

# Preparing Students for a Lifetime of Success

Understanding New  
Science Standards  
for Grades K-12

## How will we prepare students for academic success?

Utah has adopted new K-12 standards based on the latest research in *A Framework for K-12 Science Education* because we understand that a robust science education will increase student critical thinking and pave the way for increased opportunities in high school, college, and future careers.

The **Utah Science with Engineering Education (SEEd) Standards** enable our teachers to offer all students interactive science instruction that promotes analysis and interpretation of data, critical thinking, problem solving, and connections across science disciplines—with a high set of expectations for achievement in grades K-12.

**A quality science education can help expand opportunities for all our students.**

These science standards complement our English/Language Arts and mathematics standards, enabling classroom instruction to reflect a clearer picture of the real world, where solving problems often requires skills and knowledge from multiple disciplines. Further, these standards are designed to benefit and engage all students, whether they currently lack access to a quality science education or already excel in science subjects.



## What is our vision for science education?

Utah's standards reflect the latest research and advances in modern science. In order to equip students to think critically, analyze information, and solve complex problems, the standards are arranged such that once fully created and implemented for all grades, students have multiple opportunities to build on the knowledge and skills gained during each grade, by revisiting important concepts and expanding their understanding of connections across scientific domains. This document will help parents understand that while some content might be similar to the past, it may look different from how it was taught.

**As the current science standards are implemented in schools and districts, they will enable students to:**

- Develop a deeper understanding of science beyond memorizing facts.
- Experience similar scientific and engineering practices as those used by professionals in the field.



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## How will students learn science in the classroom?

Each year, students in Utah will have experiences that will lead them to demonstrate greater capacity for connecting knowledge across, and between, the physical sciences, life sciences, earth and space sciences, and engineering design.

During grades K–12, your child will begin to form deep connections between concepts learned in previous grades, such as collecting evidence and drawing conclusions, understanding relationships between objects, and critical thinking that leads to designing effective solutions for problems.

### While in science classes your child will gain a deep understanding of:

#### Physical Sciences

Physical sciences standards will explore topics including: matter and its interactions (matter, chemical reactions, nuclear processes), forces and interactions (motion, interactions, stability in physical systems), energy (definitions, conservation, relationships, and processes), and waves (properties, radiation, and their applications).

#### Life Sciences

Life Sciences standards will explore topics including molecules to organisms (cells, organ systems, and organisms), ecosystems (relationships, cycles, dynamics, and behavior), heredity (inheritance and variation of traits), and biological evolution (evidences, natural selection, adaptation, and biodiversity).

#### Earth and Space Sciences

Earth and space sciences standards will explore topics including the Earth's place in the universe (from the universe, solar system, and Earth's history), Earth's systems (materials, tectonics, role of water, weather/ climate, and biogeology), and Earth and Human Activity (resources, hazards, impacts, and climate change).

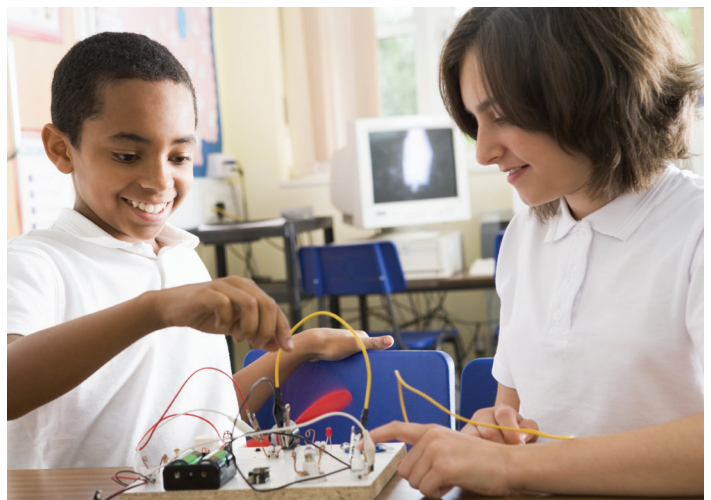
#### Engineering Design

Engineering design will exist in all grades and will allow students to identify and solve problems using engineering design (defining problems and constraints, developing solutions, and optimizing designs). Students may also evaluate solutions that have been made.

## How can you support your child's success?

Although Utah's new standards offer an approach to teaching and learning science is different than the past, you can still actively support your child's success in the classroom!









1. Speak to your child's teacher(s) or principal about how these important changes affect your school.
2. Ask your child's teacher(s) thoughtful questions based on the information provided in this brochure.
3. Learn how you can help the teacher(s) reinforce classroom instruction at home.
4. Visit [www.schools.utah.gov](http://www.schools.utah.gov) for more information.



