7th Grade American Online School

SCIENCE CURRICULUM

Exploring Life, Matter, and Earth Systems through Scientific Inquiry

Version May/2025

1. Introduction

The Role of Science Education in 7th Grade

In 7th grade, students explore foundational concepts in life science, physical science, earth systems, and agriculture through hands-on inquiry, experimentation, and systems thinking. This curriculum emphasizes the interdependence of living organisms, the properties of matter and energy, and the scientific methods used to explore and understand our natural world. Students connect scientific learning to real-world challenges such as climate change, biodiversity, food systems, and water sustainability.

By the end of this course, students will:

✓ **Understand and apply the scientific method in diverse investigations.**

✓ **Analyze the structure and function of cells, plants, and ecosystems.**

✓ **Explore properties of matter and energy transformations.**

✓ **Model environmental cycles and human impact on natural systems.**

✓ **Communicate findings using scientific vocabulary and reasoning.**

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2. Core Competence Areas

SCI.1 Scientific Investigation and Research

Learning Outcomes

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

✓ **Pose testable scientific questions and design experiments.**

✓ **Collect, analyze, and interpret data using tools and models.**

✓ **Present conclusions supported by evidence and reflection.**

Competencies

SCI.1.A.1 – Developing experimental design and inquiry skills.

- Design investigations using variables, controls, and replicable procedures.
- Record observations accurately and organize data in tables and graphs.

SCI.1.A.2 – Communicating scientific thinking.

- Write lab reports using claim-evidence-reasoning (CER).
- Present findings through oral, written, or digital formats.

SCI.2 Life Science: Cells, Systems, and Plants

Learning Outcomes

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

✓ **Describe cell structures and their functions.**

✓ **Analyze how body systems interact to maintain life.**

✓ **Explain photosynthesis and plant processes in ecological systems.**

Competencies

SCI.2.A.1 – Understanding cell biology.

- Identify organelles in plant and animal cells and describe their roles.
- Use microscopes to observe cell structure and division.

SCI.2.A. 2– Exploring human body systems.

- Model interactions between circulatory, respiratory, and digestive systems.
- Explain homeostasis using feedback mechanisms.

SCI.2.A.3 – Investigating plant biology and photosynthesis.

- Describe the role of chloroplasts and sunlight in food production.
- Explore plant adaptation and function in ecosystems.

SCI.3 Physical Science : Matter, Energy, and Forces

Learning Outcomes

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

✓ **Differentiate between physical and chemical changes.**

✓ **Explore the structure of matter and atomic theory basics.**

✓ **Analyze forces, motion, and energy transfer.**

Competencies

SCI.3.A.1 – Classifying and analyzing matter.

- Describe states of matter and changes through heat or pressure.
- Use density, mass, and volume to compare substances.

SCI.3.A.2 – Understanding forces and motion.

- Use Newton's Laws to explain motion in systems.
- Construct models that represent force diagrams and energy flow.

SCI.3.A.3 – Exploring energy transformation.

- Identify different forms of energy (thermal, kinetic, potential).
- Analyze energy transfer in systems like food chains or machines.

SCI.4 Earth and Water Systems

Learning Outcomes

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

✓ **Model the water cycle and its role in weather and ecosystems.**

✓ **Analyze the importance of soil, water, and mineral resources.**

✓ **Evaluate human impact on natural systems.**

Competencies

SCI.4.A.1 – Modeling environmental cycles.

- Illustrate evaporation, condensation, and precipitation.
- Track how water moves through natural and built environments.

SCI.4.A.2 – Investigating weather, soil, and resources.

- Interpret weather data and relate it to climate patterns.
- Compare renewable and nonrenewable resource use.

SCI.4.A.3 – Connecting human activity to ecological balance.

- Evaluate pollution, land use, and conservation strategies.
- Propose sustainable practices for local or global contexts.

SCI.5 Agricultural Science and Sustainability

Learning Outcomes

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

✓ **Describe plant needs and the components of healthy soil.**

✓ **Model nutrient cycles and pollination in food systems.**

✓ **Apply principles of sustainable agriculture in practice.**

Competencies

SCI.5.A.1 – Understanding agricultural ecosystems.

- Explore composting, soil testing, and nutrient needs.
- Design controlled experiments to grow plants in different conditions.

SCI.5.A.2 – Modeling interdependence in food production.

- Illustrate how pollinators, microorganisms, and abiotic factors affect growth.
- Study sustainable methods like crop rotation or permaculture.

SCI.5.A.3 – Applying scientific practices in gardening.

- Plan and reflect on a gardening or simulation project.
- Evaluate how agriculture connects to biodiversity and climate resilience.

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3. Assessment and Evaluation

Formative Assessments – Active Engagement in Inquiry

✓ Observation journals and exit slips.
✓ Lab notebooks and hypothesis tracking.
✓ Peer feedback on group investigations.

Summative Assessments – Mastery and Application

✓ Unit tests and concept maps.
✓ Formal lab reports and CER writing tasks.
✓ Multimedia presentations or digital posters.

Authentic Assessment – Real-World Integration

✓ Water quality testing and community proposals.
✓ Sustainable garden plans or food system audits.
✓ Science fair project or simulation presentation.

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4. Instructional Strategies for Online Learning

Inquiry-Based and Phenomena-Driven Learning

✓ **Use real-world questions to drive units: e.g., "What's in our water?".**
✓ **Engage students in prediction, observation, and explanation cycles.**

Project-Based Learning (PBL)

✓ **Home garden or simulated agriculture challenges.**
✓ **Sustainability and environmental data projects.**
✓ **Modeling ecosystems using interactive simulations.**

Technology-Integrated Learning

✓ **Virtual labs and microscope simulations.**
✓ **Digital journals and science blogs.**
✓ **Weather modeling tools and interactive maps.**