

High School Science

What should my students learn in science each year?

All students should reach the expectations outlined in the NYS standards. This means that no matter what curricular resources your school uses, there are certain experiences all students in high school have. This learning map helps you know what your students should be learning and details examples of research validated pedagogical practices that you can employ to create access to rich and culturally responsive grade level content.

Science empowers students to be able to make sense of the world around them. It also helps students develop the critical thinking, problem solving, and data analysis and interpretation skills they can use in any career, and that will help them make decisions that affect themselves, their families, their communities, and our shared planet.

Science learning is not about memorizing a set of science facts, but rather about figuring out how and why things happen. Core ideas in life science, Earth science, physical science, and engineering are intentionally arranged from kindergarten through twelfth grade so that students can build their understanding over time and see the connections among different ideas and across disciplines. To figure out these core ideas, students engage in the same practices that professional scientists and engineers do. For example, students develop and use models, analyze data, and make evidence-based arguments. They also learn to make sense of core ideas using crosscutting concepts, such as systems or cause and effect, which are useful ways of thinking about and making connections across different areas of science and engineering. Students use these three dimensions—core ideas, practices, and crosscutting concepts—to develop their understanding of the natural world and to ask new questions about it.

**Science
Living
Environment**

Through the study of Living Environment, students learn to inquire scientifically and to learn not only about how organisms work, but also how they interact to make up our world. The major topics of study are scientific inquiry, ecology, organization and patterns in life, homeostasis and immunity, Reproduction and development, genetics and biotechnology, evolution, and human impact on the environment. At the conclusion of this course, students should have an understanding of how the different systems in their body interact to keep them healthy, how that connects to the work of the cells of all organisms, as well as how species evolve over time, how they interact to make up stable ecosystems, and how human interactions affect the environment.

The [NYCDOE scope and sequence](#) for this course (beginning on p63), based on the [NYSED Core Curriculum for The Living Environment](#), provides guidance on what students should be learning and when that learning should be occurring. When all schools are following the scope and sequence, students should not miss or repeat content if they transfer from one school to another.

Though high school students will not be tested on the newer New York State Science Learning Standards in biology before 2024, teachers are strongly encouraged to engage students in three-dimensional learning, incorporating [science and engineering practices](#) and [crosscutting concepts](#) with the existing content.

This course culminates in a Regents exam. As per [Recovering, Rebuilding, and Renewing: The Spirit of New York’s Schools Reopening Guidance](#), “Per Commissioner’s Regulations, courses that culminate in a Regents examination in science must include 1200 minutes of laboratory experiences. Due to the possibility of a hybrid or fully remote model of instruction as a result of COVID-19, the 1200-minute lab requirement can be met through hands-on laboratory experiences, virtual laboratory experiences, or a combination of virtual and hands-on lab-oratory experiences coupled with satisfactory lab reports for the 2020-21 school year. This laboratory requirement is in addition to the course requirement and entitles a student to admission to a culminating Regents Exam. The school district is responsible for aligning laboratory experiences specific to each science course; determining the mode or modes of instruction; and identifying a viable vetted list of acceptable virtual labs or a combination of virtual and hands-on labs that a student would need to complete for each science course that culminates in a Regents examination. Schools must determine a method for students to record laboratory experiences and satisfactory lab reports. In a virtual environment, emphasis should be placed on the quality of the experience and the satisfactory completion of each laboratory experience rather than the time spent in completing such laboratory experience. Any student who has completed all laboratory experiences in accordance with teacher expectations shall be deemed to have met the 1200-minute requirement.”

Some possible digital resources are:

[New Visions Living Environment](#) (Please note that New Visions does not follow the NYCDOE unit sequence.)

[HHMI Biointeractive](#)

[Bozeman Science Biology](#) and [AP Biology](#)

[The Concord Consortium](#)

[LabXchange](#)

[Virtual Biology Lab](#)

Science
Earth
Science

Through the study of Earth Science, students learn multistep problem-solving skills as they use the Earth Science Reference Tables and other resources to study geology, meteorology, and astronomy. The major topics of study are maps and measurement, the dynamic Earth, rocks and minerals, landscapes, Earth’s history, insolation, meteorology, climate, and astronomy. At the conclusion of this course, students should have an understanding of how cycles play a critical role in Earth’s processes and how Earth is one part of the larger system of Universe. Included in this is an understanding of how humans can play a role in protecting one another from natural hazards and how some of these hazards are compounded through human impact.

The [NYCDOE scope and sequence](#) for this course (beginning on p95), based on the [NYSED Core Curriculum for Earth Science](#), provides guidance on what students should be learning and when that learning should be occurring. When all schools are following the scope and sequence, students should not miss or repeat content if they transfer from one school to another.

Though high school students will not be tested on the newer New York State Science Learning Standards in Earth and space sciences before 2024, teachers are strongly encouraged to engage students in three-dimensional learning, incorporating [science and engineering practices](#) and [crosscutting concepts](#) with the existing content.

This course culminates in a Regents exam. As per [Recovering, Rebuilding, and Renewing: The Spirit of New York’s Schools Reopening Guidance](#), “Per Commissioner’s Regulations, courses that culminate in a Regents examination in science must include 1200 minutes of laboratory experiences. Due to the possibility of a hybrid or fully remote model of instruction as a result of COVID-19, the 1200-minute lab requirement can be met through hands-on laboratory experiences, virtual laboratory experiences, or a combination of virtual and hands-on laboratory experiences coupled with satisfactory lab reports for the 2020-21 school year. This laboratory requirement is in addition to the course requirement and entitles a student to admission to a culminating Regents Exam. The school district is responsible for aligning laboratory experiences specific to each science course; determining the mode or modes of instruction; and identifying a viable vetted list of acceptable virtual labs or a combination of virtual and hands-on labs that a student would need to complete for each science course that culminates in a Regents examination. Schools must determine a method for students to record laboratory experiences and satisfactory lab reports. In a virtual environment, emphasis should be placed on the quality of the experience and the satisfactory completion of each laboratory experience rather than the time spent in completing such laboratory experience. Any student who has completed all laboratory experiences in accordance with teacher expectations shall be deemed to have met the 1200-minute requirement.”

