

General Chemistry (4190) Course Overview Curriculum Document

Course Description

General Chemistry uses laboratory activities and projects to introduce topics including but not limited to: atoms, bonding, chemical equations, gasses, and chemistry issues in society. A basic understanding of algebra including graphing and solving equations will be needed. The focus of the course is on the development of chemical concepts that are important for making informed decisions as a citizen. Chemistry 4190 provides the student with a knowledge of chemistry concepts that may lead to more introductory courses in chemistry after high school. Students who plan to take AP Chemistry should strongly consider taking Chemistry 4200. Students who complete General Chemistry (4190) cannot take Chemistry (4200) for credit.

Credits	Prerequisites
1.0	Algebra 1 or 1A and 1B
Board Approved	Revised
June 2008	May 2020, June 2023

Required Assessments

District-wide, standards-based common summative assessments

Textbooks/Resources

Pearson Education (2021). *Experience Chemistry* [Vol. 1 and 2]. Glenview, IL: Pearson, Prentice Hall, and Pearson Prentice Hall Education, Inc.
ISBN: 978-1-4183-2946-4

Course Essential Understandings

As a result of successfully completing this course, students will understand that:

- Matter is neither created nor destroyed in a chemical reaction, the atoms simply re-arrange.
- The periodic table is a working arrangement of elements; known and unknown. The position of an element determines its properties.
- The structure of a particle affects its properties and interactions with other particles.
- Molar quantities can be used to determine amounts of reactants and products in a chemical reaction.
- There is a relationship between the pressure, temperature, volume and number of molecules in a gas.
- The properties of hydrocarbons depend on the structure and functional groups.

Course Relevance Questions

- What are the safety procedures in the chemistry lab and why are they important?
- How does the structure of an atom affect its properties?
- What determines how atoms react and bond together?
- How does the structure and arrangement of particles affect the properties of a substance?
- How do moles help chemists know the amount of substances in a reaction?
- How do the pressure, temperature, number of molecules and volume of a gas affect each other?
- What are the properties of hydrocarbons and how do they react?

Unit Overviews

Unit Name	Unit Description	Unit Relevance Question	Instructional Standards	Assessed Standards
Unit 1: Atomic Structure and Periodicity	Students use the periodic table to predict the patterns of behavior of the elements based on the attraction and repulsion between electrically charged particles and the patterns of outermost electrons that determine the typical reactivity of an atom. Students predict the following patterns of properties: <ol style="list-style-type: none"> Electron configurations of different elements. The arrangement of the main groups of the periodic table reflects the patterns of outermost electrons. Elements in the periodic table are arranged by the numbers of protons in atoms. 	How does the structure of an atom affect its properties?	HS-PS-1-1 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-PS-1-1 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.
Unit 2: Intramolecular versus Intermolecular Forces and Properties of Matter	Students describe the phenomenon under investigation using the relationship between measurable properties of a substance and the strength of the electrical forces between the particles of the substances. Students will describe how the forces between particles affect their physical properties.	How does the structure and arrangement of particles affect the properties of a substance?	PS1-3 Create a model and use evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles.	PS1-3 Create a model and use evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles
Unit 3: Chemical Bonding and Chemical Reactions	Students construct an explanation of the outcome of the given reaction, including: <ol style="list-style-type: none"> The numbers and types of bonds (i.e., ionic, covalent) that each atom forms, as determined by the outermost (valence) electron states and the electronegativity; The outermost (valence) electron state of the atoms that make up both the reactants and the products of the reaction is based on their position in the periodic table; A discussion of how the patterns of attraction allow the prediction of the type of reaction that occurs (e.g., formation of ionic compounds, combustion of hydrocarbons). 	What determines how elements bond together?	HS-PS1-2 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 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

Unit 4: Moles	Students will mathematically prove that there is a relationship between the amount of atoms in a substance and the mass. Students will mathematically prove that mass is conserved in a chemical change.	How do moles help chemists know the amount of substances in a reaction?	PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass is conserved during a chemical reaction. [PS1-7 Use mathematical representations to support the claim that atoms, and therefore mass is conserved during a chemical reaction. [
Unit 5: Gasses	Students will explore the behavior of gasses and examine the relationships among volume, pressure, temperature, and number of particles. Students will predict outcomes for volume, pressure, temperature, and number of particles when one variable is changed for the various gas laws.	How do the pressure, temperature, number of molecules, and volume of a gas affect each other?	PS1-9 Analyze data to support the claim that the combined gas law describes the relationships among volume, pressure, and temperature for a sample of an ideal gas.	PS1-9 Analyze data to support the claim that the combined gas law describes the relationships among volume, pressure, and temperature for a sample of an ideal gas.