

NORTH CAROLINA STANDARD COURSE OF STUDY
Crosswalk
Earth/Environmental Science

The purpose of this document is to provide a general comparison of the 2023 Earth/Environmental Science Standard Course of Study and the 2009 Earth/Environmental Science Standard Course of Study. It provides initial insight into similarities and differences between these two sets of standards. This document is not intended to answer all questions about the nuances of the new 2023 standards versus the previous 2009 standards..

Earth/Environmental Science Standards

Note: The 2023 Earth/Environmental Science standards and objectives are not intended to be the curriculum, nor do they indicate the whole of a curriculum which will be written by a local public-school unit (PSU) or school. The standards for this course have been developed to serve as the framework which will guide each PSU in the development of the curriculum for Earth/Environmental Science.

Earth's Place in the Universe		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>ESS.EES.1 Explain how Earth's position relative to the sun influences conditions on Earth.</i>	<i>EEn.1.1 Explain the Earth's role as a body in space.</i>	
ESS.EES.1.1 Use models to illustrate the formation of the solar system.		New - created based on <i>NRC Framework</i> and stakeholder feedback
ESS.EES.1.2 Use mathematics and computational thinking to analyze Earth's motion through space.	EEn.1.1.2 Explain how the Earth's rotation and revolution about the Sun affect its shape and is related to seasons and tides.	*Although EEn.1.1.1 has been deleted from the 2023 E/E Standards, the term, "barycenter" is included. See the section below for more information and the Support Document for clarification.
ESS.EES.1.3 Use models to illustrate how the sun produces energy.	EEn.1.1.3 Explain how the sun produces energy which is transferred to the Earth by radiation.	
ESS.EES.1.4 Construct an explanation to infer how incoming solar radiation interacts	EEn.1.1.4 Explain how incoming solar energy makes life possible on Earth.	

with Earth systems to support life.		
-------------------------------------	--	--

Earth's Systems		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>ESS.EES.2 Analyze how the geosphere is shaped by plate tectonics and the rock cycle.</i>	<i>EEn.2.1 Explain how processes and forces affect the lithosphere.</i>	
ESS.EES.2.1 Use models to explain how mantle convection powers plate tectonics.		New - created based on <i>NRC Framework</i> and stakeholder feedback
ESS.EES.2.2 Analyze and interpret data to predict locations of volcanoes and earthquakes based on plate boundaries.	EEn.2.1.2 Predict the locations of volcanoes, earthquakes, and faults based on information contained in a variety of maps.	
ESS.EES.2.3 Use a model to explain how plate tectonics influence topography.	EEn.2.1.1 Explain how the rock cycle, plate tectonics, volcanoes, and earthquakes impact the lithosphere.	
ESS.EES.2.4 Carry out investigations to explain how the rock cycle and rates of weathering, erosion, and soil formation influence Earth's systems.	EEn.2.1.3 Explain how natural actions such as weathering, erosion (wind, water and gravity), and soil formation affect Earth's surface.	
ESS.EES.2.5 Analyze and interpret data to explain how volcanic activity influences changes in Earth's atmosphere, geosphere, biosphere, and hydrosphere.	EEn.2.1.4 Explain the probability of and preparation for geohazards such as landslides, avalanches, earthquakes and volcanoes in a particular area based on available data.	
<i>ESS.EES.3 Analyze how the interactions between the hydrosphere and atmosphere transfer energy and influence climate.</i>	<i>EEn.2.3 Explain how water is an agent of energy transfer.</i>	
	<i>EEn.2.5 Understand the structure of and processes within our atmosphere.</i>	
ESS.EES.3.1 Carry out investigations to explain the properties of water.	EEn.2.3.1 Explain water as an energy agent (currents and heat transfer).	
ESS.EES.3.2 Use models to explain how water is an agent of energy transfer.	<i>EEn.2.3.1 Explain how water is an agent of energy transfer.</i>	
ESS.EES.3.3 Analyze and interpret data to	EEn.2.6.2 Explain changes in global climate	

explain how major greenhouse gases influence climate.	due to natural processes.	
ESS.EES.3.4 Analyze and interpret data to attribute how atmospheric composition and surface conditions influence heat retention in the troposphere.		New - created based on <i>NRC Framework</i> and stakeholder feedback
ESS.EES.3.5 Construct an explanation to conclude that heat exchange between the ocean and atmosphere results in local, regional, global weather phenomena and climate patterns.	<i>EEn.2.6 Analyze patterns of global climate change over time.</i>	
	EEn.2.6.2 Explain changes in global climate due to natural processes.	
<i>ESS.EES.4 Analyze the connections between the biosphere and other Earth systems (geosphere, hydrosphere, atmosphere).</i>	<i>EEn.2.7 Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere.</i>	
ESS.EES.4.1 Use models to explain how abiotic/biotic interactions shape various ecosystems.	EEn.2.7.1 Explain how abiotic and biotic factors interact to create the various biomes in North Carolina.	
ESS.EES.4.2 Analyze and interpret data to explain how carbon cycling influences various ecosystems.	<i>EEn.2.6 Analyze patterns of global climate change over time.</i>	
	EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.).	
ESS.EES.4.3 Analyze and interpret data to explain past climate trends.	EEn.2.6.4 Attribute changes in Earth systems to global climate change (temperature change, changes in pH of ocean, sea level changes, etc.).	
ESS.EES.4.4 Construct an explanation to predict how potential future changes in abiotic factors could impact biodiversity and species distribution.		New - created based on <i>NRC Framework</i> and stakeholder feedback
ESS.EES.4.5 Obtain, evaluate and communicate information to explain how biodiversity impacts ecosystem resilience.	EEn.2.7.2 Explain why biodiversity is important to the biosphere.	

