



Developed at:



THE LAWRENCE
HALL OF SCIENCE™
UNIVERSITY OF CALIFORNIA, BERKELEY

**Science is best
learned when
it's discovered.**



Active investigation is at the heart of FOSS.

Every student deserves the benefits of science education—not just exposure to scientific phenomena but the opportunity to understand and explain them. From its foundations, FOSS is built to afford that opportunity to all, regardless of background, culture, language, or ability.

The scholars at the Lawrence Hall of Science designed FOSS around the principle of collaborative, active investigation. FOSS effectively engages all students by inviting them to interact with observable phenomena, a teaching philosophy subsequently codified with the arrival of the Utah Science with Engineering Education (SEEd) Standards. Some recent programs place the phenomenon at the start of every lesson in a rigid “one size fits all” formula, but FOSS lessons carefully create a level playing field so that all learners have a logical context to recognize the phenomenon’s significance as it is introduced. This student-centered approach ultimately honors the spirit of the SEEd Standards better by ensuring that all learners can make sense of phenomena and solve problems. In this way, FOSS makes science accessible and equitable for every student in every classroom.

Comprehensive packages for complete learning.

FOSS® is more than just a science curriculum or science kit. Your investment in any FOSS® Next Generation™ module buys you all the student and teacher components to deliver world-class science education. No teachers scrambling or budgets strained to provide what's been left out—all the key components are included, with each element thoughtfully designed to conserve your money, space, and precious time.



“The FOSS program includes most of the supplies teachers need. The hands-on investigations are simple and are designed so every student can grow their skills and gain a true understanding of scientific concepts.”

Lynn G., Science Specialist
Utah

Equipment Kit

Durable equipment and classroom tested materials, selected and designed expressly for FOSS, lead to successful investigations for all students. Kits include permanent equipment for classes of 32 students (8 groups) with enough consumables for five (5) uses at middle school.

Investigations Guide

Core instructional tool supports the teacher with Overview, Frameworks, Materials, Investigations within the unit, and Assessments. Available in print and digital.

FOSS Science Resources

FOSS student reading materials are in-depth articles that connect students' firsthand experiences to informational text, helping expand understanding from the concrete to the abstract. Available in print, eBook, and audiobook.

FOSS Technology

Interactive FOSSweb on ThinkLink™ offers simulations and virtual investigations. Online activities provide differentiating instruction. Student ebooks and streaming video are also included. Comprehensive teacher preparation videos and instructional slides support teachers.

Teacher Resources

Provided in print and available online, resources include grade-level chapters on sense-making and three-dimensional teaching and learning; connections to ELA and Math core standards; taking FOSS outdoors; access and equity in science; science-centered language development; using science notebooks; and notebook, teacher, and assessment masters.

Spanish Resources

Spanish editions of *FOSS Science Resources* are offered both in print and eBook. FOSSweb provides audio files for *FOSS Science Resources*, as well as notebook, assessment, and teacher masters, module vocabulary and definitions, teaching slides, and Focus Questions.

Materials management made easy.

We believe that students learn science best by *doing* science. Your commitment to preparing for FOSS hands-on experiences comes to fruition when you see your students' engagement soar and their understanding grow. We've spent decades working in classrooms to provide comprehensive materials management support for teachers of all levels of experience.

- *Investigations Guide* with step-by-step instructions to help you through lesson preparation, facilitation, and assessment.
- Teacher preparation videos to provide visuals for important investigation setups.
- Efficient equipment kits, designed for middle schools—outfit your classroom with materials to complete each investigation with five classes of students.
- Handy refill kits replace consumables so you can make the most of your time teaching science.

New equipment options for middle schools

We listened to middle school teachers from across the country when developing FOSS Next Generation Middle School and now offer greater flexibility in equipping your FOSS classroom or lab. **Ask your Regional Sales Manager** which equipment option is the best fit for you.

