New York State P-12 Science Learning Standards

Phase I:
Raise Awareness - Build Capacity
Spring 2018

Office of Curriculum and Instruction

New York State EDUCATION DEPARTMENT
Knowledge › Skill › Opportunity

Goals

- Share opportunities for educators/students
- *Standards background and development*
- Share information and materials to support standards implementation
- Discuss 2017-2018 implementation outline

Opportunities

- Presidential Award of Excellence in Math and Science Teaching 2017-2018
  - K-6
  - Nomination/self-initiation

  New York State Presidential Award of Excellent Information

  2016-2017 New York State Finalists Announcement

  https://www.paemst.org/

Opportunities

- Request for Proposals (RFP) for the 2018-2019 Title II, Part B - Mathematics and Science Partnership (MSP) Program.
- RFP #GC18-017 is posted on P-12 Grants Administered by NYSED
- **All proposals must be postmarked by Friday, April 6, 2018.**

- Questions relative to this RFP must be sent to EMSCMSP@nysed.gov no later than close of business on **Monday, March 5, 2018**.
- A questions and answers summary will be posted by Friday, March 23, 2018.

New York State P-12 Science Learning Standards

In December 2016, the Board of Regents:

- Approved new State science learning standards, with an initial transition beginning with the 2017-2018 school year.

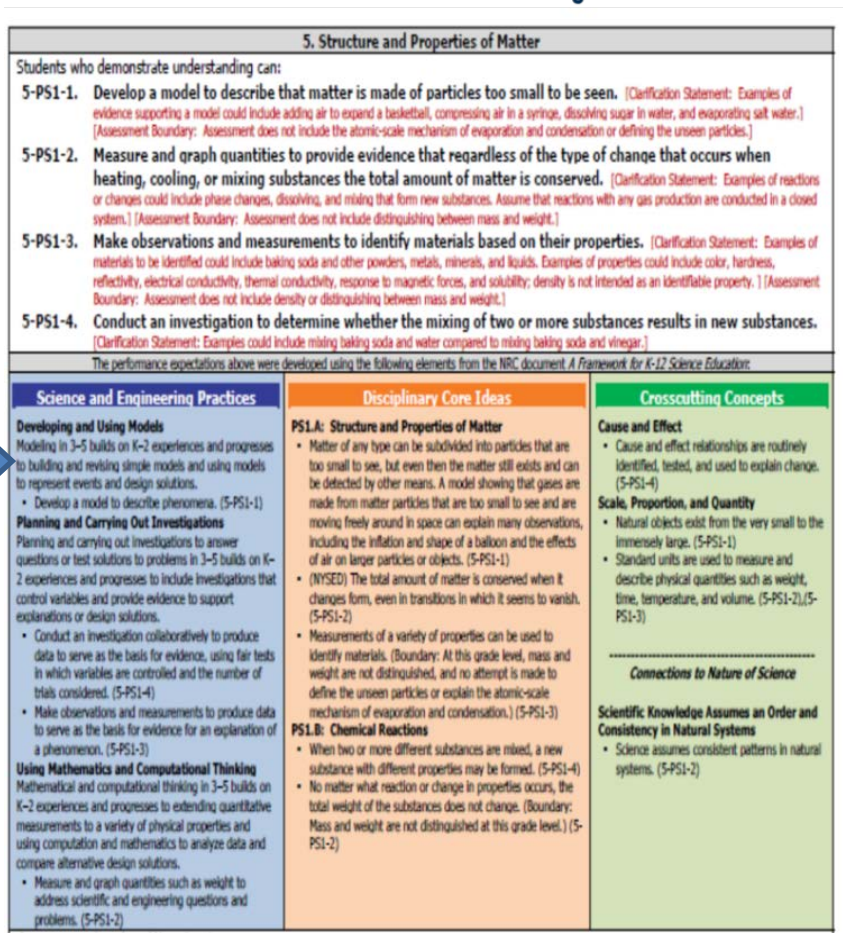
http://www.regents.nysed.gov/common/regents/files/1216p12a1.pdf
http://www.p12.nysed.gov/ciai/mst/sci/documents/p-12-science-learning-standards.pdf

