

Course Resources:**Chemistry Principles - Course Syllabus**

Chemistry Principles - Course Syllabus

Description:

This rigorous full-year course engages students in the study of the composition, properties, changes, and interactions of matter. The components of this course include chemistry and its methods, the composition and properties of matter, changes and interactions of matter, factors affecting the interactions of matter, electrochemistry, organic chemistry, biochemistry, nuclear chemistry, mathematical applications, and applications of chemistry in the real world.

Textbook: Chemistry Principles - Excel Education Systems, Inc. ©

Course objectives:

Throughout the course, you will meet the following goals:

Understand and apply the methods of chemistry: scientific thinking, measurements, and using mathematics as a tool for logically solving chemistry problems.

Describe the composition and properties of matter as well as the changes that matter undergoes.

Trace the development of the atomic theory.

Examine the relationship between the elements on the periodic table.

Describe chemical reactions and interactions and their causes and effects in real-world applications.

Contents:

Semester A		Semester B	
Unit 1	1: Introduction to Chemistry Principles	Unit 5	14: The Properties of Gases
	2: Matter and Change		15: Water
	3: Measurement		16: Solutions
Unit 2	4: Atomic Structure	Unit 6	17: Thermochemistry
	5: Electrons in Atoms		18: Kinetics
	6: The Periodic Table		19: Chemical Equilibrium
	7: Chemical Nomenclature	Unit 7	20: Entropy and Free Energy
Unit 3	8: Ionic and Metallic Bonding		21: Acids and Bases
	9: Covalent Bonding		22: Oxidation Reduction Reactions
	10: The Mole	Unit 8	23: Electrochemistry
Unit 4	11: Chemical Reactions		24: Nuclear Chemistry
	12: Stoichiometry		25: Organic Chemistry
	13: States of Matter		26: Biochemistry

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Grading Scale

A = 90-100%
 B = 80-89%
 C = 70-79%
 D = 60-69%
 F = under 59%

Grade Weighting

Quizzes..... 70%
 Final Exam..... 30%
 100%

Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
Unit 1: Months 1-12				
Module 1: Introduction to Chemistry Principles				
Module 2: Matter and Change <i>(updated 3/19/20)</i>		Identify the characteristics of matter Explain how matter is classified Explain how chemists use the Periodic Table of Elements Compare homogenous and heterogeneous mixtures Compare chemical changes and physical changes or matter	direct instruction graphic aids guided practice note taking virtual lab videos study guide	2.1 Properties of Matter 2.2 Classification of Matter 2.3 Changes in Matter Virtual Lab: States of Matter: Basics Video: Time-lapse demonstration Video: Decomposition Reaction
Module 3: Measurement <i>(updated 3/10/21)</i>	SS.9C.1.3.4.1(A) Use significant figures and an understanding of accuracy and precision in scientific measurements to determine and express the uncertainty of a result.	Explain why the Systeme International (SI) is used by scientists Identify SI base units and derived units Add/Subtract/multiply/divide base units Understand the importance of scientific notation.	direct instruction guided practice graphic aids note taking study guide video	3.1 Units of Measurement 3.2 Unit Conversion Video - Powers of Ten
Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
Unit 2: Months 1-12				
Module 4: Atomic Structure <i>(updated 3/18/20)</i>			direct instruction graphic aids note taking guided practice problems virtual labs study guide	4.1 Evolution of the Atomic Model 4.2 Structure of the Atom Video: Crookes Tube Video: Millikan Oil Drop Experiment Video: Rutherford's Experiment: Nuclear Atom Video: Discovery of Neutrons Virtual Lab: Build an Atom 4.3 Isotopes and Atomic Mass Virtual Lab: Isotopes and Atomic Mass