**Fact: “Standards” are not “curriculum”. “Standards” provide clarity about what students are expected to know and be able to do by the end of each grade level. “Curriculum” refers to how students meet those expectations. Please contact your child’s teacher or school if you have questions about their curriculum.**



## How will science look different in the classroom?

Classroom activities in School will look less like this:	And look more like this:
<b>Physical Sciences</b> 	<b>Physical Sciences</b> 
Students memorize Newton's Law of Gravity.	Students gather and analyze evidence about gravity's effect on objects with different masses.
Students follow scripted chemistry experiments.	Students use chemistry knowledge to design and explain a heat pack.
Students learn to read a thermometer.	Students construct arguments about the relationship between particle motion and temperature.
<b>Life Sciences</b> 	<b>Life Sciences</b> 
Students memorize the equation for photosynthesis.	Students explain the chemistry behind photosynthesis and how it relates to the growth of a plant.
Students build a model of a cell out of gelatin and label its parts.	Students design a new cell to optimize a particular function, such as energy production.
Students draw an ecosystem on paper.	Students conduct research to identify significant changes in local ecosystem(s).
<b>Earth &amp; Space Sciences</b> 	<b>Earth &amp; Space Sciences</b> 
Students memorize the water cycle.	Students analyze real data to determine how water moves through the cycle.
Students build a papier-mâché volcano.	Students conduct research to learn how scientists observe and monitor volcanic activity on a continuous or near-real-time basis.
Students paint and position Styrofoam balls to represent planets in the solar system.	Students give presentations describing evidence that gravity controls the motion of the planets around the sun.
<b>Engineering Design</b> 	<b>Engineering Design</b> 
Students learn engineering separately from other science disciplines.	Students consider or apply engineering design principles throughout each content area.
Engineering lessons are only offered to some students.	Engineering lessons are offered to all students and each student is encouraged to connect lessons to their own personal experiences.
Students use trial and error to build a bridge out of popsicle sticks.	Students research various bridge designs, select a design that best aligns to their scientific knowledge about forces, and finally test their selected design.



## About SEEd: Reshaping Science Education for All Students

To better prepare American students for college and careers, schools need to ensure that quality science education is accessible to all students - regardless of ethnicity or zip code. In an effort to improve science education in Utah, the Utah State Board of Education adopted the Utah Science with Engineering Education (SEEd) Standards in 2015 for grades 6-8 and in 2019 for grades K-5/9-12. The SEEd standards were developed by Utah science teachers, district/charter science leaders, and local university partners. The SEEd standards were based on research found in *A Framework for K-12 Science Education* and adapted alignment to the Next Generation Science Standards (NGSS). To see the full alignment between the old Science Standards, SEEd Standards, and the NGSS, go to: [bit.ly/seedcrosswalk](http://bit.ly/seedcrosswalk)



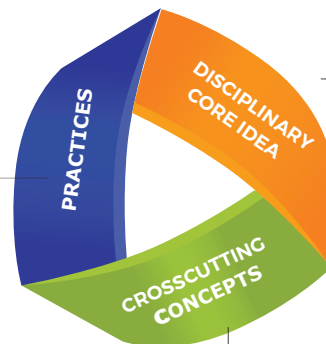
## Three Dimensions of Science Learning

*A Framework for K-12 Science Education* emphasizes three distinct, yet equally important dimensions that help students learn science. Each dimension is integrated into the Utah SEEd Standards. When combined—the three dimensions build a powerful foundation to help students build a cohesive understanding of science over time.

## What Does 3 Dimensional Assessment Look Like?

It is important that the end-of-year test for these classes assess all three dimensions of the framework. In order to do this, we have created cluster style questions that consist of a stimulus followed by a short series of questions that will look at how well a student understands and can use all 3 dimensions in a standard. Students will be assessed at the state level in grades 4-10 at the end of the school year. To see some sample clusters, please take the training tests located at: [utahrise.org/training-tests.shtml](http://utahrise.org/training-tests.shtml) for grades 4-8 and at [utah.pearsonaccessnext.com/question-samplers/](http://utah.pearsonaccessnext.com/question-samplers/) for grades 9-10.

**Standard behaviors that scientists and engineers use to explain the world or solve problems.** Examples include: asking questions, designing experiments and analyzing data.



### Fundamental scientific knowledge

Examples include: energy flows from high levels to low, matter is made of particles, Earth's crust is made of plates, all living things are made from cells.

**Frameworks for scientific thinking across disciplines** Examples include: patterns, structure and function, cause and effect.

## Support your child's success in the classroom!

For a copy of the K-12 SEEd Standards please visit: [schools.utah.gov/curr/science](http://schools.utah.gov/curr/science)

For questions about the Utah SEEd Standards contact:

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Ricky Scott - [richard.scott@schools.utah.gov](mailto:richard.scott@schools.utah.gov) (Secondary)

For questions about the state assessment of the Utah SEEd Standards contact:

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