New York State P-12 Science Learning Standards

National Science Education Standards (1996) & Benchmarks for Science Literacy (1993)

A Framework for K-12 Science Education (2012)

Next Generation Science Standards (2013)



New York State P-12 Science Learning Standards

5. Structure and Properties of Matter

Students who demonstrate understanding can:

5-PS1-1. Develop a model to describe that matter is made of particles too small to be seen. [Clarification Statement: Examples of evidence supporting a model could include adding air to expand a basketball, compressing air in a syringe, dissolving sugar in water, and evaporating salt water.] [Assessment Boundary: Assessment does not include the atomic-scale mechanism of evaporation and condensation or defining the unseen particles.]

5-PS1-2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances the total amount of matter is conserved. [Clarification Statement: Examples of reactions or changes could include phase changes, dissolving, and mixing that form new substances. Assume that reactions with any gas production are conducted in a closed system.] [Assessment Boundary: Assessment does not include distinguishing between mass and weight.]

5-PS1-3. Make observations and measurements to identify materials based on their properties. [Clarification Statement: Examples of materials to be identified could include baking soda and other powders, metals, minerals, and liquids. Examples of properties could include color, hardness, reflectivity, electrical conductivity, thermal conductivity, response to magnetic forces, and solubility; density is not intended as an identifiable property.] [Assessment Boundary: Assessment does not include density or distinguishing between mass and weight.]

5-PS1-4. Conduct an investigation to determine whether the mixing of two or more substances results in new substances. [Clarification Statement: Examples could include mixing baking soda and water compared to mixing baking soda and vinegar.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models
Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.
- Develop a model to describe phenomena. (5-PS1-1)

Planning and Carrying Out Investigations
Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions.
- Conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (5-PS1-4)
- Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon. (5-PS1-3)

Using Mathematics and Computational Thinking
Mathematical and computational thinking in 3–5 builds on K–2 experiences and progresses to extending quantitative measurements to a variety of physical properties and using computation and mathematics to analyze data and compare alternative design solutions.
- Measure and graph quantities such as weight to address scientific and engineering questions and problems. (5-PS1-2)

Disciplinary Core Ideas

PS1.A: Structure and Properties of Matter
- Matter of any type can be subdivided into particles that are too small to see, but even then the matter still exists and can be detected by other means. A model showing that gases are made from matter particles that are too small to see and are moving freely around in space can explain many observations, including the inflation and shape of a balloon and the effects of air on larger particles or objects. (5-PS1-1)
- (NYSED) The total amount of matter is conserved when it changes form, even in transitions in which it seems to vanish. (5-PS1-2)
- Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) (5-PS1-3)

PS1.B: Chemical Reactions
- When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)
- No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)

Crosscutting Concepts

Cause and Effect
- Cause and effect relationships are routinely identified, tested, and used to explain change. (5-PS1-4)

Scale, Proportion, and Quantity
- Natural objects exist from the very small to the immensely large. (5-PS1-1)
- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. (5-PS1-2),(5-PS1-3)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems
- Science assumes consistent patterns in natural systems. (5-PS1-2)

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Architecture of the Science Standards

- **Title Box** – Indicates grade level for PreK-5, grade band (6-8, 9-12) for middle school and high school and Topic Area.
- **Performance Expectations Box** – Includes each Performance Expectation for that Grade level/Topic Area and Clarification Statement and/or Assessment Boundary, as appropriate.
- **Foundations Boxes** – Include pertinent Science and Engineering Practices, Disciplinary Core Ideas, and Crosscutting Concepts to further define the Performance Expectations.
- **Connections Boxes** - Include connections to other Disciplinary Core Ideas within the same grade level, articulations of Disciplinary Core Ideas across grade levels, and will include updated connections to revised state learning standards in Mathematics and English Language Arts & Literacy when adopted.

