Lab-Aids Correlations for

New York State P-12 Science Learning Standards (NYSP12SLS), adopted 2016

EARTH AND SPACE SCIENCES

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This document is intended to show how the EDC Earth Science materials align with the New York State P-12 Science Learning Standards for Earth and Space Sciences.

ABOUT OUR PROGRAMS

Lab-Aids has maintained its home offices and operations in Ronkonkoma, NY, since 1963. We publish over 200 kits and core curriculum programs to support science teaching and learning, grades 6-12. All core curricula support an inquiry-driven pedagogy, with support for literacy skill development and with assessment programs that clearly show what students know and are able to do as a result of program use. All programs have extensive support for technology and feature comprehensive teacher support. For more information, please visit https://www.lab-aids.com/edc.

ABOUT *EDC EARTH SCIENCE*

EDC Earth Science – Revised (EDC-R), Copyright 2021, is a full year, activity-driven high school earth science course developed by the Education Development Center (EDC), with support from the National Science Foundation, and is fully aligned to the *Next Generation Science Standards (*NRC and Lead States, 2013). *EDC Earth Science* is designed around the belief that students are capable of rigorous and in-depth explorations in science when given adequate support, structure, and motivation for learning.

EDC Earth Science features the following design components:

- In-depth treatment of content based on recommendations in NGSS and representative state frameworks
- Developmentally appropriate lessons featuring Earth Science concepts that build on previous learning and prepare students for more advanced courses
- Using historical, newsworthy, and fictionalized stories to draw students into the earth science content, to motivate them to acquire the knowledge for solving problems, and to serve as a framework around which students build conceptual understanding
- Differentiated instructional strategies and activities that help students construct meaning from their experiences and that serve as bridges between concrete and abstract thinking
- Support for developing literacy skills and the use of formative assessment techniques

Each chapter of EDC: Earth Science is a cluster of activities that addresses a specific set of concepts and skills. The amount of class time for each chapter will vary. A chapter may range from one to four weeks of classroom sessions. Not shown here are two project-oriented shorter chapters that open and close the course, which taken together require 2-4 weeks for completion. This provides up to 32 weeks of actual instructional time, plus an additional 4 weeks for assessment and related activities.

EDC Earth Science		
Unit Title	*Core Science Content*	*Suggested Time*
1 Hydrosphere: Water in Earth's Systems	Water cycle; surface water, groundwater, assessing and protecting water supplies, Global patterns of ocean circulation; how wind and density differences drive ocean currents; global conveyor belt; El Niño	3-4 weeks
2 Atmosphere and Climate	Climate and weather; influence of latitude, atmospheric circulation, proximity to ocean, elevation, land features, and prevailing winds on regional climate, energy balance, albedo effect, greenhouse effect, carbon cycle, positive and negative feedback loops; Paleoclimatology, climate proxies, climate change in Earth's past, Milankovitch cycles, tectonic processes that influence climate, human impact on climate	5-8 weeks
3 Earth's Place in the Universe	Life and death of stars, solar nebular condensation hypothesis, Kepler's Laws, Earth's interior structure and composition, internal sources of heat energy, seismic waves, introduction to plate tectonic theory, driving forces of plate movement	3-4 weeks
4 Plate Tectonics	Transform-fault boundaries, earthquakes, physical and computer models Subduction zones, volcanoes, formation of igneous rocks, field-measurement technologies for volcano monitoring seafloor spreading, paleomagnetism, plate tectonics summary, landforms associated with plate boundaries	5-7 weeks
5 The Rock Cycle	Erosion and deposition, deltaic processes, formation of sedimentary rock, The nature of rocks and minerals, rock cycle	3-6 weeks
6 Earth Resources	The geologic processes by which mineral ores are formed; mineral extraction and processing, fossil fuel formation, petroleum resources and exploration technologies	3-6 weeks

Each TE chapter provides detailed information on support for key NGSS core content, practices, cross cutting concepts, use of phenomena in EDC-R and more. For more information, visit us at www.lab-aids.com/edc.

ABOUT THE LAB-AIDS CITATIONS

The following tables show locations in EDC Earth Science (student book chapter and page numbers and when appropriate, Resource Supplements (RS)) that support NGSS High School performance expectations (PE).

