

Next Generation Science Standards
Update, Fall, 2011

A joint effort between the National Research Council, the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve is underway to create the foundations for all students to have a solid K-12 science education. Since it has been 15 years since science education standards were last revised at the national level, this effort is proceeding very differently from the CCSS Initiative to develop common K-12 mathematics and English Language Arts (ELA) standards.

Development of the Next Generation Science Standards is progressing in two stages. The final version of the *Framework for K-12 Science Education* was released in July 2011. This 270 page document can be accessed and read online free at: http://www.nap.edu/catalog.php?record_id=13165 I've attached an outline of the *Framework* on the following pages.

The next step in the process is the development of *Next Generation Science Standards* that are faithful to the NRC *Framework*, internationally-benchmarked, and rigorous. The goal of this process is to create excellent K-12 science standards. Michigan is one of 20 "Lead State Partners" in this process. Whether individual states decide to adopt them and whether they become consistent between states will ultimately be up to the states themselves. Below is the general process and timeline for the development of the NGSS.



We will keep you apprised of any new developments in the process.

Summary of the *Framework for K-12 Science Education*, July 2011.

Dimension 1: Scientific and Engineering Practices

1. Asking questions (for science) and defining problems (for engineering)
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics, information and computer technology, and computational thinking
6. Constructing explanations (for science) and designing solutions (for engineering)
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating information

Dimension 2: Crosscutting Concepts

1. *Patterns.*
2. *Cause and effect: Mechanism and explanation.*
3. *Scale, proportion, and quantity.*
4. *Systems and system models.*
5. *Energy and matter: Flows, cycles, and conservation.*
6. *Structure and function.*
7. *Stability and change.*

Dimension 3: Disciplinary Core Ideas: Physical Sciences

Core Idea PS1: Matter and Its Interactions

- PS1.A: Structure and Properties of Matter
- PS1.B: Chemical Reactions
- PS1.C: Nuclear Processes

Core Idea PS2: Motion and Stability: Forces and Interactions

- PS2.A: Forces and Motion
- PS2.B: Types of Interactions
- PS2.C: Stability and Instability in Physical Systems

Core Idea PS3: Energy

- PS3.A: Definitions of Energy
- PS3.B: Conservation of Energy and Energy Transfer
- PS3.C: Relationship Between Energy and Forces
- PS3.D: Energy in Chemical Processes and Everyday Life

Core Idea PS4: Waves and Their Applications in Technologies for Information Transfer

- PS4.A: Wave Properties
- PS4.B: Electromagnetic Radiation
- PS4.C: Information Technologies and Instrumentation.

Dimension 3: Disciplinary Core Ideas: Life Sciences

Core Idea LS1: From Molecules to Organisms: Structures and Processes

LS1.A: Structure and Function

LS1.B: Growth and Development of Organisms

LS1.C: Organization for Matter and Energy Flow in Organisms

LS1.D: Information Processing

Core Idea LS2: Ecosystems: Interactions, Energy, and Dynamics

LS2.A: Interdependent Relationships in Ecosystems

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

LS2.C: Ecosystems Dynamics, Functioning, and Resilience

LS2.D: Social Interactions and Group Behavior

Core Idea LS3: Heredity: Inheritance and Variation of Traits

LS3.A: Inheritance of Traits

LS3.B: Variation of Traits

Core Idea LS4: Biological Evolution: Unity and Diversity

LS4.A: Evidence of Common Ancestry and Diversity

LS4.B: Natural Selection

LS4.C: Adaptation

LS4.D: Biodiversity and Humans

Dimension 3: Disciplinary Core Ideas: Earth and Space Sciences

Core Idea ESS1: Earth's Place in the Universe

ESS1.A: The Universe and Its Stars

ESS1.B: Earth and the Solar System

ESS1.C: The History of Planet Earth

Core Idea ESS2: Earth's Systems

ESS2.A: Earth Materials and Systems

ESS2.B: Plate Tectonics and Large-Scale System Interactions

ESS2.C: The Roles of Water in Earth's Surface Processes

ESS2.D: Weather and Climate

ESS2.E: Biogeology

Core Idea ESS3: Earth and Human Activity

ESS3.A: Natural Resources

ESS3.B: Natural Hazards

ESS3.C: Human Impacts on Earth Systems

ESS3.D: Global Climate Change

Dimension 3: Disciplinary Core Ideas: Engineering and Technology

Core Idea ETS1: Engineering Design

ETS1.A: Defining and Delimiting an Engineering Problem

ETS1.B: Developing Possible Solutions

ETS1.C: Optimizing the Design Solution

Core Idea ETS2: Links Among Engineering, Technology, Science, and Society

ETS2.A: Interdependence of Science, Engineering, and Technology

ETS2.B: Influence of Engineering, Technology and Science on Society and the Natural World