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New York State P-12 Science Learning Standards

Initial Transition Curriculum & Instruction

- Coherent professional development opportunities are vital.
- Continued collaboration among science education stakeholders will ensure building awareness and capacity of teachers and leaders of science at the local, regional, and state levels.
- Continued focus of science education stakeholders on the critical components of the Statewide Strategic Plan for Science will enhance opportunities for student achievement of the new NYS P-12 Science Learning Standards.

New York State P-12 Science Learning Standards

New York State Statewide Strategic Plan for Science:

A plan that aligns to the mission, vision and six key components of the *Statewide Strategic Plan for Science* *across 3 phases;*

http://www.p12.nysed.gov/ciai/mst/sci/strplan.html

- Standards, Curriculum, Professional Development to Enhance Instruction, Assessment, Materials & Resource Support, Administration and Community Support

New York State P-12 Science Learning Standards

Proposed Phases of Implementation:

- **Three Phases**
  Phase I - Initial Transition
  Raise Awareness and Build Capacity
  Phase II -Transition and Implementation
  Phase III - Implementation and Sustainability

- Each phase is aligned to specific goals, objectives, and activities included in the six key components areas of the *Statewide Strategic Plan for Science at* three distinct levels; state, regional and local levels.

More information and periodic updates can be found on the Department's website at

http://www.p12.nysed.gov/ciai/mst/sci/nyssls.html

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Standards Introduction

- Context
- Diverse learner populations
  - English Language Learners/Multilanguage Learners
  - Students with Disabilities
- Organization
- Connecting to Performance Expectations

http://www.p12.nysed.gov/ciai/mst/sci/NYS_Science_Intro.pdf

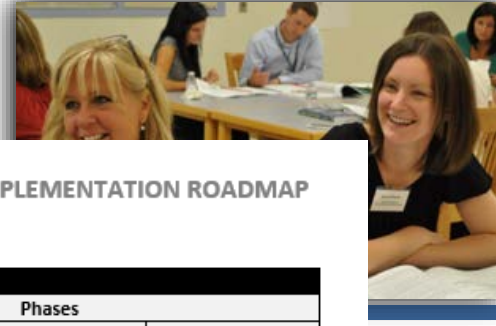
New York State Science Education Networks

- Identifies major assets that can support teaching and learning initiatives in science.
- Builds on the educational infrastructure at the state, regional and local levels.
- Designed to facilitate collaborations and partnerships to meet regional and local needs/desires for science standard implementation.

http://www.p12.nysed.gov/ciai/mst/Ecosystem2-27-18.pptx

Roadmap

- Guidance document that pinpoints goals, objectives and activities aligned with three phases to address a systematic and systemic transition to new standards based on the Statewide Strategic Plan for Science.



