

SCIENCE CURRICULUM FRAMEWORK
OVERVIEW OF CONTENT STANDARDS BY GRADE LEVEL

Connecticut State Department of Education
Bureau of Curriculum and Instruction

OVERVIEW OF THE PREK-12 SCIENCE CORE CURRICULUM FRAMEWORK

Grade	Inquiry and Communication	Physical Science	Life Science	Earth Science	Science in a Context
preK-2	Observations & measurements	Classifying Objects & Materials	Properties of Plants & Animals	The Sky: Sun, Moon & Weather	Staying Healthy
3	K-2 + one variable experiments	Structure of Matter: Properties & Changes	Interactions Among Plants, Animals & Environments	Water: Land & Sky	Natural Resources: Rocks, Soils and Minerals
4	K-2 + one variable experiments	Energy: Electricity, Magnetism & Motion	Biomes & Adaptations	Changes to Earth’s Surface	Endangered Species
5	K-2 + one variable experiments	Energy: Sound & Light	Plant Life Cycles	Interactions Among Earth, Moon & Sun	Sense-Enhancing Technologies
6	K-5 + controlled lab experiments	Energy: Work & Forces	Energy & Matter Flow in Ecosystems	Energy in the Atmosphere: Weather & Climate	Designing Technology
7	K-5 + controlled lab experiments	Structure of Matter: Elements, Mixtures & Compounds	Cell & Organ Structure and Function	Cycling of Earth Materials: Water & Rocks	Infectious Disease
8	K-5 + controlled lab experiments	Energy: Laws of Motion	Characteristics of Life: Energy Transformation & Heredity	Movement in the Solar System: Sun, Moon & Planets	Space Exploration
9-10	K-8 + science investigations	Alternative Energy Resources	Cell Chemistry & Biotechnology	A Balanced Environment	
9-10	K-8 + science investigations	The Physics of Modern Technologies	Organic & Synthetic Polymers	Understanding Evolution	
11/12	K-8 + science investigations	Advanced Physics & Chemistry	Advanced Biology	Advanced Earth & Environmental Science	

PREK-12 CORE CONTENT STANDARDS FOR SCIENTIFIC REASONING AND COMMUNICATION

Note: The Scientific Reasoning & Communication content standards should be learned within the context of the Expected Performance standards for Life, Physical, Earth and Personal/Social Contexts

preK-2	3-5	6-8	9-10
<ul style="list-style-type: none"> • Make observations and ask questions about nature. • Seek information in books, magazines and pictures. • Make predictions based on observed patterns. • Use senses and simple measuring tools to collect data. • Describe natural phenomena by words and drawings. 	<ul style="list-style-type: none"> • Make observations and ask questions about objects, organisms and the environment. • Seek relevant information in books, magazines and electronic sources of information. • Design and conduct simple investigations. • Employ simple equipment and measuring tools to gather data and extend the senses. • Use data to construct reasonable explanations. • Analyze, critique and communicate investigations using words, graphs and drawings. • Communicate ideas and support arguments about science-related matters using relevant science vocabulary, evidence and logic. • Read fiction and non-fiction science-related text, and compose narrative, expository and persuasive texts. • Search the web and locate relevant science information. • Use measurement tools and units to describe objects and materials. • Use mathematics to analyze, interpret and present data. 	<ul style="list-style-type: none"> • Identify questions that can be answered through scientific investigations • Seek relevant information in books, magazines and electronic sources of information. • Design and conduct scientific investigations, including controlled lab experiments. • Use appropriate tools and techniques to gather, analyze and interpret data. • Use mathematical operations to analyze the data. • Develop descriptions, explanations, predictions and models based on evidence and logical thinking • Analyze, critique and communicate investigations by words, graphs and drawings. • Communicate ideas and support arguments about science-related matters using relevant science vocabulary, evidence and logic. • Develop the interpretive, analytical and critical capacities needed for reading and writing various scientific texts. • Use web search engines to locate relevant information, and examine the credibility and validity of on-line information sources. • Use mathematics to analyze data, interpret it and present relationships between variables in bar and line graphs. 	<ul style="list-style-type: none"> • Identify questions and concepts that guide scientific investigations. • Formulate hypotheses using various sources of relevant information. • Design and conduct scientific investigations, including controlled lab experiments and analysis of scientific data bases. • Use appropriate tools and techniques to gather, analyze and interpret data. • Develop descriptions, explanations, predictions and models based on evidence and logical thinking. • Analyze, critique and communicate investigations using words, graphs and drawings. • Communicate ideas and support arguments about science-related matters using relevant science vocabulary, evidence and logic. • Develop the interpretive, analytical and critical capacities needed for reading and writing various scientific texts. • Learn how to efficiently use web search engines, and how to examine the relevance, credibility and validity of on-line information sources. • Use mathematics to analyze, interpret and present relationships between variables in various forms. • Use computer-based tools to collect, graph and analyze data.

