FOSS

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 make sense of them and authentically apply them to the real world. From its foundations, FOSS® is built to ensure access 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 leveraging their natural curiosity for observable phenomena, a teaching philosophy now considered best practice with the arrival of the Next Generation Science Standards (NGSS).

FOSS lessons help teachers reach all students through phenomena that are local and relevant. This student-centered approach ultimately enhances learning by ensuring that each individual has multiple opportunities to apply their prior knowledge and personal experiences to 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 course provides you with all the key student and teacher components to deliver world-class science education – no need to spend additional minutes or dollars searching for essential materials. Each element is thoughtfully designed with consideration for your money, space, and precious time.

“My students loved experiencing the visuals and exploring the topics throughout the year. Materials were provided, including live animals!”

Adriana R., Teacher
Richmond, IN

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

This is the core instructional tool that supports the teacher in facilitating student investigations. Chapters include Overview, Framework and NGSS, Materials, Technology, Assessment, and each detailed Investigation. 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

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

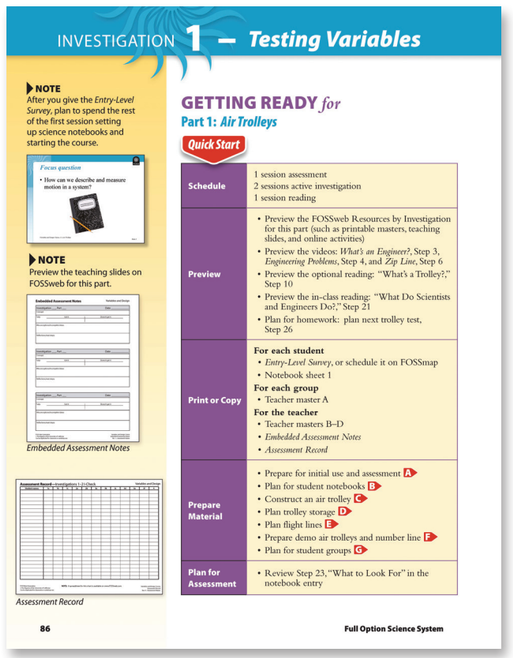
Spanish Resources

Spanish editions of *FOSS Science Resources* are offered both in print and eBook. FOSSweb on ThinkLInk 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. FOSS materials are field-tested to help you provide students with hands-on experiences that engage their minds and build their understanding. 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.



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.

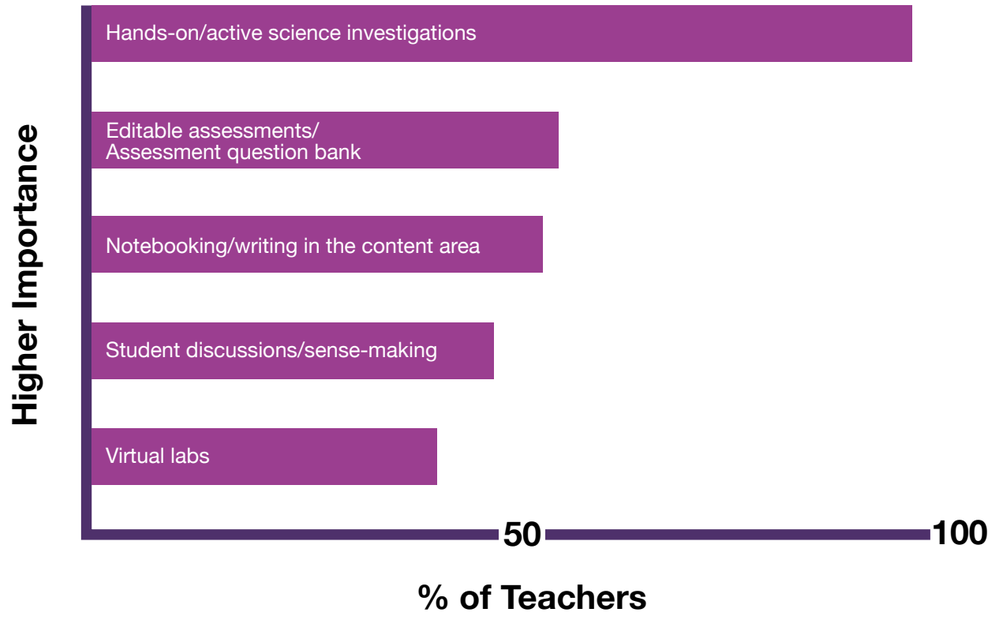
New equipment options for middle schools.

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	

FOSS provides what teachers value.

Middle school science teachers rated the program components they viewed as most important.* Every one of their top five choices can be found in FOSS.



[1]Survey of middle school educators, 2022.

Course Descriptions: The options are all yours.