	FULL KIT	LITE KIT
Consumable items (refill kits available)	X	X
Unique, program-specific permanent items	X	X
Common science lab items (beakers, graduated cylinders, etc.) or items found in multiple FOSS courses	X	

INVESTIGATION 1 — Testing Variables

NOTE
After you give the Entry-Level Survey, plan to spend the rest of the first session setting up science notebooks and starting the course.

Focus question
• How can we describe and measure motion in a system?

NOTE
Preview the teaching slides on FOSSweb for this part.

Embedded Assessment Notes

Assessment Record

GETTING READY for Part 1: Air Trolleys

Quick Start

Schedule
1 session assessment
2 sessions active investigation
1 session reading

Preview
• Preview the FOSSweb Resources by Investigation for this part (such as printable masters, teaching slides, and online activities)
• Preview the videos: *What's an Engineer?*, Step 3, *Engineering Problems*, Step 4, and *Zip Line*, Step 6
• Preview the optional reading: "What's a Trolley?," Step 10
• Preview the in-class reading: "What Do Scientists and Engineers Do?," Step 21
• Plan for homework: plan next trolley test, Step 26

Print or Copy
For each student
• Entry-Level Survey, or schedule it on FOSSmap
• Notebook sheet 1
For each group
• Teacher master A
For the teacher
• Teacher masters B–D
• Embedded Assessment Notes
• Assessment Record

Prepare Material
• Prepare for initial use and assessment **A**
• Plan for student notebooks **B**
• Construct an air trolley **C**
• Plan trolley storage **D**
• Plan flight lines **E**
• Prepare demo air trolleys and number line **F**
• Plan for student groups **G**

Plan for Assessment
• Review Step 23, "What to Look For" in the notebook entry

86 Full Option Science System

FOSS *Investigations Guides* include a streamlined Quick Start Guide for each part of every investigation that highlights exactly what needs to be printed, set up, or prepared in advance of the lesson.

"I've seen a really big difference in student engagement using the FOSS program, especially in terms of classroom discussion. Kids are willing to raise their hands and share ideas. They seem a lot more comfortable in giving an answer, versus only giving an answer if it's correct."

Amee T., 6th Grade Teacher
Jordan School District, Utah



Course Descriptions: The options are all yours.

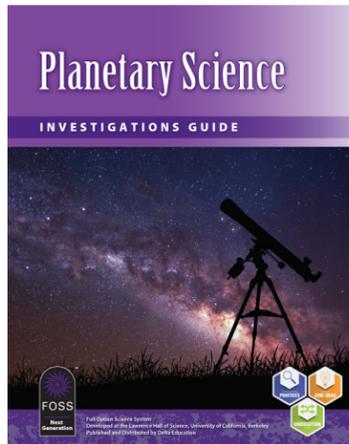
Full Option Science System® courses for the middle school grades are designed for flexibility. FOSS provides a suggested SEEd Standards scope and sequence for grades 6–8. Courses vary in length from 4 to 14 weeks.

Course Descriptions for Grade 6

Planetary Science

PHYSICAL SCIENCE, EARTH SCIENCE

Students develop a thorough understanding of the local cosmos — including the organization of the solar system and day/night/seasons—before turning their study to the top planetary science headlines of our times, in particular, the hunt for exoplanets. In a capstone project that completes students’ middle school science careers, students use satellite images to analyze changes to Earth’s systems and draw conclusions about human impact upon Earth’s systems.



Course Driving Question:

What is my cosmic address?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of Earth, an object in space, to explain day, night, seasons, solar system formation, and human impact to Earth’s systems.