NEW YORK STATE P-12 SCIENCE LEARNING STANDARDS				
		Phases		
		I	II	III
Goals/Objectives	Key Implementation Activities	Raise Awareness and Build Capacity	Transition and Implementation	Implementation and Sustainability
B. Curriculum Goal: Provide opportunities that are reflective of research and best practices for P-12 students to engage with scientific phenomena through implementation of innovative science curriculum programming that fosters learning, deep understanding, and application of core science content, conceptual understandings, and practices.				
B1. Objective: Survey current research pertaining to teaching and learning in science, science education, and cognitive science to develop relevant curriculum guidance and resources.	B1a.Explore, identify, and provide access to pertinent research.	✓		
	B1b.Align and incorporate relevant connections to engineering, technology, New York State Next Generation Mathematics Learning Standards (2017), and New York State Next Generation English Language Arts Learning Standards (Revised 2017).	✓		
	B1c.Provide funding opportunities for equitable development and/or adoption of exemplary science curriculum programming.	✓	✓	
	B1d.Develop articulated P-12 guidance to support curriculum development and implementation aligned to the new P-12 NYS science learning standards.	✓	✓	
	B1e.Provide funding opportunities for equitable implementation and evaluation of exemplary science curriculum programming at the regional and local levels.			✓
	B1f.Review and update curriculum guidance and resources to be reflective of changes in instructional technology, content, and best educational practices, emphasizing active engagement in STEM.			✓
B2. Objective: Build the capacity of regional centers and local school districts to implement curriculum and instructional programs that are based on the new P-12 NYS science learning standards.	B2a.Engage education stakeholders with expertise in various disciplines to support local and regional development, dissemination, and implementation of curriculum based on the new P-12 NYS science learning standards.	✓	✓	
	B2b.Leverage funding opportunities for partnerships and collaborations of science education stakeholders for the development, dissemination, and implementation of local and regional curriculum programming.	✓	✓	
	B2c.Support the implementation of exemplary, data-informed science curriculum programming and instructional materials, using cross-curricular connections from engineering, technology New York State Next Generation Mathematics Learning Standards (2017), and New York State Next Generation English Language Arts Learning Standards (Revised 2017) that strengthen, support, and reinforce the development of scientific literacy.		✓	
	B2d.Create opportunities that bring students into contact with working scientists, mathematicians, and engineers through innovative curriculum design, internships, and mentorships with institutes of higher education and/or business and industry partners.			✓
B3. Objective: Incorporate the use of technology to expand the development, dissemination, and implementation of curriculum and instructional resources to broaden accessibility.	B3a.Leverage existing and seek new funding sources to support the use of technology to develop, disseminate, and implement science curriculum and instructional resources through various delivery platforms.			✓
	B3b.Utilize multiple platforms to access exemplary curriculum and instructional resources.			✓
	B3c.Build student resources by establishing community-based programs that provide relevant STEM applications in science curriculum and instructional programs.			✓

Return to overview

Influencing Factors

- ESSA
  - http://www.p12.nysed.gov/accountability/essa.html
  - https://www.achieve.org/science-and-stem-in-essa

New York State P-12 Science Learning Standards

Assessment System Transition

- New local and state-level assessments will need to be developed to measure the learning expectations included in the new standards.
- New local and state-level assessments should focus on evaluating student achievement of three-dimensional learning – Science and Engineering Practices, Crosscutting Concepts, and Disciplinary Core Ideas.
- Proposed State Assessments:
  - Grade 5
  - Grade 8
  - High School Regents examinations in life-science/biology, chemistry, Earth and space science, and physics

New York State P-12 Science Learning Standards

Timeframe	Phase I - Initial Transition
2017-2018 School Year	Engage relevant stakeholder groups to help outline a transition strategy for the new NYS P-12 Science Learning Standards in alignment with the Statewide Strategic Plan for Science to the New York State P-12 Science Learning Standards Implementation Roadmap.
	Phase I: Raise Awareness, Build Capacity of new NYS P-12 Science Learning Standards; Collaborate with relevant stakeholder groups to build awareness of the new NYS P-12 Science Learning Standards across the state. Develop and propose assessment frameworks for State assessments in science

New York State P-12 Science Learning Standards

MOVING FORWARD

- Continue to collaborate with science education stakeholders during the transition to new NYS P-12 Science Learning Standards to develop the NYS Comprehensive Science Standards Systems Implementation Plan;
- Continue to identify STEM assets and Initiatives across the State to build a Statewide Science Education Ecosystem Network;
- Target specific State and federal funding sources to signal fiscal resources to support statewide, regional and local initiatives, as well as seek possible grant opportunities to support the implementation of the Statewide Strategic Plan for Science;
- Strive to maintain fidelity with the Statewide Strategic Plan for Science throughout the transition period.

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