ELEMENTARY SCHOOL CORE SCIENCE CONTENT STANDARDS

	Grade preK-2: Observing Our World	Grade 3: Exploring Our World	Grade 4: Exploring Changes	Grade 5: Exploring Energy & Life Cycles
Core Physical Science	<p>Properties of Solid Materials: How Can We Explore Them?</p> <p>PreK-2.2 Properties of objects and materials can be observed using our senses and measured using simple tools.</p> <p>PreK-2.3 We use materials that have suitable properties for the jobs that we want them to do.</p>	<p>Changes in Matter: Is It There If We Can't See It?</p> <p>3.1 Materials can exist in different states (e.g., solids, liquids or gases), and can be changed by heating or cooling.</p> <p>3.2 Substances have characteristic properties and a mixture of substances can be separated using one or more of these characteristics.</p>	<p>Electricity, Magnetism and Motion: How Are They Related?</p> <p>4.1 Electricity in circuits can produce light, heat, sound and magnetic effects.</p> <p>4.2 Changes in speed or direction of motion are caused by forces; the greater the force is, the greater the change.</p>	<p>Light and Sound: How Do We Sense Them?</p> <p>5.1 Sound is a form of energy that is produced by the vibration of objects and is transmitted by the vibration of air and objects.</p> <p>5.2 Light is a form of energy that travels in a straight line and can be reflected by a mirror, refracted by a lens, or absorbed by objects.</p>
Core Life Science	<p>Properties of Plants and Animals: How Are They Alike and Different?</p> <p>PreK-2.4 Living things have certain characteristics that distinguish them from nonliving things.</p> <p>PreK-2.5 Many different kinds of living things inhabit the earth.</p> <p>PreK-2.6 Plants and animals have characteristic life cycles that include birth, maturation and death.</p> <p>PreK-2.7 Organisms have basic needs and different body parts that help them to satisfy those needs (e.g., plants need water, light and nutrients; animals need air, water and food).</p>	<p>Habitats: How Do They Support Life?</p> <p>3.3 Organisms can survive and reproduce only in environments that meet their basic needs.</p> <p>3.4 All animals depend on plants. Some animals eat plants and others eat the animals that eat plants.</p>	<p>Biomes: How Do Plants and Animals Survive In Different Places?</p> <p>4.3 The living and nonliving things in a region interact with each other.</p> <p>4.4 Organisms have physical and behavioral adaptations that improve their chances to survive in different environments.</p>	<p>Nature and Nurture: How Do They Affect the Characteristics of Plants?</p> <p>5.3 Many characteristics of an organism are inherited from the parents, but others result from interactions with the environment and cannot be passed to the next generation.</p>
Core Earth Science	<p>Weather and the Sky: What Is Going On Up There?</p> <p>PreK-2.8 Weather conditions can be measured, described and predicted.</p> <p>PreK-2.9 Most objects in the solar system are in regular and predictable motion.</p>	<p>Water: What Makes the Rain?</p> <p>3.5 Water covers the majority of the Earth's surface and it circulates through the crust, oceans and atmosphere.</p>	<p>Land Formations: What Shapes the Face of the Earth?</p> <p>4.5 The Earth's surface is shaped by slow processes, such as erosion and weathering, and by rapid processes, such as earthquakes and volcanoes.</p>	<p>Earth, Moon and Sun: How Do They Interact?</p> <p>5.4 The predictable movement of the Earth and the moon relative to the sun explains cycles such as day/night, years, moon phases and eclipses.</p>
Science in a Personal and Social Context	<p>Staying Healthy: What keeps our bodies healthy?</p> <p>PreK-2.10 To keep your body healthy you need a balanced diet, regular physical exercise and appropriate rest.</p>	<p>Earth Materials: How Do We Use Them to Improve Our Lives?</p> <p>3.6 Earth materials provide resources for all living things, but these resources are not unlimited and should be conserved.</p>	<p>How Do Human Activities Affect Ecosystems?</p> <p>4.6 When the environment changes, some organisms survive and reproduce and others die or move to another location.</p>	<p>Technology: How Does It Help Us to Extend Our Senses?</p> <p>5.5 Humans have the capacity to build and use tools to advance the quality of their lives.</p>