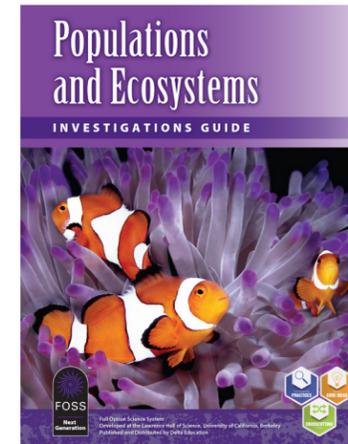
SEEd Standards:

Strand 6.1: Structure and Motion within the Solar System

Populations and Ecosystems

EARTH SCIENCE, LIFE SCIENCE, ENGINEERING

Students learn that every organism has a role to play in its ecosystem. To understand how ecosystems work and what they need to remain healthy, students explore how changes to one part of the ecosystem affect others by studying ecosystem interactions of matter and energy.



Course Driving Question:

How do organisms, matter, and energy interact in an ecosystem?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of population dynamics within ecosystems by studying matter and energy flow and addressing a student-chosen ecological issue.

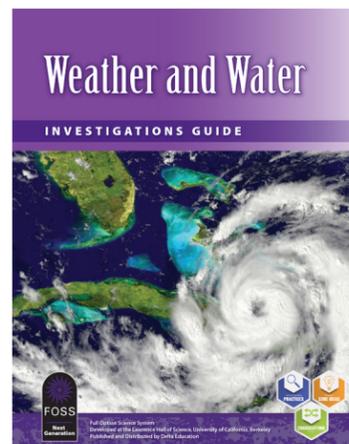
SEEd Standards:

Strand 6.4: Stability and Change in Ecosystems

Weather and Water

PHYSICAL SCIENCE, EARTH SCIENCE, ENGINEERING

Students explore physical science processes to explain earth science phenomena. They learn about atoms and molecules, density, wind, and energy transfer and then investigate phase change, the water cycle, ocean currents, climate change, and meteorology.



Course Driving Question:

What makes weather happen?

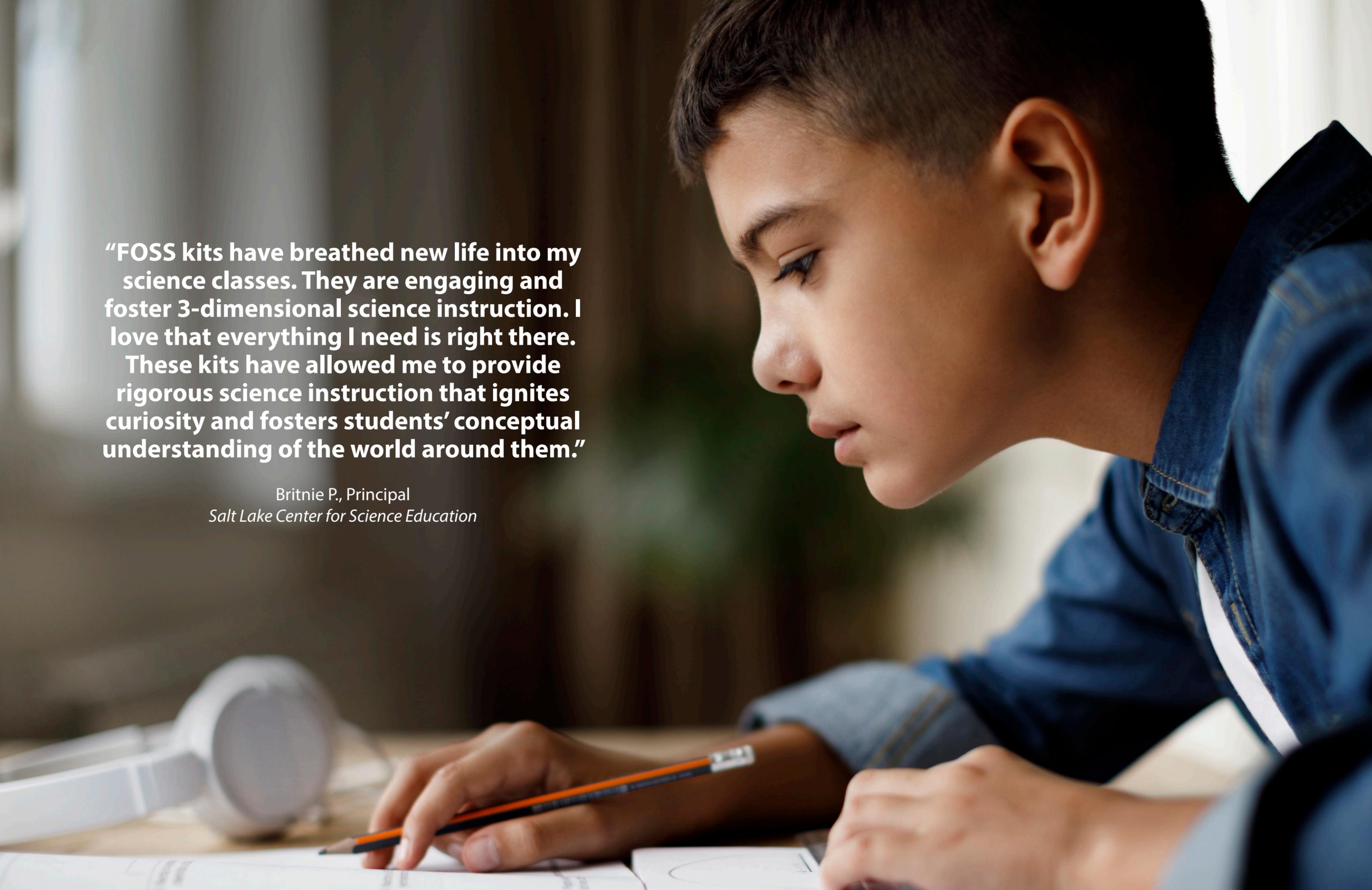
Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of observable local weather conditions to make sense of why weather changes and explore climate patterns.

