

6th Grade American Online School

SCIENCE CURRICULUM

Exploration, Systems, and the Essentials of Life

Version May/2025

1. Introduction

The Role of Science Education in 6th Grade

The 6th Grade Science curriculum introduces students to systems thinking, the scientific method, and the interconnectedness of Earth's systems, living organisms, and the universe. Students explore oceanography, energy, matter, space science, and weather through inquiry, research, experimentation, and modeling. Special attention is given to foundational life science themes through a research-based "Essentials of Life" project, and an advanced introduction to chemical reactions is integrated through a discovery-based lens.

By the end of this course, students will:

- ✓ Conduct scientific investigations and develop evidence-based conclusions.
- ✓ Understand energy transformations in physical, chemical, and biological systems.
- ✓ Describe and model Earth's oceans, atmosphere, and climate systems.
- ✓ Explore matter and chemical reactions through observation and modeling.
- ✓ Research and present on essential components of life at the cellular level.
- ✓ Apply systems thinking to natural and planetary phenomena.

2. Core Competence Areas

SCI.1 Oceanography and Earth Systems

Learning Outcomes

By the end of this course, students will be able to:

- ✓ Explain ocean currents, salinity, and ocean floor features.
- ✓ Model how the ocean interacts with weather and climate systems.
- ✓ Analyze the role of oceans in supporting life and regulating Earth's systems.

Competencies

SCI.1.A.1 – Understanding ocean structure and function.

- describe ocean zones, ecosystems, and the role of phytoplankton
- Use topographic maps and simulations to explore ocean features.

SCI.1.A.2 – Connecting oceans to global systems.

- Model ocean currents and their influence on climate.
- Investigate plastic pollution, overfishing, and conservation.

SCI.2 Matter and Chemical Reactions

Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Describe properties of matter and physical changes.
- ✓ Identify signs of chemical reactions and distinguish them from physical changes.
- ✓ Use models to explain the structure of atoms and molecules.

Competencies

SCI.2.A.1 – Exploring properties and states of matter.

- Measure mass, volume, density, and observe phase changes.
- Use particle models to describe solids, liquids, and gases..

SCI.2.A.2 – Observing and explaining chemical change.

- Conduct experiments with safe substances to observe reaction indicators.
 - Explain conservation of mass and energy in chemical processes.
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SCI.3 Energy and Its Transformations

Learning Outcomes

By the end of this unit, students will be able to:

- ✓ **Define energy and explain its different forms.**
- ✓ **Demonstrate how energy moves and changes form in systems.**
- ✓ **Apply concepts of thermal energy, mechanical energy, and conservation.**

Competencies

SCI.3.A.1 – Investigating energy in systems.

- Design simple machines or circuits to demonstrate energy transformations.
- Use thermal sensors or simulations to study heat flow.

SCI.3.A.2 – Understanding conservation and transfer of energy.

- Trace energy through food chains, roller coasters, and engines.
 - Evaluate energy efficiency in natural and human systems.
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SCI.4 Weather, Climate, and Atmosphere

Learning Outcomes

By the end of this unit, students will be able to:

- ✓ **Distinguish between weather and climate.**
- ✓ **Explain atmospheric processes and how they affect weather patterns.**
- ✓ **Use models to predict weather changes and analyze climate data.**

Competencies

SCI.4.A.1 – Exploring Earth’s atmosphere and water cycle.

- Investigate air pressure, humidity, and the water cycle.
- Use digital simulations or weather kits to model cloud formation.

SCI.4.A.2 – Interpreting weather and climate data.

- Use weather maps, satellite images, and real-time data.
 - Compare climate regions and examine climate change impacts.
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SCI.5 Space Science and the Solar System

Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Describe celestial motion and the structure of the solar system.
- ✓ Understand the causes of seasons, eclipses, and moon phases.
- ✓ Explore the possibilities of life and exploration beyond Earth.

Competencies

SCI.5.A.1 – Modeling solar system motion.

- Create models of Earth’s rotation and revolution.
- Track moon phases and simulate eclipses with 3D materials.

SCI.5.A.2 – Exploring planets and space exploration.

- Compare planetary characteristics and technology used in space.
 - Discuss current missions, satellites, and space telescopes.
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SCI.6 Essentials of Life

Learning Outcomes

By the end of this unit, students will be able to:

- ✓ Research what life needs to survive and grow.
- ✓ Describe cell structures and functions.
- ✓ Investigate the role of water, energy, and molecules in living systems.

Competencies

SCI.5.A.1 – Investigating cellular and life-sustaining systems.

- Label plant and animal cell parts and explain their functions.
- Model photosynthesis and respiration in simplified diagrams.

SCI.5.A.2 – Presenting scientific research.

- Conduct a research mini-project on “Essentials of Life.”
- Use digital tools to create and present visual science reports.

3. Assessment and Evaluation

Formative Assessments – Observation and Engagement

- ✓ Lab notebooks and reflection sheets.
- ✓ Concept check-ins and peer quizzes.
- ✓ Exit tickets and “Draw Your Understanding” tasks.

Summative Assessments – Unit Projects and Presentations

- ✓ Weather tracker + climate comparison poster.
- ✓ Planet model and research fact sheet.
- ✓ Capstone: Essentials of Life digital portfolio.

Authentic Assessment – Real-World Integration

- ✓ Sustainability challenge: Local impact analysis.
- ✓ NASA mission proposal for a new planet.
- ✓ Energy-saving plan or home experiment report.

4. Instructional Strategies for Online Learning

Inquiry-Driven and Experiment-Based Learning

- ✓ Use “Claim-Evidence-Reasoning” format to build scientific arguments.
- ✓ Design, test, and revise hypotheses in class labs.

Integrated STEM and Media Use

- ✓ Use virtual labs, climate data platforms, and interactive simulations.
- ✓ Record lab demonstrations, reflections, and science explainers.

Learning Culture

- ✓ Promote curiosity, resilience, and collaborative exploration.
- ✓ Encourage scientific mindset over rote answers.
- ✓ Value creativity and diversity in how students express science understanding.

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