MIDDLE SCHOOL CORE SCIENCE CONTENT STANDARDS

	Grade 6: Energy	Grade 7: Structures & Processes	Grade 8 – Systems & Changes
Core Physical Science	<p>Work: How Much Energy Does It Take to Do the Job?</p> <p>6.1 Energy is the ability to do work and can be either potential (energy of position) or kinetic (energy of motion).</p> <p>6.2 Potential energy and kinetic energy can be transformed from one to the other, and both can be used to do work.</p>	<p>Elements, Mixtures and Compounds: How Do Materials React With Each Other?</p> <p>7.1 Elements are the simplest form of matter and they can be grouped by their chemical and physical properties.</p> <p>7.2 Mixtures can be made from different combinations of elements and compounds in gases, liquids and solids.</p> <p>7.3 Elements combine to produce compounds which account for the living and nonliving substances that we encounter.</p>	<p>Laws of Motion: How Do They Explain Everyday Phenomena?</p> <p>8.1 An object in motion that is not being subjected to a force will continue to move at a constant speed and in a straight line.</p> <p>8.2 Unbalanced forces cause change in the speed and/or direction of an object’s motion.</p>
Core Life Science	<p>Ecology: How Do Energy and Matter Flow Through Ecosystems?</p> <p>6.3 Energy from sunlight is captured and transformed into chemical energy by green plants to support life in most ecosystems.</p>	<p>The Human Body: How Does It Work?</p> <p>7.4 All organisms are made up of one or more cells that have common structures to maintain life.</p> <p>7.5 Many organisms, including humans, have specialized organ systems that interact with each other to maintain dynamic internal balance.</p>	<p>Life: What Are Its Essential Characteristics?</p> <p>8.3 Life is characterized by continuous transformations of energy and matter.</p> <p>8.4 Reproduction is one of the defining characteristic of life and different organisms have different strategies for reproduction.</p>
Core Earth Science	<p>Weather and Climate: How Does the Sun’s Energy Affect Phenomena on Earth?</p> <p>6.4 Variation in the amount of the sun’s energy hitting the Earth’s surface affects daily and seasonal weather patterns.</p> <p>6.5 Factors such as latitude, topography and proximity to an ocean affect regional climates.</p>	<p>The Earth: Is It Still Changing?</p> <p>7.6 The Earth is layered with a lithosphere, hot mantle and dense metallic core.</p> <p>7.7 The rock cycle and soil formation are evidence that the Earth is continuously changing.</p>	<p>The Solar System: What Forces Govern Its Motion?</p> <p>8.5 The solar system is composed of planets and other objects that orbit the sun in regular and predictable motion.</p> <p>8.6 Gravity is the force that governs the motions of the solar system, attracts objects to the Earth and influences tides.</p>
Science in a Personal and Social Context	<p>How Do We Design Technological Solutions to Problems?</p> <p>8.5 People use scientific principles, creativity and careful analysis to invent technological devices to meet human needs.</p>	<p>Infectious Diseases: Where Do They Come From?</p> <p>7.8 Understanding the transmission of bacterial and viral diseases enables us to prevent, treat and cure many diseases.</p>	<p>Space Explorations: What Do We Gain?</p> <p>8.7 Space explorations provide information about the solar system, the universe and the possibility of life beyond Earth.</p>