SEEd Standards:

Strand 6.2: Energy Affects Matter 6.2.2-6.2.4

Strand 6.3: Earth’s Weather Patterns and Climate



“FOSS kits have breathed new life into my science classes. They are engaging and foster 3-dimensional science instruction. I love that everything I need is right there. These kits have allowed me to provide rigorous science instruction that ignites curiosity and fosters students’ conceptual understanding of the world around them.”

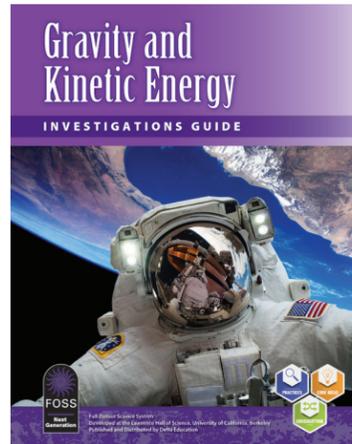
Britnie P., Principal
Salt Lake Center for Science Education

Course Descriptions for Grade 7

Gravity and Kinetic Energy

PHYSICAL SCIENCE, ENGINEERING

Students explore speed, acceleration, gravity, and collision physics. They explore how the force of gravity is related to the mass of objects and distance between them, and how this relates to gravity on various celestial objects. They learn Newton's laws and engage in an engineering challenge to design a helmet that will provide protection during impact.



Course Driving Question:

How can we explain the motion of objects?

Preview of Phenomena Investigated:

Students explore the anchor phenomena of falling objects and collisions to understand energy and forces, including gravity.

