



Solvay Schools Science Department Update 2017-2018



Current Programming

K-4 BOCES Science Kits/ Smithsonian Units
(13 teachers have been in a grant pilot program for the Units)

5-8 Locally Developed Curriculum Aligned to Intermediate Level
Science Core Curriculum Standards
(Also Grade 5 - New Smithsonian Unit)

9th Grade – Living Environment

10th Grade – Earth Science

11th Grade - Chemistry

12th Grade - College Physics

Additional Courses

8th Grade

Accelerated Living Environment

High School

Food Science

Physical Science

ESF Chemistry – for Accelerated Students

Physics 103/104 – OCC Physics (8 credit hours)

Everyday Physics & Engineering Physics

ESF Biology 103/104 – College Biology (8 credit hours)

ESF 120 – Global Environment (3 credit hours)

Assessment Structure

4th Grade Elementary Level Science
Assessment (Since 2000)**

**Proposed move to 5th grade in
year 2022

8th Grade Intermediate Level
Science Assessment (Since 2000)

Assessment Structure Cont'd

Living Environment Regents Examination (9)

Earth Science Regents Examination (10)

Chemistry Regents Examination (11)

Local Finals

College Finals

Changes ahead

New York State adopted the New York State Science Learning Standards (NYSSLS) in December 2016
(Modeled after NGSS)

The NYSSLS emphasize a fundamental shift in instruction:

from content-driven instruction

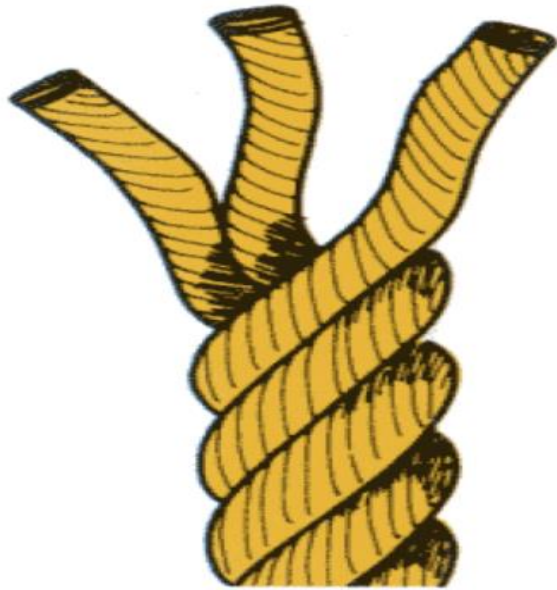
to

process-driven instruction

where students work in small groups to investigate phenomenon, develop explanations, and engage in classroom discourse and science and engineering practices

Focus: Three-Dimensional Learning

Practices Crosscutting Concepts Core Ideas



Blending of Three Dimensions

- Science and engineering practices
- Crosscutting concepts
- Disciplinary core ideas

Dimension 1: Science and Engineering Practices

1. Ask questions (for science) and define problems (for engineering)
2. Develop and use models
3. Plan and carry out investigations
4. Analyze and interpret data
5. Use mathematics and computational thinking
6. Construct explanations (for science) and design solutions (for engineering)
7. Engage in argument from evidence
8. Obtain, evaluate, and communicate information

Dimension 2: Crosscutting Concepts

1. Patterns
2. Cause and effect
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter
6. Structure and function
7. Stability and change

Dimension 3: Disciplinary Core Ideas

Physical Sciences

PS 1: Matter and its interactions

PS 2: Motion and stability: Forces and interactions

PS 3: Energy

PS 4: Waves and their applications in technologies for information transfer

Life Sciences

LS 1: From molecules to organisms: Structures and processes

LS 2: Ecosystems: Interactions, energy, and dynamics

LS 3: Heredity: Inheritance and variation of traits

LS 4: Biological Evolution: unity and diversity

Earth and Space Sciences

ESS 1: Earth's place in the universe

ESS 2: Earth's systems

ESS 3: Earth and human activity

Engineering, Technology, and the Applications of Science

ETS 1: Engineering design

ETS 2: Links among engineering, technology, science, and society

2.Earth's Systems: Processes that Shape the Earth

2.Earth's Systems: Processes that Shape the Earth

Students who demonstrate understanding can:

2-ESS1-1. Use information from several sources to provide evidence that Earth events can occur quickly or slowly.

[Clarification Statement: Examples of events and timescales could include volcanic explosions and earthquakes, which happen quickly and erosion of rocks, which occurs slowly.] [Assessment Boundary: Assessment does not include quantitative measurements of timescales.]

2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*

[Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]

2-ESS2-2. Develop a model to represent the shapes and kinds of land and bodies of water in an area. [Assessment Boundary:

Assessment does not include quantitative scaling in models.]

2-ESS2-3. Obtain information to identify where water is found on Earth and that it can be solid or liquid.

