Public Schools of Edison Township
Division of Curriculum & Instruction

Executive Summary
Curriculum Guide Development/Revision

Title: Science
Length of Course: School Year
Elective/Required: Required
Schools: Elementary Schools
Student Eligibility: K-5
Credits: N/A

In July 2011, the National Research Council (NRC) of the National Academy of Sciences developed *A Framework for K-12 Science Education*. This guidance provides a sound, evidence-based foundation for standards by drawing on current scientific research - including research on the methods in which students learn science effectively - and identifies the science all students in grade K-12 should know.

This Framework was composed based on a set of core principles that:

- Reaffirm children are born investigators;
- Recognize understanding builds over time;
- Assert science & engineering require both knowledge and practice;
- Acknowledge a connection to students’ interests and experiences is essential;
- Focus on core ideas and practices; and
- Promote equity.

The NRC’s Framework describes a vision of what it means to be proficient in science; it rests on a view of science as both a body of knowledge and an evidence-based, model and theory building enterprise that continually extends, refines, and revises understanding. It presents three dimensions that will be combined to form each standard:

**Dimension 1: Practices**

Practices describe behaviors that scientists engage in as they investigate and build models and theories about the natural world. They also include the key set of engineering practices that engineers use as they design and build models and systems. The NRC uses the term “practices” instead of a term like “skills” to emphasize that engaging in scientific investigation requires not only skill but also knowledge that is specific to each practice. Part of the NRC’s intent is to better explain and extend what is meant by “inquiry” in science and the range of cognitive, social, and physical practices that it requires.
Although engineering design is similar to scientific inquiry, there are significant differences. For example, scientific inquiry involves the formulation of a question that can be answered through an investigation, while engineering design involves the formulation of a problem that can be solved through design. Emphasizing the engineering aspects of the Next Generation Science Standards will clarify for students the relevance of science, technology, engineering, and mathematics to everyday life.

**Dimension 2: CrossCutting Concepts**

The CrossCutting Concepts have application across all domains of science and, as such, are a way of linking different domains together. They include:

- Patterns, similarity, and diversity;
- Cause and effect;
- Scale, proportion, and quantity;
- Systems and system models;
- Energy and matter;
- Structure and function; and
- Stability and change.

The Framework emphasizes that these concepts need to be made explicit for students because they provide an organizational schema for inter-relating knowledge from various science fields into a coherent and scientifically-based view of the world.

**Dimension 3: Disciplinary Core Ideas**

Disciplinary Core Ideas have the power to focus K-12 science curriculum, instruction, and assessment on the most important aspects of science. To be considered core, the ideas meet at least two of the following criteria (and, ideally, all four):

- Have broad importance across multiple sciences or engineering disciplines, or be a key organizing concept of a single discipline;
- Provide a key tool for understanding or investigating more complex ideas and solving problems;
- Relate to the interests and life experiences of students or be connected to societal or personal concerns that require scientific or technological knowledge; and/or
- Be teachable and learnable over multiple grades at increasing levels of depth and sophistication.

Disciplinary Core Ideas are grouped in four domains: the physical sciences, the life sciences, the earth and space sciences; and engineering, technology, and applications of science.

The NRC’s Framework serves as the foundation of the Next Generation Science Standards (NGSS), a set of internationally-benchmarked science learning outcomes published in April 2013. NGSS proposes shifts in the teaching and learning of science to augment student engagement and strengthen connections between science, technology, engineering, and mathematics. Developed collaboratively with states and other stakeholders in science, science education, higher education, and industry, the NGSS present standards that are rich in content and practice and arranged in a coherent manner across disciplines and grades to prepare students for college and careers.

Our current K-5 Science instructional program reflects the learning and performance expectations found in the Next Generation Science Standards. The NGSS, adopted by the New Jersey State Board of Education in 2014, were officially renamed as the New Jersey Student Learning Standards for Science (NJSLS-S) in 2016.
The district’s curriculum is strategically designed to help students foster an understanding of the four domains of science from kindergarten through fifth grade.

In earlier grades, students begin by recognizing patterns and formulating answers to questions about the world around them. By the end of fifth grade, students are able to demonstrate grade-appropriate proficiency in gathering, describing, and using information about the natural and designed world(s).

The performance expectations in elementary school grade bands develop ideas and skills over time that will allow students to explain more complex phenomena in the four disciplines as they progress to middle and high school. While the performance expectations shown in kindergarten through fifth grade couple particular practices with specific Disciplinary Core Ideas, informed instructional decisions based on formative and summative assessment should be made by the teacher to ensure understanding of the many science and engineering practices that lead to the performance expectations.

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Kindergarten Science Curricular Overview

The performance expectations in kindergarten help students formulate answers to questions such as:

- What happens if you push or pull an object harder?
- Where do animals live and why do they live there?
- What is the weather like today and how is it different from yesterday?

Kindergarten performance expectations include PS2, PS3, LS1, ESS2, ESS3, and ETS1 Disciplinary Core Ideas from the National Research Council Framework.

Earth and Space Science:

- Students are expected to develop understanding of patterns and variations in local weather and the purpose of weather forecasting to prepare for, and respond to, severe weather.

Physical Science:

- Students are able to apply an understanding of the effects of different strengths or different directions of pushes and pulls on the motion of an object to analyze a design solution.

Life Science:

- Students are also expected to develop understanding of what plants and animals (including humans) need to survive and the relationship between their needs and where they live.

Crosscutting Concepts: The crosscutting concepts of patterns; cause and effect; systems and system models; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world are called out as organizing concepts for these Disciplinary Core Ideas.

Science & Engineering Practices: In the kindergarten performance expectations, students are expected to demonstrate grade-appropriate proficiency in:

- Asking questions;
- Developing and using models;
- Planning and carrying out investigations;
- Analyzing and interpreting data;
- Designing solutions;
- Engaging in argument from evidence; and
- Obtaining, evaluating, and communicating information.

Students are expected to use these practices to demonstrate understanding of the core ideas.

In Kindergarten, Science will be embedded within both ELA and Mathematics. Teachers should consult the Kindergarten ELA curriculum for integration recommendations to target the Disciplinary Core Ideas presented in NJSLS-Science/NGSS through literature. Mathematics integration may occur during calendar math to establish patterns in weather, for example. Teachers may leverage hands-on experiences that target the DCIs in Kindergarten to foster deeper understanding and employ the Science & Engineering Practices.

Please click HERE to view the NJSLS-Science / NGSS for Kindergarten.