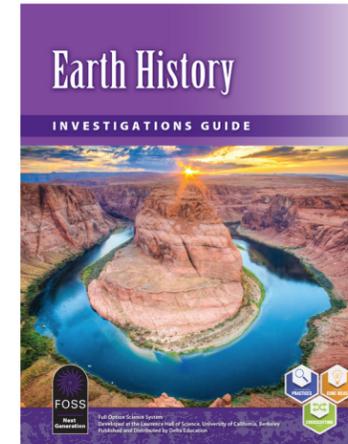
SEEd Standards:

Strand 7.1: Forces are Interactions between Matter
7.1.1, 7.1.2, 7.1.3, 7.1.5

Earth History

PHYSICAL SCIENCE, EARTH SCIENCE, LIFE SCIENCE

Students read evidence from rock, landforms, and fossils. They grapple with Earth's processes and systems that have operated over geologic time to understand the cycling of Earth's materials and the flow of energy that drives this process. They consider human interactions with natural resources and the technology that supports the geosciences.



Course Driving Question:

What do we need to know to tell the geologic story of a place?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of the Grand Canyon by exploring the Earth processes that make up the rock cycle and using their knowledge to tell Earth's geologic story.

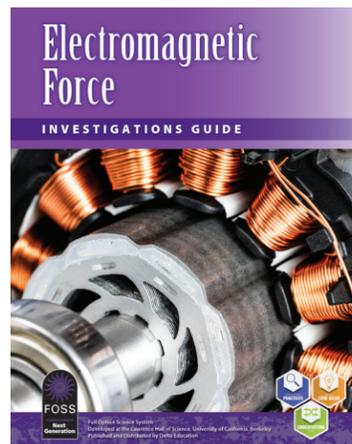
SEEd Standards:

Strand 7.2: Changes to Earth over Time

Electromagnetic Force

PHYSICAL SCIENCE, EARTH SCIENCE, ENGINEERING

Students begin to explore the concept of force. They measure the force of invisible magnetic fields, learn to build a circuit, design an electromagnet, and explain the energy transfers that make it all possible. They consider energy sources for human use and limitations of renewable and nonrenewable resources.



Course Driving Question:

What is the relationship between magnetic and electric forces?

Preview of Phenomena Investigated:

Students engage with the anchor phenomena of magnetic and electric forces by exploring their interactions and effects.

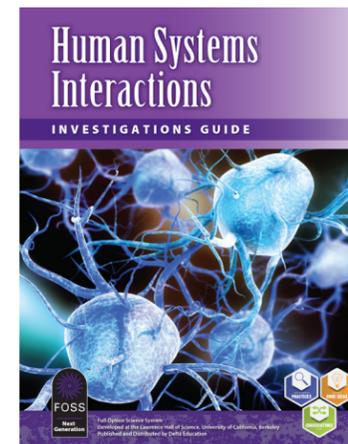
SEEd Standards:

Strand 7.1: Forces are Interactions between Matter 7.1.1, 7.1.3, 7.1.4

Human Systems Interactions

LIFE SCIENCE

Students tackle big questions about body systems and the factors that affect them. They learn about what happens when the body is attacked by an invader or an organ system malfunctions, how cells get the resources they need to live, and how systems support the human organism as it senses and interacts with the environment.



Course Driving Question:

How do humans live, grow, and respond to their environment?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of the human body by exploring how organ systems interact to support each and every cell.

SEEd Standards:

Strand 7.3: Structure and Function of Life

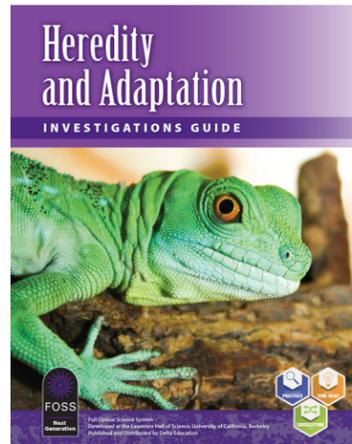
Course Descriptions for Grade 7

(continued)

Heredity and Adaptation

EARTH SCIENCE, LIFE SCIENCE

Students explore evidence for evolution, including the fossil record, the similarities between past and present organisms, the genetic principles of inheritance, and how natural selection produces adaptations that lead to changes in species and eventually the creation of new species.



