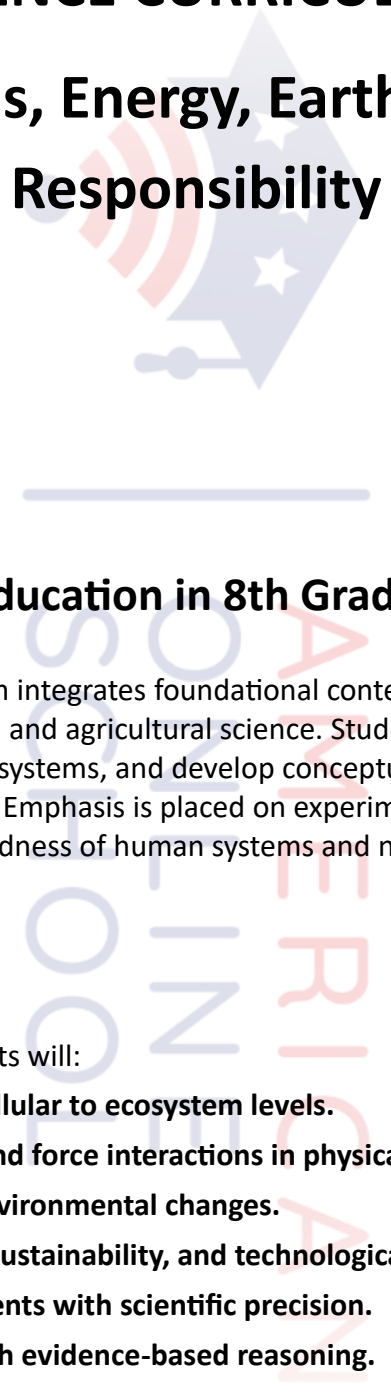


8th Grade American Online School

SCIENCE CURRICULUM

Living Systems, Energy, Earth, and Human Responsibility



Version May/2025

1. Introduction

The Role of Science Education in 8th Grade

The 8th Grade Science curriculum integrates foundational content knowledge across biology, chemistry, physics, earth science, and agricultural science. Students apply scientific inquiry to real-world problems, investigate systems, and develop conceptual models that bridge physical, environmental, and life sciences. Emphasis is placed on experimentation, data analysis, and understanding the interconnectedness of human systems and natural processes.

By the end of this course, students will:

- ✓ **Explain life processes from cellular to ecosystem levels.**
 - ✓ **Understand matter, energy, and force interactions in physical systems.**
 - ✓ **Analyze Earth systems and environmental changes.**
 - ✓ **Apply science to agriculture, sustainability, and technological innovation.**
 - ✓ **Design and evaluate experiments with scientific precision.**
 - ✓ **Communicate findings through evidence-based reasoning.**
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2. Core Competence Areas

SCI.1 Biological Sciences (Life Sciences Strand)

Learning Outcomes

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

- ✓ Understand the structure, function, and interaction of living systems.
- ✓ Model heredity and disease prevention.
- ✓ Analyze ecosystem dynamics and biodiversity.

Competencies

SCI.1.A.1 – Describing the structure and function of plant and animal cells.

SCI.1.A.2 – Explaining interactions among body systems for homeostasis.

SCI.1.A.3 – Simulating disease spread and describing immune responses.

SCI.1.A.4 – Modeling simple genetic inheritance using Punnett squares.

SCI.1.A.5 – Analyzing food webs and biodiversity impacts in ecosystems.

SCI.2 Chemistry (Introductory Strand)

Learning Outcomes

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

- ✓ Distinguish between types and properties of matter.
- ✓ Investigate atomic structure and chemical changes.
- ✓ Understand the periodic classification of elements.

Competencies

SCI.2.A.1 – Classifying solids, liquids, and gases using observable properties.

SCI.2.A.2 – Identifying physical and chemical changes through experimentation.

SCI.2.A.3 – Recognizing atomic structure and labeling atomic particles.

SCI.2.A.4 – Using the Periodic Table to identify groups and element types.

SCI.2.A.5 – Comparing mixtures and compounds through modeling.

SCI.3 Physical Sciences

Learning Outcomes

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

- ✓ Understand energy transformations and motion laws.
- ✓ Analyze heat transfer and mechanical advantage.
- ✓ Explore waves and light behavior.

Competencies

SCI.3.A.1 – Explaining potential and kinetic energy in everyday systems.

SCI.3.A.2 – Applying Newton’s Laws using real-world examples and formulas.

SCI.3.A.3 – Describing conduction, convection, and radiation of heat.

SCI.3.A.4 – Modeling sound and light wave behavior.

SCI.3.A.5 – Calculating mechanical advantage in simple machines.

SCI.4 Natural Sciences (Earth and Environmental Strand)

Learning Outcomes

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

- ✓ Understand Earth systems, cycles, and resources.
- ✓ Analyze weather, climate, and natural processes.
- ✓ Evaluate human impact and sustainability strategies.

Competencies

SCI.4.A.1 – Modeling global atmospheric and oceanic circulation.

SCI.4.A.2 – Describing the stages of the water cycle in various climates.

SCI.4.A.3 – Identifying renewable and non-renewable resources and their uses.

SCI.4.A.4 – Analyzing rock and soil formation through the rock cycle.

SCI.4.A.5 – Evaluating the impact of human activity on Earth systems.

SCI.5 Agricultural Science

Learning Outcomes

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

- ✓ Connect plant science to food production and ecosystems.
- ✓ Analyze sustainable practices and technology in agriculture.
- ✓ Understand interdependence in agricultural systems.

Competencies

SCI.5.A.1 – Testing soil for optimal plant growth conditions.

SCI.5.A.2 – Modeling photosynthesis and linking it to food webs.

SCI.5.A.3 – Investigating sustainable farming techniques.

SCI.5.A.4 – Describing the role of pollinators and ecosystem services.

SCI.5.A.5 – Debating the ethical and ecological implications of agricultural biotechnology.

3. Assessment and Evaluation

Formative Assessments – Monitoring Scientific Growth

- ✓ Lab journals and observation logs.
- ✓ Interactive science notebooks.
- ✓ Concept maps and diagrams.
- ✓ Practice modeling and questioning exercises.

Summative Assessments – Mastery of Scientific Concepts

- ✓ Unit-based written assessments.
- ✓ Group presentations and oral explanations.
- ✓ Research essays on biological or environmental topics.
- ✓ Final system modeling projects.

Authentic Assessment – Real-World Applications

- ✓ Student-designed experiments or citizen science participation.
 - ✓ Science fair or symposium presentations.
 - ✓ Cross-subject research on food systems, climate, or health.
 - ✓ Model-building for complex systems (e.g., ecosystems, energy flow).
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4. Instructional Strategies for Online Learning

Inquiry-Based and Problem-Based Learning

- ✓ Emphasize questioning, discovery, and interdisciplinary challenges.

Project-Based Learning (PBL)

- ✓ Use student-led investigations and collaborative experiments.

Technology-Integrated Learning

- ✓ Use PhET simulations, virtual labs, and data apps.
- ✓ Integrate video analysis and digital graphing tools.
- ✓ Use microscopes, sensors, or spreadsheet modeling.