HIGH SCHOOL CORE SCIENCE CONTENT STANDARDS

	Main Concepts and Issues	
Core Physical Science	<p style="text-align: center;">ALTERNATIVE ENERGY RESOURCES</p> <p style="text-align: center;">Energy: How Is It Transferred and Transformed?</p> <p>HS1.1 The total matter and energy of the universe is constant. Energy cannot be created or destroyed, but it can be changed from one form to another.</p> <p style="text-align: center;">Radioactivity: What Are Its Uses and Risks?</p> <p>HS1.2 Radioactive elements decay and emit radiation which can be both beneficial and/or hazardous.</p> <p style="text-align: center;">Energy Resources: How Can We Meet Global Energy Needs?</p> <p>HS1.3 Current fuel resources are limited and renewable energy sources should be explored.</p>	<p style="text-align: center;">THE PHYSICS OF MODERN TECHNOLOGIES</p> <p style="text-align: center;">Electromagnetic Spectrum: What Are the Properties of Waves?</p> <p>HSV.1 Waves have energy and can transfer energy when they interact with matter.</p> <p style="text-align: center;">The Stars: Are They Still Evolving?</p> <p>HSV.2 Technology based on the electromagnetic spectrum is used to collect and interpret evidence about the structure of the universe.</p> <p style="text-align: center;">Modern Technologies: How Do They Work?</p> <p>HSV.3 Important modern technologies are designed based on our understanding of the properties of electromagnetic radiation.</p>
Core Life Science	<p style="text-align: center;">CELL CHEMISTRY AND BIOTECHNOLOGY</p> <p style="text-align: center;">Cells: How Do They Carry Out Life Processes?</p> <p>HSIII.1 The fundamental cell processes in plants, animals and bacteria depend on cell structure and chemistry.</p> <p style="text-align: center;">Genetic Code: How Does DNA Provide The Information For Protein Synthesis?</p> <p>HSIII.2 The genetic information in most organisms is carried in DNA molecules, and there are differences among the genomes of different species.</p> <p style="text-align: center;">Biotechnology: How Do We Use It To Improve Life?</p> <p>HSIII.3 Cell chemistry is the basis for purposeful modifications of gene compositions and cell products.</p>	<p style="text-align: center;">ORGANIC AND SYNTHETIC POLYMERS</p> <p style="text-align: center;">Thermal Energy: How Does It Explain the Behavior of Gases, Liquids and Solids?</p> <p>HSIV.1 The atoms and molecules of all matter are perpetually in motion, and changes in their average energy of motion result in changes in the temperature of the matter.</p> <p style="text-align: center;">Carbon: What Makes It the Building Block of Organic and Synthetic Materials?</p> <p>HSIV.2 Carbon atoms can bond to one another in chains, rings and branching networks to form a variety of structures, including synthetic polymers, oils, and the large molecules essential to life.</p> <p style="text-align: center;">Plastics and Fibers: How Are They Made and Used?</p> <p>HSIV.3 Advances in chemistry have personal and societal costs and benefits.</p>
Core Earth Science	<p style="text-align: center;">A BALANCED ENVIRONMENT</p> <p style="text-align: center;">Population Dynamics: What Determines the Size of a Population?</p> <p>HSII.1 Living things have the capacity to produce populations of infinite size, but environments and resources are finite and therefore limit population size.</p> <p style="text-align: center;">Chemical Reactions: How Are New Materials Formed?</p> <p>HSII.2 Atoms react with each other to form molecules, and the configuration of atoms and molecules determines the properties of the new materials.</p> <p style="text-align: center;">The Environment – How Can We Sustain Its Health?</p> <p>HSII.3 The environment becomes degraded due to the increase consumption of natural resources and use of synthetic materials.</p>	<p style="text-align: center;">UNDERSTANDING EVOLUTION</p> <p style="text-align: center;">Genetics and Evolution: What Makes Us What We Are?</p> <p>HSVI.1 Evolution and biodiversity are the result of genetic changes that occur over time in constantly changing environments.</p> <p style="text-align: center;">Earth History: How and What Can We Learn From It?</p> <p>HSVI.2 Interactions among the solid Earth, the oceans, the atmosphere and organisms have resulted in the ongoing evolution of the Earth system.</p> <p style="text-align: center;">Plate Tectonics: What Moves the Continents?</p> <p>HSVI.3 Energy within the Earth creates forces that drive the movement of plates, which results in changes in the Earth's surface.</p>