Content: Physical Science	**Grade or Course:** Lab Chemistry	**Date Developed:** 08/06/2018 *updated 03/09/22*

Overview:

Lab Chemistry serves as an introduction to the science of Chemistry. Chemistry will be studied by seeking connections between the properties and structure of matter. New concepts will generally be introduced via discussions and demonstrations, and then applied, reinforced, and extended with a variety of team-based and individual labs, projects, and practice problems.

This 1 credit course, which is intended primarily for students who have either already completed Algebra II or for those that are completing Algebra II concurrently with Lab Chemistry, provides students with a foundation for post-secondary readiness. It will fulfill any college's requirement of a high school lab-based chemistry course. Topics include nuclear chemistry, nomenclature, chemical bonding, stoichiometry, and thermodynamics.

Essential Questions:

•How can the properties and behavior of materials be explained by their atomic and molecular structure?

•How does matter undergo changes, and how do we use chemical equations?

•How do the laws of thermodynamics explain the relationship between heat and forms of energy?

•How can observed chemical phenomena be modeled both mathematically and visually (at a molecular level)?

•How do scientists work to collect, evaluate, communicate, and justify data, and then use that data to form and change models?

EO's addressed to proficiency level:

Students will understand, demonstrate, and be evaluated on the following Scientific Practices:

- Developing and Using Models
- Planning and Carrying Out Investigations
- Analyzing and Interpreting Data
- Constructing Explanations and Designing Solutions
- Engaging in Argument from Evidence

Standards:

Students will understand and use the following additional Scientific Practices:

- Asking Questions and Defining Problems
- Using Math and Computational Thinking
- Obtaining, Evaluating, and Communicating Information

Students will understand and use the following Cross-Cutting Concepts:

- Patterns
- Energy and Matter
- Systems and System Models

Students will understand, use, and be evaluated on the following Disciplinary Core Ideas:

•Students will "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-PS1-1)

•Students will "use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction." (HS-PS1-7)

•Students will "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." (HS-PS1-8)

•Students will "plan and conduct an investigation to provide evidence that the transfer of thermal energy when two components of different temperature are combined within a closed system results in a more uniform energy distribution among the components in the system (second law of thermodynamics)." (HS-PS3-4)

Students will understand and use the following Disciplinary Core Ideas:

•Students will "construct and revise 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." (HS-PS1-2)

•Students will "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-PS1-4)

•Students will "design a solution to a complex real-world by breaking it down into smaller, more manageable problems that can be solved through engineering." (HS-ETS1-2)

Units:

Unit 1 The Periodic Table
Unit 2 Atomics and Nuclear Chemistry
Unit 3 Chemical Bonding
Unit 4 The Mole
Unit 5 Equations and Stoichiometry
Unit 6 Thermodynamics

EO Assessments:

- Radiation Lab
- Qualitative Analysis Lab
- Chemical Bonding Lab
- Mole Project
- Essay on Nuclear Power