Lab-Aids Correlations for

Tennessee Academic Standards for Science:

Earth and Space Science

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This document is intended to show how the *EDC Earth Science – Revised (EDC-R),* curriculum materials align with the Tennessee Academic Standards for Science: Earth and Space Science.

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. *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's 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

ABOUT THE LAB-AIDS CITATIONS

This correlation is intended to show selected locations in NAC student materials that support the Idaho Content Standards for Earth Science. It is not an exhaustive list; other locations may exist that are not listed here.

Citations included in the correlation document are as follows:

Unit title	*Earth's Place in the Universe*
Chapter number: relevant pages	Ch 8: 200-203, 212-215, RS 8.0*

*RS = Resource Supplement included in the Teacher's Guide

Earth and Space Science: Academic Standard	*EDC Earth Science* Unit: Chapter pages
ESS.ESS1: Earth's Place in the Universe	
1) Construct an explanation regarding the rapid expansion of the universe based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe.	*Earth's Place in the Universe* Ch 8: 200-206, Resource Supplement 8.0
2) Construct a model using astronomical distances to explain the spatial relationships and physical interactions among planetary systems, stars, multiple-star systems, star clusters, galaxies, and galactic groups in the universe.	*Earth's Place in the Universe* Ch 8: 202-203, 208-209 (partial coverage)
3) Analyze and interpret data about the mass of a star to predict its composition, luminosity, and temperature across its life cycle, including an explanation for how and why it undergoes changes at each stage.	*Earth's Place in the Universe* Ch 8: 200-201
4) Communicate scientific ideas to explain the nuclear fusion process and how elements with an atomic number greater than helium have been formed in stars, supernova explosions, or exposure to cosmic rays.	*Earth's Place in the Universe* Ch 8: 200-201
5) Analyze and compare image data from instruments used to study deep space (e.g., visible, infrared, radio, refracting and reflecting telescopes, and spectrophotometer). Evaluate the strengths and weaknesses of the instrumentation.	*Earth's Place in the Universe* Ch 8: 212-216 (partial coverage)
6) Recognize how advances in deep space research instrumentation over the last 30 years have led to new understandings of Earth's place in the universe and how these advances have benefitted society.	*Earth's Place in the Universe* Ch 8: 212-216 (partial coverage)
7) Analyze and interpret data to compare, contrast, and explain the characteristics of objects in the solar system including the sun, planets and their satellites, planetoids, asteroids, and comets. Characteristics include: mass, gravitational attraction, diameter, and composition.	*Earth's Place in the Universe* Ch 8: 202-206
8) Use mathematical or computational representations to predict motions of the various kinds of objects in our solar system, including planets, satellites, comets, and asteroids, and the influence of gravity, inertia, and collisions on these motions.	*Earth's Place in the Universe* Ch 8: 208-209
9) Evaluate the evidence for the role of gravitational force and heat production in theories about the origin and formation of Earth. Design a research study to confirm or refute one aspect of such evidence.	*Earth's Place in the Universe* Ch 9: 195-199, 203-206 *The Rock Cycle* Ch 14: 415-426
10) Summarize available sources of data within the solar system which provide clues about Earth's formation. Using engineering principles, design a means to gather more data.	*Earth's Place in the Universe* Ch 8: 194-199, 203-207, 212-216, Resource Supplement 8.0 (partial coverage)

Earth and Space Science: Academic Standard	*EDC Earth Science* Unit: Chapter pages
ESS.ESS2: Earth's Systems	
1) Given an environmental disaster, analyze its effect upon the geosphere, hydrosphere, atmosphere, and/or biosphere, including sphere-to-sphere interactions. Analysis should conclude with an identification of future research to improve our ability to predict such interactions.	*Atmosphere and Climate* Ch 5: 111-140; Ch 6: 163-178
2) Construct an argument based on evidence about how global and regional climate is impacted by interactions among the Sun's energy output, tectonic events, ocean circulation, vegetation, and human activities. The argument should include discussion of a variety of time scales from sudden (volcanic ash clouds) to intermediate (ice ages) to long-term tectonic cycles.	*Atmosphere and Climate* Ch 5: 111-140; Ch 6: 141-185
3) Communicate scientific and technical information to explain how evidence from deep probes and seismic waves, reconstructions of historical changes in Earth's surface and its magnetic field, and an understanding of physical and chemical processes lead to a model of Earth with a hot but solid inner core, a liquid outer core, a solid mantle, and crust.	*Earth's Place in the Universe* Ch 9: 221-248
4) Analyze surface features of Earth and identify and explain the geologic processes responsible for their formation.	*Plate Tectonics* Ch 10: 250-281; Ch 11: 289-303, 317-322; Ch 12: 329-352 *The Rock Cycle* Ch 13: 358-387, 391-392; Ch 14: 397-407, 415-425
5) Develop a visual model to illustrate the formation and reformation of rocks over time including processes such as weathering, sedimentation, and plate movement. The model should include a comparison of the physical properties of various rock types, common rock-forming minerals, and continental rocks versus the oceanic crust.	*Plate Tectonics* Ch 10: 250-281; Ch 11: 293-301, 317-319; Ch 12: 342-345, 350-352 *The Rock Cycle* Ch 13: 363-370, 391-392; Ch 14: 415-419
6) Make and defend a claim based on evidence to describe the formation and on-going availability of mined resources such as phosphorus, platinum, rare minerals, rare earth elements, and/or fossil fuels.	*Earth Resources* Ch 15: 439-444 (partial coverage)
7) Apply scientific principles regarding thermal convection and gravitational movement of dense materials to predict	*Earth's Place in the Universe* Ch 9: 241-245