Course Driving Question:

How can we explain the diversity of life that has lived on Earth?

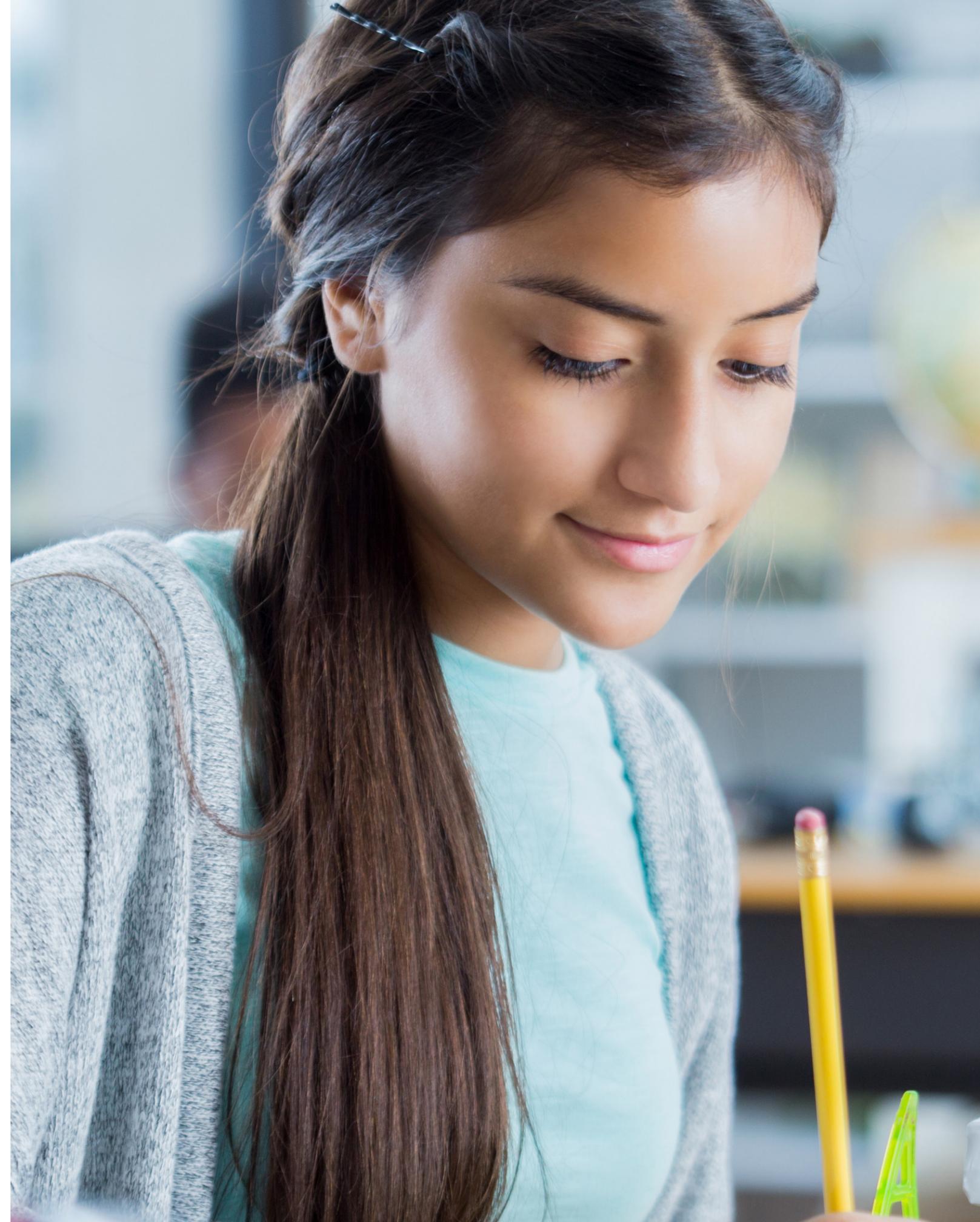
Preview of Phenomena Investigated:

Students search for evidence that explains the anchor phenomenon of biodiversity on Earth.