NEW YORK STATE EARTH AND SPACE SCIENCES LEARNING STANDARD	Location in EDC Earth Science Unit and title Chapter and pages
HS. Space Systems	
E-ESS1-1. Develop a model based on evidence to illustrate the life span of the Sun and the role of nuclear fusion in the Sun's core to release energy that eventually reaches Earth in the form of radiation. [Clarification Statement: Emphasis is on the energy transfer mechanisms that allow energy from nuclear fusion in the Sun's core to reach Earth. Examples of evidence for the model could include observations of the masses and lifetimes of other stars, as well as the ways that the Sun's radiation varies due to sudden solar flares ("space weather"), the 11-year sunspot cycle, and non-cyclic variations over centuries.] [Assessment Boundary: Assessment does not include details of the atomic and sub-atomic processes involved with the Sun's nuclear fusion.]	Unit 3: Earth's Place in the Universe Chapter 8: 200-203, 212-215, RS 8.0
E-ESS1-2. Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. [Clarification Statement: Emphasis is on the astronomical evidence of the red shift of light from galaxies as an indication that the universe is currently expanding at an accelerated rate, the cosmic microwave background as the remnant radiation from the Big Bang, and the observed composition of ordinary matter of the universe, primarily found in stars and interstellar gases (from the spectra of electromagnetic radiation from stars), which matches that predicted by the Big Bang theory (3/4 hydrogen and 1/4 helium).]	Unit 3: Earth's Place in the Universe Chapter 8: 200-206, RS 8.0
E-ESS1-3. Communicate scientific ideas about the way stars, over their life cycle, produce elements. [Clarification Statement: Emphasis is on how nucleosynthesis varies as a function of the mass of a star and the stage of its lifetime.] [Assessment Boundary: Details of the many different nucleosynthesis pathways for stars of differing masses are not assessed.]	Unit 3: Earth's Place in the Universe Chapter 8: 200-201
E-ESS1-4. Use mathematical or computational representations to predict the motion of orbiting objects in the solar system. [Clarification Statement: Emphasis is on Newtonian gravitational laws governing orbital motions, which apply to human-made satellites as well as planets and moons.] [Assessment Boundary: Mathematical representations for the gravitational attraction of bodies and Kepler's Laws of orbital motions should not deal with more than two bodies, nor involve calculus.]	Unit 3: Earth's Place in the Universe Chapter 8: 208-209
HS-ESS1-7. Construct an explanation using evidence to support the claim that the phases of the moon, eclipses, tides and seasons change cyclically. [Clarification Statement: Emphasis of the explanation should include how the relative positions of the moon in its orbit, Earth, and the Sun cause different phases, types of eclipses or strength of tides.	Unit 3: Earth's Place in the Universe Chapter 8: RS 8.2

NEW YORK STATE EARTH AND SPACE SCIENCES LEARNING STANDARD	Location in EDC Earth Science Unit and title Chapter and pages
Examples of evidence could include various representations of relative positions of the Sun, Earth and moon.] [Assessment Boundary: Assessment does not include mathematical computations to support explanations but rather relies on conceptual modeling using diagrams to show how celestial bodies interact to create these cyclical changes.]	
HS. History of the Earth	
E-ESS1-5. Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks. [Clarification Statement: Emphasis is on the ability of plate tectonics to explain the ages of crustal rocks. Examples include evidence of the ages of oceanic crust increasing with distance from mid-ocean ridges as a result of plate spreading and that the North American continental crust contains a much older central ancient core compared to the surrounding continental crust as a result of complex and numerous plate interactions.]	Unit 4: Plate Tectonics Chapter 10: 256-260 Chapter 12: 342-347 Unit 5: The Rock Cycle Chapter 14: 399-401, 415-426
E-ESS1-6. Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history. [Clarification Statement: Emphasis is on using available evidence within the solar system to reconstruct the early history of Earth, which formed along with the rest of the solar system 4.6 billion years ago. Examples of evidence include the absolute ages of ancient materials (obtained by radiometric dating of meteorites, moon rocks, and Earth's rocks and minerals), the sizes and compositions of solar system objects, and the impact cratering record of planetary surfaces.]	Unit 3: Earth's Place in the Universe Chapter 9: 195-199, 203-206 Unit 5: The Rock Cycle Chapter 14: 415-426
E-ESS2-1. Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features. [Clarification Statement: Emphasis is on how the appearance of land features (such as mountains, valleys, and plateaus) and sea-floor features (such as trenches, ridges, and seamounts) are a result of both constructive processes (such as volcanism, tectonic uplift, and deposition) and destructive processes (such as weathering, subduction, and coastal erosion).] [Assessment Boundary: Assessment does not include recalling the details of the formation of specific geographic features of Earth's surface.]	Unit 3: Earth's Place in the Universe Chapter 9: 241-244 Unit 4: Plate Tectonics Chapter 10: 250-279 Chapter 11: 289-322, RS 11.1 Chapter 12: 336-345, 350-352 Unit 5: The Rock Cycle Chapter 13: 363-389 Chapter 14: 415-426, RS 14.1