Earth and Space Science: Academic Standard	*EDC Earth Science* Unit: Chapter pages
ESS.ESS2: Earth's Systems	
the outcomes of continued development and movement of lithospheric plates from their growing margins at a divergent boundary (mid-ocean ridge) to their destructive margin at a convergent boundary (subduction zone).	*Plate Tectonics* Ch 11: 293-296, 317-319 Ch 12: 342-345, 350-353
8) Using maps and numerical data, evaluate the claims, evidence, and reasoning that forces due to plate tectonics cause earthquake activity, volcanic eruptions, and mountain building.	*Plate Tectonics* Ch 10: 250-281; Ch 11: 293-301, 317-322; Ch 12: 329-352
9) Design a research study to examine an area of increasing seismic or volcanic activity and predict what will occur in that area over the next month, year, and decade. The description should include the instruments and measures to be used in the study and an explanation of their capabilities and limitations.	*Plate Tectonics* Ch 10: 254-282; Ch 11: 293-315 (partial coverage)
10) Construct a model which shows the interactions between processes of the hydrologic cycle and the greenhouse effect.	*Atmosphere and Climate* Ch 5: 115-124, 133-135
11) Obtain, evaluate, and communicate information about human or natural threats to Tennessee.	Local standard
12) Engage in an argument from evidence to explain the degree to which the dynamics of oceanic currents could contribute to at least one aspect of climate change.	*Hydrosphere: Water in Earth's Systems* 3: 58-70, 72-76; 4: 94-103 *Atmosphere and Climate* Ch 5: 133-137
13) Use a model to predict how variations in the flow of energy through radiation, conduction, and convection into and out of Earth's systems could contribute to global atmospheric processes and climactic effects.	*Atmosphere and Climate* Ch 5: 115-124, 133-135
14) Using data, weather maps, and other scientific tools, predict weather conditions from an analysis of the movement of air masses, high and low pressure systems, and frontal boundaries.	Not addressed
15) Use satellite-based image datasets to compare and explain how weather and climate patterns at various latitudes, elevations, and proximities to water and ocean currents are a function of heat, evaporation, condensation, and rotation of the planet. The comparison should also include an examination of the same location across various seasons or years.	*Atmosphere and Climate* Ch 4: 80-108 (partial coverage)
16) Design a mathematical model of Earth's energy budget showing how the electromagnetic radiation from the sun is reflected, absorbed, stored, redistributed among the atmosphere, ocean, and land systems, and reradiated back into space. The model should provide a means to predict how changes in greenhouse gases could affect Earth's temperatures.	*Atmosphere and Climate* Ch 5: 115-124, 133-128 (partial coverage)

Earth and Space Science: Academic Standard	*EDC Earth Science* Unit: Chapter pages
ESS.ESS2: Earth's Systems	
17) Analyze the multiple sources of energy that provide power in the state of Tennessee and compare them to each other and to an alternative energy source. The analysis should include their functional components (such as infrastructure cost, on-going costs, safety, and reliability), and their social, cultural, and environmental impacts (including emissions of greenhouse gases).	Local standard
18) Identify the organisms that are major drivers in the global carbon cycle and trace how greenhouse gases are continually moved through the carbon reservoirs and fluxes represented by the ocean, land, life, and atmosphere.	*Atmosphere and Climate* Ch 5: 127-132

Earth and Space Science: Academic Standard	***EDC Earth Science*** **Unit: Chapter pages**
ESS.ESS3: Earth and Human Activity	
1) Identify a geographical region or small area where energy and mineral resources are scarce and evaluate competing design solutions for developing, managing, and utilizing these energy and mineral resources based on a cost-benefit analysis.	*Earth Resources* Ch 15 and 16 address energy and mineral resource acquisition, but do not address costs, management, or utilization.
2) Obtain, evaluate, and communicate information on how natural resource availability, natural hazard occurrences, and climatic changes impact individuals and society.	*Atmosphere and Climate* Ch 5: 111-113 *Plate Tectonics* Ch 10: 250-253; Ch 11: 289-292 *The Rock Cycle* Ch 13: 358-361
3) Design, evaluate, or refine a technological solution that reduces impacts of human activities on natural systems.	*Hydrosphere: Water in Earth's Systems* Ch 2: 42-43 *Earth Resources* Ch 15: 453-455
4) 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.	*Atmosphere and Climate* Ch 6: 165-179