Earth and Human Activity		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
ESS.EES.5 Evaluate how human consumption patterns impact Earth's systems.	<i>EEn.2.2 Understand how human influences impact the lithosphere.</i>	
	EEn.2.6.3 Analyze the impacts that human activities have on global climate change (such as burning hydrocarbons, greenhouse effect, and deforestation).	
ESS.EES.5.1 Analyze and interpret data to explain the impacts of land use on Earth's systems.	EEn.2.2.1 Explain the consequences of human activities on the lithosphere (such as mining, deforestation, agriculture, overgrazing, urbanization, and land use) past and present.	
ESS.EES.5.2 Analyze and interpret data to evaluate how human use of ground and surface waters impacts water quality and availability in river basins, wetlands, estuaries and aquifers.	<i>EEn.2.4 Evaluate how humans use water.</i>	
	EEn.2.4.1 Evaluate human influences on freshwater availability (wells, aquifer depletion, dams and dam removal, agricultural, and recreation).	
	EEn.2.4.2 Evaluate human influences on water quality in NC's river basins, wetlands and tidal environments. (ground and surface water pollution, wetland and estuary degradation, and saltwater intrusion).	
	EEn.2.3.2 Explain how groundwater and surface water interact.	
ESS.EES.5.3 Construct an argument to evaluate the ways that human activities influence atmospheric composition.	EEn.2.5.5 Explain how human activities affect air quality.	

ESS.EES.5.4 Construct an argument to evaluate the benefits and trade-offs of using non-renewable or renewable energy sources for electricity production and transportation fuels.	EEn.2.2.2 Compare the various methods humans use to acquire traditional energy sources (such as peat, coal, oil, natural gas, nuclear fission, and wood).	
	EEn.2.8.1 Evaluate alternative energy technologies for use in North Carolina (solar, wind, biofuels, nuclear fusion, fuel cells).	
ESS.EES.5.5 Construct an argument to evaluate potential solutions that will ensure sustainable consumption of Earth's resources.	<i>EEn.2.8 Evaluate human behaviors in terms of how likely they are to ensure the ability to live sustainably on Earth.</i>	
	EEn.2.8.2 Critique conventional and sustainable agriculture and aquaculture practices in terms of their environmental impacts.	
ESS.EES.5.6 Construct an argument to evaluate a range of solutions to mitigate impacts of human activities on Earth's systems.		New - created based on <i>NRC Framework</i> and stakeholder feedback
<i>ESS.EES.6 Analyze how Earth's systems impact humans and the biosphere.</i>	<i>EEn.2.7 Explain how the lithosphere, hydrosphere, and atmosphere individually and collectively affect the biosphere.</i>	
ESS.EES.6.1 Analyze and interpret data to infer how use of natural resources impacts ecosystems and human populations, including human health.	EEn.2.7.3 Explain how human activities impact the biosphere.	
ESS.EES.6.2 Construct an argument to infer how some natural hazards (such as flooding and wildfires) are increasing in frequency and intensity due to human activities.	EEn.2.8.3 Explain the effects of uncontrolled population growth on the Earth's resources.	
ESS.EES.6.3 Construct an argument to explain how natural hazards and other environmental problems may impact some human populations more than others.		New - created based on <i>NRC Framework</i> and stakeholder feedback

Not Addressed:

EEn.1.1.1 Explain the Earth’s motion through space, including precession, nutation, the barycenter, and its path about the galaxy. *The term, *barycenter*, is used in Objective EES.ESS.1.2 to denote the point at which two objects rotate.

EEn.2.5.1 Summarize the structure and composition of our atmosphere. (Removed based on data gathered during the revision process, previously covered in middle school)

EEn.2.5.2 Explain the formation of typical air masses and the weather systems that result from air mass interactions. (Removed based on data gathered during the revision process, previously covered in middle school)

EEn.2.5.3 Explain how cyclonic storms form based on the interactions of air masses. (Removed based on data gathered during the revision process, previously covered in middle school)

EEn.2.5.4 Predict the weather using available weather maps and data (including surface, upper atmospheric winds, and satellite imagery). (Removed based on data gathered during the revision process, previously covered in middle school)

EEn.2.6.1 Differentiate between weather and climate. (Removed based on data gathered during the revision process, previously covered in middle school)

EEn.2.8.4 Evaluate the concept of “reduce, reuse, recycle” in terms of impact on natural resources. (Removed based on data gathered during the revision process, previously covered in middle school)