NEW YORK STATE EARTH AND SPACE SCIENCES LEARNING STANDARD	Location in EDC Earth Science Unit and title Chapter and pages
HS. Earth's Systems	
E-ESS2-2. Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to Earth's systems. [Clarification Statement: Examples should include climate feedbacks, such as how an increase in greenhouse gases causes a rise in global temperatures that melts glacial ice, which reduces the amount of sunlight reflected from Earth's surface, increasing surface temperatures and further reducing the amount of ice. Examples could also be taken from other system interactions, such as how the loss of ground vegetation causes an increase in water runoff and soil erosion; how dammed rivers increase groundwater recharge, decrease sediment transport, and increase coastal erosion; or how the loss of wetlands causes a decrease in local humidity that further reduces the wetland extent.]	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 3: 66-70, 72-76 Unit 2: Atmosphere and Climate Chapter 4: 102-106 Chapter 5: 115-135, RS 5.0 Chapter 6: 155-164
E-ESS2-3. Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection. [Clarification Statement: Emphasis is on both a one-dimensional model of Earth, with radial layers determined by density, and a three-dimensional model, which is controlled by mantle convection and the resulting plate tectonics. Rocks and minerals can be identified and classified using various tests and protocols that determine their physical and chemical properties. Examples of evidence include maps of Earth's three-dimensional structure obtained from seismic waves, records of the rate of change of Earth's magnetic field (as constraints on convection in the outer core), and identification of the composition of Earth's layers from high-pressure laboratory experiments.]	Unit 3: Earth's Place in the Universe Chapter 9: 241-244 Unit 4: Plate Tectonics Chapter 11: 317-319 Chapter 12: 342-352
E-ESS2-5. Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. [Clarification Statement: Emphasis is on mechanical and chemical investigations with water and a variety of solid materials to provide the evidence for connections between the hydrologic cycle and system interactions commonly known as the rock cycle. Examples of mechanical investigations include stream transportation (erosion) and deposition using a stream table, infiltration and runoff by measuring permeability and porosity of different materials, or frost wedging by the expansion of water as it freezes. Examples of chemical investigations include chemical weathering and recrystallization (by testing the solubility of different materials) or melt generation (by examining how water lowers the melting temperature of most solids).]	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 2:24-35 Chapter 3: 58-76 Unit 2: Atmosphere and Climate Chapter 4: 99-103 Chapter 5: 116-124, 133-135 Chapter 6: 165-175
E-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere. [Clarification Statement: Emphasis is on modeling biogeochemical cycles that include the cycling of carbon through the	Unit 2: Atmosphere and Climate Chapter 5: 124-135 Chapter 6: 160-163

NEW YORK STATE EARTH AND SPACE SCIENCES LEARNING STANDARD	Location in EDC Earth Science Unit and title Chapter and pages
ocean, atmosphere, soil, and biosphere (including humans), providing the foundation for living organisms.]	
E-ESS2-7. Construct an argument based on evidence about the coevolution of Earth's systems and life on Earth. [Clarification Statement: Emphasis is on the dynamic causes, effects, and feedbacks between the biosphere and Earth's other systems, whereby geoscience factors control the evolution of life, which in turn continuously alters Earth's surface. Examples include how the outgassing of water from Earth's interior caused the development of Earth's early oceans leading to the evolution of microorganisms and stromatolites; how photosynthetic life altered the atmosphere through the production of oxygen, which in turn increased weathering rates and allowed for the evolution of animal life; how microbial life on land increased the formation of soil, which in turn allowed for the evolution of land plants; or how the evolution of corals created reefs that altered patterns of erosion and deposition along coastlines and provided habitats for the evolution of new life forms.] [Assessment Boundary: Assessment does not include a comprehensive understanding of the mechanisms of how the biosphere interacts with all of Earth's other systems.]	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 2: 36-40 Unit 2: Atmosphere and Climate Chapter 5: 127-135, RS 5.1 Chapter 6: 165-178 Unit 3: Earth's Place in the Universe Chapter 8: RS 8.1 Unit 5: The Rock Cycle Chapter 13: 387-389 Chapter 14: 425-426 Unit 6: Earth Resources Chapter 15: 447-453 Chapter 16: 479-485
HS. Weather and Climate	
E-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate. [Clarification Statement: Examples of the causes of climate change differ by timescale, over 1-10 years: large volcanic eruption, ocean circulation; 10-100s of years: changes in human activity, ocean circulation, solar output; 10-100s of thousands of years: changes to Earth's orbit and the orientation of its axis; and 10-100s of millions of years: long-term changes in atmospheric composition and plate tectonic movement.] [Assessment Boundary: Assessment of the results of changes in climate is limited to changes in surface temperatures, precipitation patterns, glacial ice volumes, sea levels, and biosphere distribution.]	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 3: 66-76 Unit 2: Atmosphere and Climate Chapter 4: 94-98 Chapter 5: 115-123 Chapter 6: 165-178 Unit 3: Earth's Place in the Universe Chapter 8: RS 8.2
E-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence-based forecast of the current rate of global or regional climate change and associated future impacts to Earth systems. [Clarification Statement: Examples of evidence, for both data and climate model outputs, are for climate changes (such as precipitation and temperature) and their associated impacts (such as on sea level, glacial ice volumes, or atmosphere and ocean composition).] [Assessment Boundary: Assessment is limited to one example of a climate change and its associated impacts.]	Unit 2: Atmosphere and Climate Chapter 6: 165-178

