nuclear lifetimes allow radiometric dating to be used to determine the ages of rocks and other materials from the isotope ratios present.	