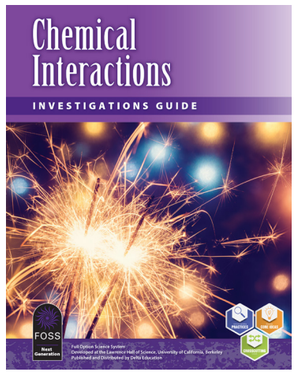
Full Option Science System® courses for the middle school grades are designed for flexibility. FOSS provides Physical, Earth, and Life Science courses for grades 6-8. Each course is designed to be used as part of your core curriculum for science education—no supplemental curricula needed. In addition, you can rearrange the sequence of courses if your district implements a grade-specific model. Courses vary in length from 4 to 14 weeks.

Physical Science Course Descriptions

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 Length: 10–12 weeks



Course Driving Question:

How does matter interact?

Preview of Phenomena Investigated:

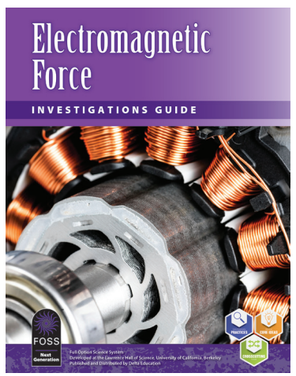
Students engage with the anchor phenomenon of interactions of matter to explain how energy and matter interact, including phase changes and chemical reactions.

Performance Expectations: *MS-PS1-1, MS-PS1-2, MS-PS1-3, MS-PS1-4, MS-PS1-5, MS-PS1-6, MS-PS3-3, MS-PS3-4, MS-PS3-5, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4*

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 Length: 5–6 weeks*



Course Driving Question:

What is the relationship between magnetic and electric forces?

Preview of Phenomena Investigated:

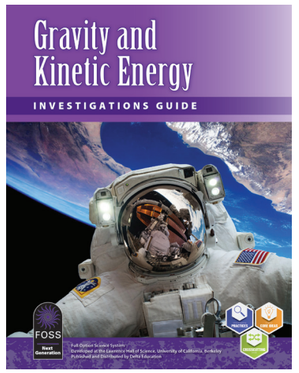
Students engage with the anchor phenomena of magnetic and electric forces by exploring their interactions and effects.

Performance Expectations: *MS-PS2-2, MS-PS2-3, MS-PS2-5, MS-PS3-2, MS-PS3-5, MS-ESS3-4, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4*

Gravity and Kinetic Energy

PHYSICAL SCIENCE, EARTH 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 Length: 5–6 weeks



Course Driving Question:

How can we explain the motion of objects?

Preview of Phenomena Investigated:

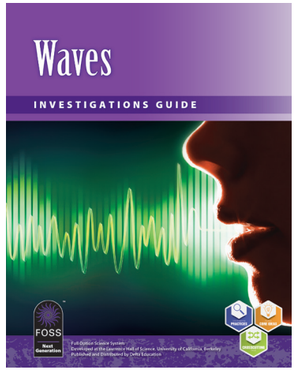
Students explore the anchor phenomena of falling objects and collisions to understand energy and forces, including gravity.

Performance Expectations: *MS-PS2-1, MS-PS2-2, MS-PS2-4, MS-PS2-5 (foundational), MS-PS3-1, MS-PS3-2, MS-PS3-5, MS-ESS1-2 (foundational), MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4*

Waves

PHYSICAL SCIENCE, ENGINEERING

Students learn about mechanical and electromagnetic waves. They manipulate springs and lasers to determine properties of waves and how modes of modern communications work. They create designs that affect transmission of sound waves in an engineering challenge.
Course Length: 5–6 weeks



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.

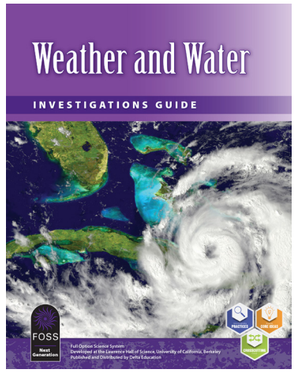
Performance Expectations: *MS-PS4-1, MS-PS4-2, MS-PS4-3, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4*

Earth Science Course Descriptions

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 Length: 10–12 weeks



Course Driving Question:

What makes weather happen?

Preview of Phenomena Investigated:

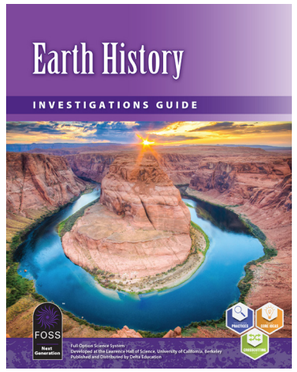
Students engage with the anchor phenomenon of observable local weather conditions to make sense of why weather changes and explore climate patterns.