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<p>Module 5: Electrons in Atoms <i>(updated 3/18/20)</i></p>			<p>direct instruction guided practice note taking videos virtual lab study guide</p>	<p>5.1 Properties of Light Video: Simple Photoelectric Effect Demo Virtual Lab: Photoelectric Effect Virtual Lab: Molecules and Light 5.2 The Bohr and Quantum Mechanical Models of the Atom 5.3 Electron Arrangement in Atoms</p>
<p>Module 6: The Periodic Table <i>(updated 3/10/21)</i></p>	<p>SC.9C.2.1.1.1(A) Explain the relationship of an element's position on the periodic table to its atomic number and electron configuration. SC.9C.2.1.1.2(A) Identify and compare trends on the periodic table, including reactivity and relative sizes of atoms and ions; use the trends to explain the properties of subgroups, including metals, non-metals, alkali metals, alkaline earth metals, halogens and noble gases.</p>		<p>direct instruction graphic aids videos note taking study guide</p>	<p>6.1 History of the Periodic Table Video: Dmitri Mendeleev: Great Minds 6.2 Electron Configuration and the Periodic Table Video: Periodic Table 6.3 Trends in the Periodic Table</p>
<p>Module 7: Chemical Nomenclature <i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.2.2(A) Compare and contrast the structure, properties and uses of organic compounds, such as hydrocarbons, alcohols, sugars, fats and proteins. SS.9C.2.1.2.3(A) Use IUPAC (International Union of Pure and Applied Chemistry) nomenclature to write chemical formulas and name molecular and ionic compounds, including those that contain</p>		<p>direct instruction graphic aids guided practice virtual lab note taking study guide</p>	<p>7.1 Ionic Compounds 7.2 Molecular Compounds Virtual Lab: Build a Molecule 7.3 Acids and Bases</p>

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	<p>polyatomic ions.</p> <p>SS.9C.2.1.2.5(A) Determine percent composition, empirical formulas and molecular formulas of simple compounds.</p> <p>SS.9C.2.1.3.3(A) Relate the properties of acids and bases to the ions they contain and predict the products of an acid-base reaction.</p>			
Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
Unit 3: Months 1-12				
<p>Module 8: Ionic and Metallic Bonding</p> <p><i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.2.5(A) Determine percent composition, empirical formulas and molecular formulas of simple compounds.</p> <p>SS.9C.2.1.2.7(A) Explain the role of solubility of solids, liquids and gases in natural and designed systems. For example: The presence of heavy metals in water and the atmosphere. Another example: Development and use of alloys.</p>		<p>direct instruction</p> <p>graphic aids</p> <p>guided practice</p> <p>note taking</p> <p>study guide</p>	<p>8.1 Ions</p> <p>8.2 Ionic Bonds and Ionic Compounds</p> <p>8.3 Metals and Metallic Bonds</p>
<p>Module 9: Covalent Bonding</p> <p><i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.2.1(A) Explain how elements combine to form compounds through ionic and covalent bonding.</p>		<p>direct instruction</p> <p>graphic aids</p> <p>virtual labs</p> <p>note taking</p> <p>study guide</p>	<p>9.1 Lewis Electron Dot Structures</p> <p>9.2 Molecular Geometry</p> <p>Virtual Lab: Molecule Shapes: Basics</p> <p>9.3 Polarity in Chemical Bonds</p> <p>Virtual Lab: Molecule Polarity</p> <p>9.4 Intermolecular Forces</p> <p>9.5 Hybridization and Molecular Orbitals</p>

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<p>Module 10: 10: The Mole <i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.2.4(A) Determine the molar mass of a compound from its chemical formula and a table of atomic masses; convert the mass of a molecular substance to moles, number of particles, or volume of gas at standard temperature and pressure. SS.9C.2.1.2.5(A) Determine percent composition, empirical formulas and molecular formulas of simple compounds.</p>		<p>direct instruction graphic aids guided practice note taking study guide</p>	<p>10.1 The Mole Concept 10.2 Mass, Volume, and the Mole 10.3 Chemical Formulas</p>
Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources

Unit 4: Months 1-12

<p>Module 11: Chemical Reactions <i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.3.1(A) Classify chemical reactions as double replacement, single replacement, synthesis, decomposition or combustion. SS.9C.2.1.3.2(A) Use solubility and activity of ions to determine whether a double replacement or single replacement reaction will occur. SS.9C.2.1.3.4(A) Balance chemical equations by applying the laws of conservation of mass and constant composition. SS.9C.2.1.3.6(A) Describe the factors that</p>		<p>direct instruction graphic aids guided practice virtual labs video note taking study guide</p>	<p>11.1 Chemical Equations Virtual Lab: Balancing Chemical Equations Video: Decomposition of Mercury(II) Oxide into Liquid Mercury and Oxygen Gas Video: Burn Steel Wool 11.2 Types of Chemical Reactions Virtual La: Reaction and Rates</p>
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	<p>affect the rate of a chemical reaction, including temperature, pressure, mixing, concentration, particle size, surface area and catalyst.</p> <p>SS.9C.2.1.3.7(A) Recognize that some chemical reactions are reversible and that not all chemical reactions go to completion.</p>			
<p>Module 12: Stoichiometry <i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.3.5(A) Use the law of conservation of mass to describe and calculate relationships in a chemical reaction, including molarity, mole/mass relationships, mass/volume relations, limiting reactants and percent yield.</p>		<p>direct instruction guided practice virtual lab note taking study guide</p>	<p>12.1 Mole Ratios 12.2 Stoichiometric Calculations 12.3 Limiting Reactant and Percent Yield Virtual Lab: Reactants, Products and Leftovers</p>
<p>Module 13: States of Matter: <i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.2.7(A) Explain the role of solubility of solids, liquids and gases in natural and designed systems. For example: The presence of heavy metals in water and the atmosphere. Another example: Development and use of alloys.</p> <p>SS.9C.2.1.4.1(A) Use kinetic molecular theory to explain how changes in energy content affect the state of matter (solid, liquid and gaseous phases).</p>		<p>direct instruction graphic aids note taking study guide</p>	<p>13.1 The Kinetic Molecular Theory of Gases 13.2 Liquids and Solids 13.3 Changes of State</p>

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	SS.9C.2.1.4.2(A) Use the kinetic molecular theory to explain the behavior of gases and the relationship among temperature, pressure, volume and the number of particles.			
Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
Unit 5: Months 1-12				
Module 14: The Properties of Gases <i>(updated 3/10/21)</i>	SS.9C.2.1.2.7(A) Explain the role of solubility of solids, liquids and gases in natural and designed systems. For example: The presence of heavy metals in water and the atmosphere. Another example: Development and use of alloys. SS.9C.2.1.4.2(A) Use the kinetic molecular theory to explain the behavior of gases and the relationship among temperature, pressure, volume and the number of particles.		direct instruction graphic aids guided practice virtual lab study guide	14.1 Gas Properties Virtual Lab: Gas Properties 14.2 Gas Laws 14.3 Gas Mixtures
Module 15: Water <i>(updated 3/10/21)</i>	SS.9C.2.1.2.6(A) Describe the dynamic process by which solutes dissolve in solvents, and calculate concentrations, including percent concentration, molarity and parts per million.		direct instruction graphic aids guided practice study guide	15.1 Properties of Water 15.2 Aqueous Solutions Video: Dissociation of Salt 15.3 Colloids and Suspensions

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Module 16: Solutions <i>(updated 3/10/21)</i>	SS.9C.2.1.2.6(A) Describe the dynamic process by which solutes dissolve in solvents, and calculate concentrations, including percent concentration, molarity and parts per million.		direct instruction graphic aids guided practice virtual labs note taking study guide	16.1 Solubility Virtual Lab: Sugar and Salt Solutions 16.2 Solution Concentration Virtual Lab: Concentration 16.3 Colligative Properties
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Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
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Unit 6: Months 1-12

