

## Chemistry

State Goals	Learning Standards	Benchmarks	Unit Name	Course Topic Description
<b>11</b> Understand the processes of scientific inquiry and technological design to investigate questions, conduct experiments and solve problems.	<b>11.A</b> Know and apply the concepts, principles and processes of scientific inquiry.	<b>11.A.5a</b> Formulate hypotheses referencing prior research and knowledge.	The Scientific Method	The Scientific Method
				Significant Figures and Energy: Introduction
		<b>11.A.5b</b> Design procedures to test the selected hypotheses.	The Scientific Method	The Scientific Method
				Significant Figures and Energy: Introduction
		<b>11.A.5c</b> Conduct systematic controlled experiments to test the selected hypotheses.	The Scientific Method	The Scientific Method
			Labs throughout course	Significant Figures and Energy: Introduction
		<b>11.A.5d</b> Apply statistical methods to make predictions and to test the accuracy of results.	The Scientific Method	Accuracy and Precision
		<b>11.A.5e</b> Report, display and defend the results of investigations to audiences that may include professionals and technical experts.	Labs throughout the course	
	<b>11.B</b> Know and apply the concepts, principles and processes of technological design.	<b>11.B.5a</b> Identify a design problem that has practical applications and propose possible solutions, considering such constraints as available tools, materials, time and costs.		
		<b>11.B.5b</b> Select criteria for a successful design solution to the identified problem.		
		<b>11.B.5c</b> Build and test different models or simulations of the design solution using suitable materials, tools and technology.		
		<b>11.B.5d</b> Choose a model and refine its design based on the test results.		
		<b>11.B.5e</b> Apply established criteria to evaluate the suitability, acceptability, benefits, drawbacks and consequences for the tested design solution and recommend modifications and refinements.		
		<b>11.B.5f</b> Using available technology, prepare and present		

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		findings of the tested design solution to an audience that may include professional and technical experts.		
<b>12</b> Understand the fundamental concepts, principles and interconnections of the life, physical and earth/space sciences.	<b>12.A</b> Know and apply concepts that explain how living things function, adapt and change.	<b>12.A.5a</b> Explain changes within cells and organisms in response to stimuli and changing environmental conditions (e.g., homeostasis, dormancy).		
		<b>12.A.5b</b> Analyze the transmission of genetic traits, diseases and defects.		
	<b>12.B</b> Know and apply concepts that describe how living things interact with each other and with their environment.	<b>12.B.5a</b> Analyze and explain biodiversity issues and the causes and effects of extinction.		
		<b>12.B.5b</b> Compare and predict how life forms can adapt to changes in the environment by applying concepts of change and constancy (e.g., variations within a population increase the likelihood of survival under new conditions).		
	<b>12.C</b> Know and apply concepts that describe properties of matter and energy and the interactions between them.	<b>12.C.5a</b> Analyze reactions (e.g., nuclear reactions, burning of fuel, decomposition of waste) in natural and man-made energy systems.	Chemical Reactions	What is a Chemical Reaction?
				Physical Change: Intro
				Types of Chemical Reactions
			Nuclear Chemistry	Nuclear Reactions
		<b>12.C.5b</b> Analyze the properties of materials (e.g., mass, boiling point, melting point, hardness) in relation to their physical and/or chemical structures.	Chemistry Fundamentals	Physical Change Classification of Matter
	<b>12.D</b> Know and apply concepts that describe force and motion and the principles that explain them.	<b>12.D.5a</b> Analyze factors that influence the relative motion of an object (e.g., friction, wind shear, cross currents, potential differences).		
<b>12.D.5b</b> Analyze the effects of gravitational, electromagnetic and nuclear forces on a physical system.				
<b>12.E</b> Know and apply concepts that describe the features and processes of the Earth and its resources.	<b>12.E.5</b> Analyze the processes involved in naturally occurring short-term and long-term Earth events (e.g., floods, ice ages, temperature, sea-level fluctuations).			

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	<b>12.F</b> Know and apply concepts that explain the composition and structure of the universe and Earth's place in it.	<b>12.F.5a</b> Compare the processes involved in the life cycle of stars (e.g., gravitational collapse, thermonuclear fusion, nova) and evaluate the supporting evidence.		
		<b>12.F.5b</b> Describe the size and age of the universe and evaluate the supporting evidence (e.g., red-shift, Hubble's constant).		
<b>13</b> Understand the relationships among science, technology and society in historical and contemporary contexts.	<b>13.A</b> Know and apply the accepted practices of science.	<b>13.A.5a</b> Design procedures and policies to eliminate or reduce risk in potentially hazardous science activities.		
		<b>13.A.5b</b> Explain criteria that scientists use to evaluate the validity of scientific claims and theories.		
		<b>13.A.5c</b> Explain the strengths, weaknesses and uses of research methodologies including observational studies, controlled laboratory experiments, computer modeling and statistical studies.		
		<b>13.A.5d</b> Explain, using a practical example (e.g., cold fusion), why experimental replication and peer review are essential to scientific claims.		
	<b>13.B</b> Know and apply concepts that describe the interaction between science, technology and society.	<b>13.B.5a</b> Analyze challenges created by international competition for increases in scientific knowledge and technological capabilities (e.g., patent issues, industrial espionage, technology obsolescence).		
		<b>13.B.5b</b> Analyze and describe the processes and effects of scientific and technological breakthroughs.	Atoms/PeriodTable	Atoms
		<b>13.B.5c</b> Design and conduct an environmental impact study, analyze findings and justify recommendations.		
		<b>13.B.5d</b> Analyze the costs, benefits and effects of scientific and technological policies at the local, state, national and global levels (e.g., genetic research, Internet access).		
		<b>13.B.5e</b> Assess how scientific and technological progress has affected other fields of study, careers and job markets and aspects of everyday life.		