NEW YORK STATE EARTH AND SPACE SCIENCES LEARNING STANDARD	Location in EDC Earth Science Unit and title Chapter and pages
HS-ESS2-8. Evaluate data and communicate information to explain how the movement and interactions of air masses result in changes in weather conditions. [Clarification Statement: Examples of evidence sources could include station models, surface weather maps, satellite images, radar, and accepted forecast models. Emphasis should focus on communicating how the uneven heating of Earth's surface and prevailing global winds drive the movement of air masses and their corresponding circulation patterns, the interaction of different air masses at frontal boundaries, and resulting weather phenomena.] [Assessment Boundary: Analysis is limited to surface weather maps and general weather patterns associated with high and low pressure systems.]	Unit 2: Atmosphere and Climate Chapter 4: 97-98, 102-106
HS. Human Sustainability	
E-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity. [Clarification Statement: Examples of key natural resources include access to fresh water (such as rivers, lakes, and groundwater), regions of fertile soils such as river deltas, and high concentrations of minerals and fossil fuels. Examples of natural hazards can be from interior processes (such as volcanic eruptions and earthquakes), surface processes (such as tsunamis, mass wasting and soil erosion), and severe weather (such as blizzards, hurricanes, tornadoes, floods, and droughts). Examples of the results of changes in climate that can affect populations or drive mass migrations include changes to sea level, regional patterns of temperature and precipitation, and the types of crops and livestock that can be raised.]	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 2: 18-20, 38-40 Unit 4: Plate Tectonics Chapter 10: 250-253, 283-284 Chapter 11: 290-292, 321-322 Unit 5: The Rock Cycle Chapter 13: 358-361, 387-389, RS 13.1 Unit 6: Earth Resources Chapter 15: 432-435, 444-456 Chapter 16: 461-468, 479-485
E-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.* [Clarification Statement: Emphasis is on the conservation, recycling, and reuse of resources (such as minerals and metals) where possible, and on minimizing impacts where it is not. Examples include developing best practices for agricultural soil use, mining (for coal, tar sands, and oil shales), and pumping (for petroleum and natural gas). Science knowledge indicates what can happen in natural systems—not what should happen.]	Unit 6: Earth Resources Chapter 16: 482-484, RS 16.1
E-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity. [Clarification Statement: Examples of factors that affect the management of natural resources include costs of resource extraction and waste management, per-capita consumption, and the development of new technologies. Examples of factors that affect human sustainability include agricultural	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 2: 18-23 Unit 2: Atmosphere and Climate Chapter 5: 127-132 Chapter 6: 165-178

NEW YORK STATE EARTH AND SPACE SCIENCES LEARNING STANDARD	Location in EDC Earth Science Unit and title Chapter and pages
efficiency, levels of conservation, and urban planning.] [Assessment Boundary: Assessment for computational simulations is limited to using provided multi-parameter programs or constructing simplified spreadsheet calculations.]	Unit 6: Earth Resources Chapter 16: 463-467
E-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.* [Clarification Statement: Examples of data on the impacts of human activities could include the quantities and types of pollutants released, changes to biomass and species diversity, or areal changes in land surface use (such as for urban development, agriculture and livestock, or surface mining). Examples for limiting future impacts could range from local efforts (such as reducing, reusing, and recycling resources) to large-scale geoengineering design solutions (such as altering global temperatures by making large changes to the atmosphere or ocean).]	Unit 1: Hydrosphere: Water in Earth's Systems Chapter 2: 38-40 Unit 5: The Rock Cycle Chapter 13: 387-389 Unit 6: Earth Resources Chapter 15: 447-453, RS 15.2 Chapter 16: 479-481
E-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.* [Clarification Statement: Examples of Earth systems to be considered are the hydrosphere, atmosphere, cryosphere, geosphere, and/or biosphere. An example of the far-reaching impacts from a human activity is how an increase in atmospheric carbon dioxide results in an increase in photosynthetic biomass on land and an increase in ocean acidification, with resulting impacts on sea organism health and marine populations.] [Assessment Boundary: Assessment does not include running computational representations but is limited to using the published results of scientific computational models.]	Unit 2: Atmosphere and Climate Chapter 5: 127-135 Chapter 6: 165-175