SEEd Standards:

Strand 7.4: Reproduction and Inheritance

Strand 7.5: Changes in Species over Time

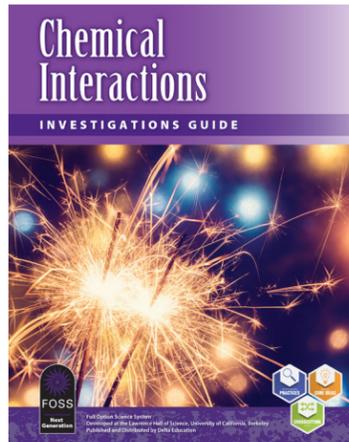


Course Descriptions for Grade 8

Chemical Interactions

PHYSICAL SCIENCE, EARTH SCIENCE, ENGINEERING

Students conduct experiments to observe macroscopic matter transformations and apply kinetic particle theory to explain those transformations at the atomic level. They explore conservation of energy and matter and use those principles to explain phase change and chemical reactions.



Course Driving Question:

How does matter interact?

Preview of Phenomena Investigated:

Students search for evidence that explains the anchor phenomenon of biodiversity on Earth.

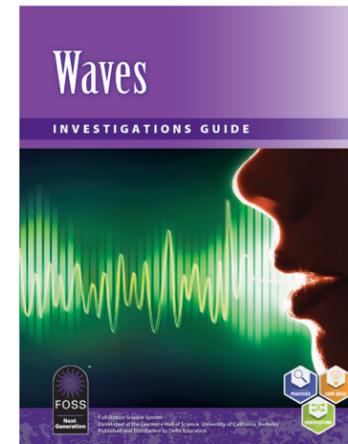
SEEd Standards:

Strand 8.1: Matter and Energy Interact in the Physical World

Waves

PHYSICAL SCIENCE, ENGINEERING

Students learn about mechanical and electromagnetic waves. They manipulate springs and lasers to determine properties of waves that are eventually used to explain how their cell phones and other modes of modern communications work. They create designs that affect transmission of sound waves in an engineering challenge.



Course Driving Question:

How is energy transferred through waves?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of energy transfer by waves to explain mechanical waves, electromagnetic waves, and communication technology.

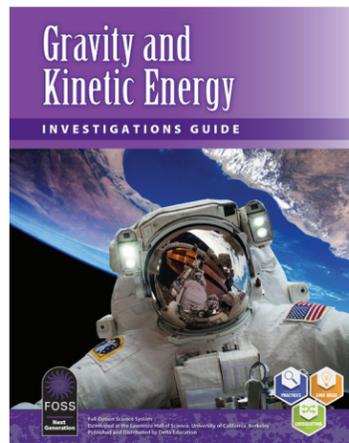
SEEd Standards:

Strand 8.2: Energy is Stored and Transferred in Physical Systems 8.2.4, 8.2.5, 8.2.6

Gravity and Kinetic Energy

PHYSICAL SCIENCE, ENGINEERING

Students explore speed, acceleration, gravity, and collision physics. They explore how the force of gravity is related to the mass of objects and distance between them, and how this relates to gravity on various celestial objects. They learn Newton's laws and engage in an engineering challenge to design a helmet that will provide protection during impact.



Course Driving Question:

How can we explain the motion of objects?

Preview of Phenomena Investigated:

Students explore the anchor phenomena of falling objects and collisions to understand energy and forces, including gravity.