Module 17: Thermochemistry <i>(updated 3/20/20)</i>			direct instruction graphic aids guided practice note taking study guide	17.1 Heat Flow 17.2 Enthalpy 17.3 Enthalpy and Phase Transitions 17.4 Hess's Law
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Module 18: Kinetics <i>(updated 3/10/21)</i>	SS.9C.2.1.4.1(A) Use kinetic molecular theory to explain how changes in energy content affect the state of matter (solid, liquid and gaseous phases). SS.9C.2.1.4.2(A) Use the kinetic molecular theory to explain the behavior of gases and the relationship among temperature, pressure, volume and the number of particles.		direct instruction graphic aids guided practice note taking study guide	18.1 Rates of Reactions 18.2 Rate Laws 18.3 Reaction Mechanisms
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Module 19: Chemical Equilibrium <i>(updated 3/20/20)</i>			direct instruction graphic aids guided practice video note taking study guide	19.1 The Nature of Chemical Equilibrium 19.2 Applications of Equilibrium Constants 19.3 Factors Affecting Equilibria Video: NO ₂ and N ₂ O ₄ Equilibrium
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Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
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Unit 7: Months 1-12

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Module 20: Entropy and Free Energy <i>(updated 3/20/20)</i>			direct instruction graphic aids guided practice website link note taking study guide	20.1 Entropy 20.2 Spontaneous Reactions and Free Energy http://chemed.chem.wisc.edu/chempaths/GenChem-Textbook/The-Free-Energy-629.html 20.3 Free Energy and Equilibrium
Module 21: Acids and Bases <i>(updated 3/10/21)</i>	SS.9C.2.1.3.3(A) Relate the properties of acids and bases to the ions they contain and predict the products of an acid-base reaction.		direct instruction graphic aides guided practice virtual labs note taking study guide	21.1 Acid Base Definitions Virtual Lab: Acid Base Solutions 21.2 The pH Concept Virtual Lab: pH Scale 21.3 Acid and Base Strength 21.4 Acid-Base Neutralization Reactions and Titrations 21.5 Salt Solutions Virtual Lab: Salts and Solubility
Module 22: Oxidation Reduction Reactions <i>(updated 3/10/21)</i>	SS.9C.2.1.3.4(A) Balance chemical equations by applying the laws of conservation of mass and constant composition.		direct instruction graphic aids guided practice note taking study guide	22.1 Nature of Oxidation Reduction Reactions 22.2 Oxidation Numbers 22.3 Balancing Redox Equations
Unit	Benchmarks	Learning Objectives	Instructional Strategies	Resources
Unit 8: Months 1-12				
Module 23: Electrochemistry <i>(updated 3/20/20)</i>			direct instruction graphic aids guided practice note taking study guide	23.1 Electrochemical Cells 23.1 Cell Potential 23.3 Electrolysis
Module 24: Nuclear Chemistry <i>(updated 3/10/21)</i>	SC.9C.1.3.3.1(A) Explain the political, societal, economic and environmental impact of chemical products and technologies. For example: Pollution effects, atmospheric changes, petroleum products, material use or waste disposal.		direct instruction graphic aids guided practice virtual lab note taking study guide	24.1 Nuclear Radiation 24.2 Half-Lives 24.3 Fission and Fusion Virtual Lab: Nuclear Fission 24.4 Applications of Radioactivity

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<p>Module 25: Organic Chemistry <i>(updated 3/20/20)</i></p>			<p>direct instruction graphic aids guided practice note taking study guide</p>	<p>25.1 Hydrocarbons - The Backbone of Organic Chemistry 25.2 Functional Groups 25.3 Organic Reactions</p>
<p>Module 26: Biochemistry <i>(updated 3/10/21)</i></p>	<p>SS.9C.2.1.3.3(A) Relate the properties of acids and bases to the ions they contain and predict the products of an acid-base reaction.</p>		<p>direct instruction graphic aids guided practice note taking study guide</p>	<p>26.1 Carbohydrates 26.2 Amino Acids and Proteins 26.3 Lipids 26.4 Nucleic Acids</p>