Some possible digital resources are:

[New Visions Earth Science](#) (Please note that New Visions does not follow the NYCDOE unit sequence.)

[Earth2Class](#)

[The Concord Consortium](#)

[My NASA Data](#)

[USGS Resources for Teachers](#)

[NOAA Resources for Teachers](#)

Science Chemistry

Through the study of chemistry, students learn about the physical world at an atomic level and about the reactions that occur in it. The major topics of study are the physical nature of matter, atomic concepts, nuclear chemistry, chemical bonding, periodicity, moles and stoichiometry, kinetics and equilibrium, acids and bases, oxidation and reduction, and carbon and organic chemistry. At the conclusion of this course, students should have an understanding of how our physical world is structured, how that world is in constant motion, and of how chemical reactions occur. Included in this is an understanding of how to minimize chemical harm to ourselves and our surroundings.

The [NYCDOE scope and sequence](#) for this course (beginning on p127), based on the [NYS Core Curriculum for Chemistry](#), provides guidance on what students should be learning and when that learning should be occurring. When all schools are following the scope and sequence, students should not miss or repeat content if they transfer from one school to another.

Though high school students will not be tested on the newer New York State Science Learning Standards in chemistry before 2025, teachers are strongly encouraged to engage students in three-dimensional learning, incorporating [science and engineering practices](#) and [crosscutting concepts](#) with the existing content.

This course culminates in a Regents exam. As per [Recovering, Rebuilding, and Renewing: The Spirit of New York's Schools Reopening Guidance](#), "Per Commissioner's Regulations, courses that culminate in a Regents examination in science must include 1200 minutes of laboratory experiences. Due to the possibility of a hybrid or fully remote model of instruction as a result of COVID-19, the 1200-minute lab requirement can be met through hands-on laboratory experiences, virtual laboratory experiences, or a combination of virtual and hands-on laboratory experiences coupled with satisfactory lab reports for the 2020-21 school year. This laboratory requirement is in addition to the course requirement and entitles a student to admission to a culminating Regents Exam. The school district is responsible for aligning laboratory experiences specific to each science course; determining the mode or modes of instruction; and identifying a viable vetted list of acceptable virtual labs or a combination of virtual and hands-on labs that a student would need to complete for each science course that culminates in a Regents examination. Schools must determine a method for students to record laboratory experiences and satisfactory lab reports. In a virtual environment, emphasis should be placed on the quality of the experience and the satisfactory completion of each laboratory experience rather than the time spent in completing such laboratory experience. Any student who has completed all laboratory experiences in accordance with teacher expectations shall be deemed to have met the 1200-minute requirement."

Some possible digital resources are:

[American Chemical Society](#)

[Bozeman Science Chemistry](#) and [AP Chemistry](#)

[PhET Simulations](#)

[CK-12 Chemistry Simulations](#)

[Royal Society of Chemistry Resources](#)

Science

Physics

Through the study of physics, students learn the laws that govern our universe, from the subatomic to the cosmic level. The major topics of study are measurement and mathematics through kinematics, mechanics, energy, electricity and magnetism, waves, and modern physics. At the conclusion of this course, students should have an understanding that energy exists in many forms, and when these forms change energy is conserved, as well as that energy and matter interact through forces that result in changes in motion.

The [NYCDOE scope and sequence](#) for this course (beginning on p161), based on the [NYSE Core Curriculum for Physics](#), provides guidance on what students should be learning and when that learning should be occurring. When all schools are following the scope and sequence, students should not miss or repeat content if they transfer from one school to another.

Though high school students will not be tested on the newer New York State Science Learning Standards in physics before 2025, teachers are strongly encouraged to engage students in three-dimensional learning, incorporating [science and engineering practices](#) and [crosscutting concepts](#) with the existing content.

This course culminates in a Regents exam. As per [Recovering, Rebuilding, and Renewing: The Spirit of New York's Schools Reopening Guidance](#), "Per Commissioner's Regulations, courses that culminate in a Regents examination in science must include 1200 minutes of laboratory experiences. Due to the possibility of a hybrid or fully remote model of instruction as a result of COVID-19, the 1200-minute lab requirement can be met through hands-on laboratory experiences, virtual laboratory experiences, or a combination of virtual and hands-on lab-oratory experiences coupled with satisfactory lab reports for the 2020-21 school year. This laboratory requirement is in addition to the course requirement and entitles a student to admission to a culminating Regents Exam. The school district is responsible for aligning laboratory experiences specific to each science course; determining the mode or modes of instruction; and identifying a viable vetted list of acceptable virtual labs or a combination of virtual and hands-on labs that a student would need to complete for each science course that culminates in a Regents examination. Schools must determine a method for students to record laboratory experiences and satisfactory lab reports. In a virtual environment, emphasis should be placed on the quality of the experience and the satisfactory completion of each laboratory experience rather than the time spent in completing such laboratory experience. Any student who has completed all laboratory experiences in accordance with teacher expectations shall be deemed to have met the 1200-minute requirement."

Some possible digital resources are:

[PhET Simulations](#)

[The Physics Aviary](#)

[CK-12 Physics Simulations](#)

[The Physics Classroom](#)

[Bozeman Science Physics](#) and [AP Physics](#)

[A Plus Physics](#)