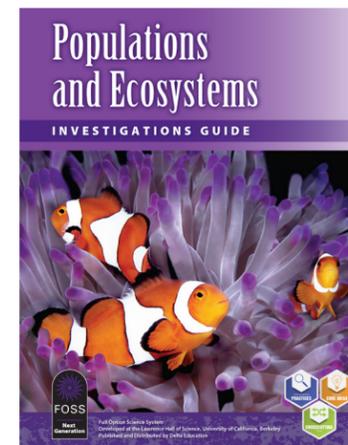
SEEd Standards:

Strand 8.2: Energy is Stored and Transferred in Physical Systems 8.2.1, 8.2.2, 8.2.3

Populations and Ecosystems

EARTH SCIENCE, LIFE SCIENCE, ENGINEERING

Students learn that every organism has a role to play in its ecosystem. To understand how ecosystems work and what they need to remain healthy, students explore how changes to one part of the ecosystem affect others by studying ecosystem interactions of matter and energy.



Course Driving Question:

How do organisms, matter, and energy interact in an ecosystem?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of population dynamics within ecosystems by studying matter and energy flow and addressing a student-chosen ecological issue..

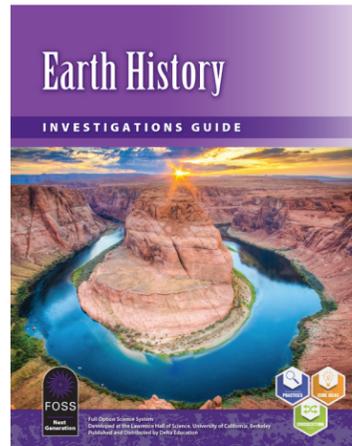
SEEd Standards:

Strand 8.3: Life Systems Store and Transfer Matter and Energy

Earth History

PHYSICAL SCIENCE, EARTH SCIENCE, LIFE SCIENCE

Students read evidence from rock, landforms, and fossils. They grapple with Earth's processes and systems that have operated over geologic time to understand the cycling of Earth's materials and the flow of energy that drives this process. They consider human interactions with natural resources and the technology that supports the geosciences.



Course Driving Question:

What do we need to know to tell the geologic story of a place?

Preview of Phenomena Investigated:

Students engage with the anchor phenomenon of the Grand Canyon by exploring the Earth processes that make up the rock cycle and using their knowledge to tell Earth's geologic story.

SEEd Standards:

Strand 8.4: Interactions with Natural Systems and Resources

FOSS® 6–8 Recommended Scope & Sequence

FOSS® Recommended Scope & Sequence for the Utah 6th through 8th Grade SEEd Standards

Grade	Strand	FOSS Course
8	Strand 8.1: Matter and Energy Interact in the Physical World	Chemical Interactions
	Strand 8.2: Energy is Stored and Transferred in Physical Systems	Gravity and Kinetic Energy • Waves
	Strand 8.3: Life Systems Store and Transfer Matter and Energy	Populations and Ecosystems
	Strand 8.4: Interactions with Natural Systems and Resources	Earth History
7	Strand 7.1: Forces are Interaction Between Matter	Gravity and Kinetic Energy Electromagnetic Force
	Strand 7.2: Changes to Earth Over Time	Earth History
	Strand 7.3: Structure and Function of Life	Human Systems Interactions
	Strand 7.4: Reproduction and Inheritance	Heredity and Adaptation
	Strand 7.5: Changes in Species Over Time	Heredity and Adaptation
6	Strand 6.1: Structure and Motion Within the Solar System	Planetary Science
	Strand 6.2: Energy Affects Matter	Weather and Water
	Strand 6.3: Earth's Weather Patterns and Climate	Weather and Water
	Strand 6.4: Stability and Change in Ecosystems	Populations and Ecosystems

Your partners in supporting quality science education.

At School Specialty, providing science curriculum is our specialty, every day of every year. We'll be right there with you, from purchase through implementation and ongoing annual professional development. Our team is supported by experienced FOSS consultants and by the program authors themselves at the Lawrence Hall of Science. We go beyond the ordinary to ensure that you have all you need to ignite your students' curiosity. With decades of combined FOSS experience, we stand ready to support your success.

Learn more.

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