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 K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a model to represent patterns in the natural world. (2-ESS2-2)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations from several sources to construct an evidence-based account for natural phenomena. (2-ESS1-1)
- Compare multiple solutions to a problem. (2-ESS2-1)

Obtaining, Evaluating, and Communicating Information

Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question. (2-ESS2-3)

Disciplinary Core Ideas

ESS1.C: The History of Planet Earth

- Some events happen very quickly; others occur very slowly, over a time period much longer than one can observe. (2-ESS1-1)

ESS2.A: Earth Materials and Systems

- Wind and water can change the shape of the land. (2-ESS2-1)

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

- Maps show where things are located. One can map the shapes and kinds of land and water in any area. (2-ESS2-2)

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

- Water is found in the ocean, rivers, lakes, and ponds. Water exists as solid ice and in liquid form. (2-ESS2-3)

ETS1.C: Optimizing the Design Solution

- Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary to 2-ESS2-1)

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed. (2-ESS2-2),(2-ESS2-3)

Stability and Change

- Things may change slowly or rapidly. (2-ESS1-1),(2-ESS2-1)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Developing and using technology has impacts on the natural world. (2-ESS2-1)

Connections to Nature of Science

Science Addresses Questions About the Natural and Material World

- Scientists study the natural and material world. (2-ESS2-1)

Connections to other DCIs in second grade: **2.PS1.A** (2-ESS2-3)

Articulation of DCIs across grade-levels: **K.ETS1.A** (2-ESS2-1); **3.LS2.C** (2-ESS1-1); **4.ESS1.C** (2-ESS1-1); **4.ESS2.A** (2-ESS1-1),(2-ESS2-1); **4.ESS2.B** (2-ESS2-2); **4.ETS1.A** (2-ESS2-1); **4.ETS1.B** (2-ESS2-1); **4.ETS1.C** (2-ESS2-1); **5.ESS2.A** (2-ESS2-1); **5.ESS2.C** (2-ESS2-2),(2-ESS2-3)

Common Core State Standards Connections:

ELA/Literacy –

- RI.2.1** Ask and answer such questions as *who, what, where, when, why, and how* to demonstrate understanding of key details in a text. (2-ESS1-1)
- RI.2.3** Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text. (2-ESS1-1),(2-ESS2-1)
- RI.2.9** Compare and contrast the most important points presented by two texts on the same topic. (2-ESS2-1)
- W.2.6** With guidance and support from adults, use a variety of digital tools to produce and publish writing, including in collaboration with peers. (2-ESS1-1),(2-ESS2-3)
- W.2.7** Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-ESS1-1)
- W.2.8** Recall information from experiences or gather information from provided sources to answer a question. (2-ESS1-1),(2-ESS2-3)
- SL.2.2** Recount or describe key ideas or details from a text read aloud or information presented orally or through other media. (2-ESS1-1)
- SL.2.5** Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. (2-ESS2-2)

Mathematics –

- MP.2** Reason abstractly and quantitatively. (2-ESS2-1),(2-ESS2-1),(2-ESS2-2)
- MP.4** Model with mathematics. (2-ESS1-1),(2-ESS2-1),(2-ESS2-2)
- MP.5** Use appropriate tools strategically. (2-ESS2-1)
- 2.NBT.A** Understand place value. (2-ESS1-1)
- 2.NBT.A.3** Read and write numbers to 1000 using base-ten numerals, number names, and expanded form. (2-ESS2-2)
- 2.MD.B.5** Use addition and subtraction within 100 to solve word problems involving lengths that are given in the same units, e.g., by using drawings (such as drawings of rulers) and equations with a symbol for the unknown number to represent the problem. (2-ESS2-1)

Performance Expectations

Foundation Boxes

Connection Boxes

Changes ahead (Cont'd)

- BOCES has partnered with the Smithsonian Institution to produce Science Units aligned to the NYSSLS
- Elementary Program will gradually phase in new Smithsonian Science Units for a total of 4 per grade level
- BOCES offers 2-day training programs on the new Smithsonian Units as the units become available

2018-2019 BOCES Science Kits & Smithsonian Units Schedule

Solvay

Grade	# classes served WinCap Code	Rotation	Start Date	Return Date	2018-2019 Unit Selections
K	5 593.010.001	D	9/3/18	11/12/18	Exploring My Weather*
			11/26/18	2/4/19	Exploring Plants and Animals**
			2/11/19	4/19/19	Waterplay
			4/29/19	6/21/19	Characteristics of Animals
1	5 593.010.001	D	9/3/18	11/12/18	How Can We Send a Message Using Sound?*
			11/26/18	2/4/19	Astronomy Gr 1
			2/11/19	4/19/19	Properties
			4/29/19	6/21/19	Organisms
2	4 593.010.001	D	9/3/18	11/12/18	How Can We Stop Soil From Washing Away?*
			11/26/18	2/4/19	Magnets
			2/11/19	4/19/19	Bats
			4/29/19	6/21/19	Plants
3	4 593.010.001	D	9/3/18	11/12/18	Buoyancy
			11/26/18	2/4/19	Sound
			2/11/19	4/19/19	How Can We Protect Animals When Their Habitat Changes?*
			4/29/19	6/21/19	Motion
4	3 593.010.001	D	9/3/18	11/12/18	How Can We Provide Energy to People's Homes?*
			11/26/18	2/4/19	Astronomy Gr 4
			2/11/19	4/19/19	Simple Machines
			4/29/19	6/21/19	Plant Life Cycles
5	2 593.010.012	D	9/3/18	11/12/18	How Can We Provide Freshwater to Those in Need?*
			4/29/19	6/21/19	What Happens When Materials Are Mixed?*

*Indicates Smithsonian Science for the Classroom unit

**Indicates new Smithsonian Science for the Classroom unit for 18-19 school year

Recently Released NYS P-12 Science Learning Standards Roadmap

Phases of implementation/PROPOSED Timeframes:

Phase I: Raise Awareness and Build Capacity 07/2017-08/2019

Phase II: Transition and Implementation 09/2019-08/2021

Phase III: Implementation and Sustainability 09/2021-08/2024

Earliest Proposed Date for New Grades 5 & 8 Assessments and High School Regents Exams: 2021-2022

Future Considerations

- Summer Curriculum Work for Grades 6-12
- Professional Development (K-12)
- Budgeting for Smithsonian Units for K-5
- Allotting sufficient class time for science instruction in K-5
- Supplies/Materials needs for changing curriculum