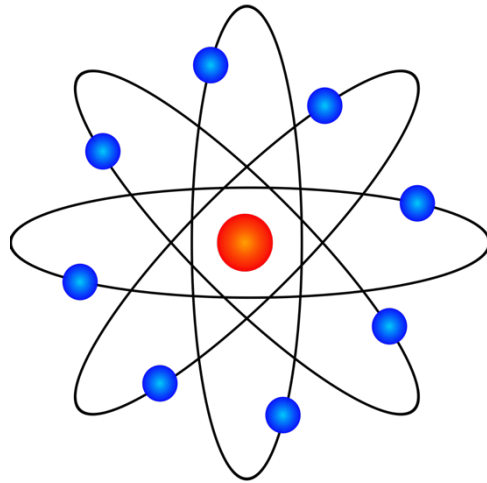




Fairbanks North Star Borough School District

# K-12 SCIENCE CURRICULUM



## INTRODUCTION

**FINAL DRAFT: MARCH 2, 2016**

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## **ADDITIONAL RECOGNITION**

We would also like to recognize the Board Curriculum Advisory Committee, the Fairbanks North Star Borough Board of Education and the many teachers, administrators, parents, and community members who have so willingly given of their time and expertise in the planning and revision process of this document.

# PHILOSOPHY & MISSION STATEMENTS

## PHILOSOPHY

Science is a process of seeking to understand the natural world. This process includes skills in observing, questioning, problem-solving, and logical reasoning through the collection, interpretation and communication of data. Science by its nature is interdisciplinary, requiring the integration of mathematics, language, and interpersonal skills.

Science, engineering, and technology permeate nearly every facet of modern life, and they also hold the key to meeting many of humanity's most pressing current and future challenges. Yet too few U.S. workers have strong backgrounds in these fields, and many people lack even fundamental knowledge of them. Recognizing this national trend has created a widespread call for a new approach to K-12 science education in the United States which is reflected in this revised curriculum document. (*A Framework for K-12 Science Education Practices*, 2012; [www.nextgenscience.org/framework-k-12-science-education](http://www.nextgenscience.org/framework-k-12-science-education))

The overarching goal of the national framework for K-12 science education is to ensure that by the end of 12<sup>th</sup> grade, all students have some appreciation of the beauty and wonder of science; possess sufficient knowledge of science and engineering to engage in public discussions on related issues; are careful consumers of scientific and technological information related to their everyday lives; are able to continue to learn about science outside school; and have the skills to enter careers of their choice, including (but not limited to) careers in science, engineering, and technology. (*A Framework for K-12 Science Education Practices*, 2012)

## MISSION

The Fairbanks North Star Borough School District (FNSBSD) fully support students' meaningful learning in science and engineering. Using nationally adopted criteria, the FNSBSD will provide a coherent and consistent approach throughout grades K-12. Students will, over multiple years of school, actively engage in science and engineering practices and apply crosscutting concepts to deepen their understanding of each field's disciplinary core ideas.

# EXPLANATION OF TERMS

## **Next Generation of Science Standards (NGSS)**

Through a collaborative state-led process, new K-12 science standards have been developed that are rich in content and practice and arranged on a coherent manner across disciplines and grades to provide all students an internationally benchmarked science education. The NGSS are based on the *Framework for K-12 Science Education* developed by the National Research Council.

[www.nextgenscience.org/next-generation-science-standards](http://www.nextgenscience.org/next-generation-science-standards)

## **Alaska Content & Performance Standards (GLEs)** (Revised March, 2006)

Standards adopted by the State Board of Education for what students should be learning in core subject areas. These standards are general statements of what Alaskans want students to know and be able to do as a result of their public school experience.

<https://education.alaska.gov/akstandards/standards/>

## **Alaska Cultural Standards**

Standards endorsed by the State Board of Education that serve to encourage enrichment of the content standards. They are used as a guide to ensure that schools are aware of and sensitive to their surrounding physical and cultural environments.

<https://education.alaska.gov/akstandards/#c3gtabs-cultural>

## **Benchmark**

A point of reference against which individuals are compared and evaluated. In relation to the Alaska Performance Standards, a benchmark identifies a level of expected achievement and is measured at the end of the 3<sup>rd</sup>, 6<sup>th</sup>, and 8<sup>th</sup> grades (benchmark exam). The high school benchmark equivalent, called the College & Career Readiness Assessment, is also required of students before they can receive a high school diploma.

## **Performance Objectives**

Statements that document specific, essential tasks students are expected to accomplish in a given grade level or course.

## **Ongoing Learner Goals**

Objectives that are consistently reinforced. Mastery is not assigned to a specific grade level or course.

## **Readiness Standards**

Expected indicators of student readiness for entering each grade level.

## **Guaranteed and Viable Curriculum (GVC)**

A guaranteed and viable curriculum is one that guarantees equal opportunity for learning for all students. Similarly, it guarantees adequate time for teachers to teach content and for students to learn it. A guaranteed and viable curriculum is one that ensures that the curriculum being taught is the curriculum being assessed. It is viable when adequate time is ensured to teach all determined essential content.

# NEXT GENERATION SCIENCE STANDARDS

The *Next Generation Science Standards* (NGSS) identifies eight science and engineering practices that mirror the practices of professional scientists and engineers. Use of the practices in the performance expectations is not only intended to strengthen students' skills in these practices but also to develop students' understanding of the nature of science and engineering. Listed below are the science and engineering practices.

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

The *Practices* do not specify grade-band endpoints for the Scientific and Engineering Practices, but instead provides a summary of what students should know by the end of grade twelve and a hypothetical progression for each. The NGSS uses constructed grade-band endpoints for the science and engineering practices that are based on these hypothetical progressions and twelfth-grade endpoints. These representations of the science and engineering practices appear in the NGSS and supporting foundation boxes.

A complete listing of the specific science and engineering practices used in the NGSS is shown in the document. <http://www.nextgenscience.org/get-to-know>

Practices in Mathematics, Science, and English Language Arts*		
Math	Science	English Language Arts
<b>M1.</b> Make sense of problems and persevere in solving them.	<b>S1.</b> Asking questions (for science) and defining problems (for engineering).	<b>E1.</b> They demonstrate independence.
<b>M2.</b> Reason abstractly and quantitatively.	<b>S2.</b> Developing and using models.	<b>E2.</b> They build strong content knowledge.
<b>M3.</b> Construct viable arguments and critique the reasoning of others.	<b>S3.</b> Planning and carrying out investigations.	<b>E3.</b> They respond to the varying demands of audience, task, purpose, and discipline.
<b>M4.</b> Model with mathematics.	<b>S4.</b> Analyzing and interpreting data.	<b>E4.</b> They comprehend as well as critique.
<b>M5.</b> Use appropriate tools strategically.	<b>S5.</b> Using mathematics, information and computer technology, and computational thinking.	<b>E5.</b> They value evidence.
<b>M6.</b> Attend to precision.	<b>S6.</b> Constructing explanations (for science) and designing solutions (for engineering).	<b>E6.</b> They use technology and digital media strategically and capably.
<b>M7.</b> Look for and make use of structure.	<b>S7.</b> Engaging in argument from evidence.	<b>E7.</b> They come to understanding other perspectives and cultures.
<b>M8.</b> Look for and express regularity in repeated reasoning.	<b>S8.</b> Obtaining, evaluating, and communicating information.	

\* The Common Core English Language Arts uses the term "student capacities" rather than the term "practices" used in Common Core Mathematics and the Next Generation Science Standards.

**NGSS@NSTA**  
STEM STARTS HERE