Performance Expectations: *MS-PS1-4, MS-PS3-3, MS-PS3-4, MS-PS3-5, MS-ESS1-1, MS-ESS2-4, MS-ESS2-5, MS-ESS2-6, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5, MS-ETS1-1, MS-ETS1-2, MS-ETS1-3, MS-ETS1-4*

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 Length: 10–12 weeks



Course Driving Question:

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

Preview of Phenomena Investigated:

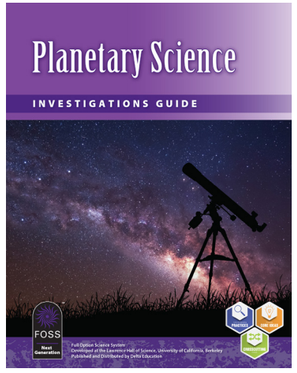
Students engage with the anchor phenomenon of how Earth's surface processes and human activities affect each other.

Performance Expectations: *MS-ESS1-4, MS-ESS2-1, MS-ESS2-2, MS-ESS2-3, MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5, MS-LS4-1*

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 Length: 10–12 weeks



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.

Performance Expectations: *MS-PS2-4 (foundational), MS-PS4-2 (foundational), MS-ESS1-1, MS-ESS1-2, MS-ESS1-3, MS-ESS1-4 (foundational), MS-ESS2-2, MS-ESS2-4 (foundational), MS-ESS3-1 (foundational), MS-ESS3-2 (foundational), MS-ESS3-3, MS-ESS3-4, MS-ETS1-1 (foundational)*

Priority #1

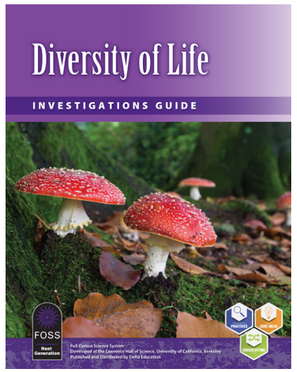
Middle school educators choose the FOSS method, hands-on/active science investigations, as the one aspect of a science program they consider most important.[1]

[1] *Survey of middle school educators, 2022*

Life Science Course Descriptions

Diversity of Life
LIFE SCIENCE

Students discover that all living things share the same basic characteristics, that all organisms are composed of cells, and that a single cell is the fundamental unit of life. Students then explore the relationship of organisms to their environment, and explore the concept of biodiversity.
Course Length: 10–12 weeks



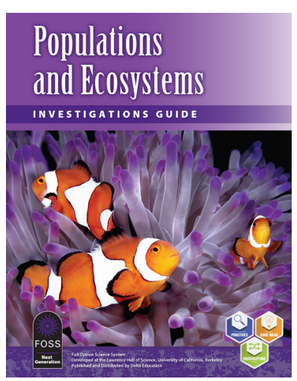
Course Driving Question:
How do you know something is living?

Preview of Phenomena Investigated:
Students engage with the anchor phenomenon of life on Earth to consider what it means to be alive.

Performance Expectations: *MS-LS1-1, MS-LS1-2, MS-LS1-3, MS-LS1-4, MS-LS1-5, MS-LS1-6 (foundational), MS-LS1-7 (foundational), MS-LS3-2*

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 Length: 10–12 weeks



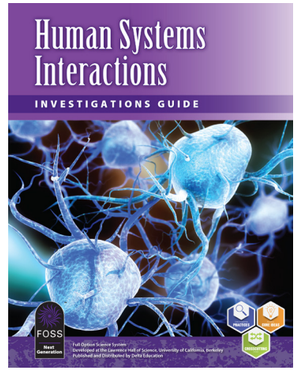
Course Driving Question:
How do organisms, matter, and energy interact in an ecosystem?

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.

Performance Expectations: *MS-LS1-6, MS-LS1-7, MS-LS2-1, MS-LS2-2, MS-LS2-3, MS-LS2-4, MS-LS2-5, MS-PS3-4 (foundational), MS-ESS3-3, MS-ESS3-4, MS-ETS1-1, MS-ETS1-2*

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 Length: 5–6 weeks*



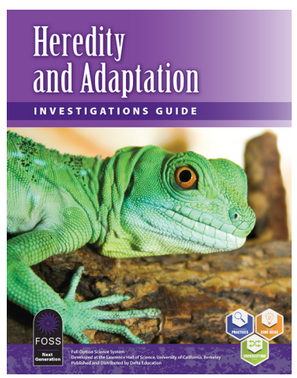
Course Driving Question:
How do humans live, grow, and respond to their environment?

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.

Performance Expectations: *MS-LS1-1 (foundational), MS-LS1-3, MS-LS1-7, MS-LS1-8*

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 Length: 5–6 weeks



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.

Performance Expectations: *MS-LS3-1, MS-LS3-2, MS-LS4-1, MS-LS4-2, MS-LS4-3, MS-LS4-4, MS-LS4-5, MS-LS4-6, MS-ESS1-4 (foundational)*

FOSS: 6–8 COURSE DESCRIPTIONS

Grades 6-8 Courses By Discipline

Physical Science	Earth Science	Life Science
Chemical Interactions	Weather and Water	Populations and Ecosystems
Electromagnetic Force*	Earth History	Diversity of Life
Gravity & Kinetic Energy*	Planetary Science	Human Systems Interactions*
Waves*		Heredity and Adaptation*

*Half-length courses

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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