

NORTH CAROLINA STANDARD COURSE OF STUDY

Crosswalk

Physics

The purpose of this document is to provide a general comparison of the 2009 Standard Course of Study and the 2023 Physics 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..

Physics Standards

Note: The 2023 Physics 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 Physics.

Motion and Stability - Forces and Interactions		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.Phy.1 Analyze the motion of objects using time, distance, displacement, speed, velocity, and acceleration.</i>	<i>Phy.1.1 Analyze the motion of objects.</i>	
PS.Phy.1.1 Use models (graphs, equations, diagrams) to infer motion in one dimension.	Phy.1.1.1 Analyze motion graphically and numerically using vectors, graphs and calculations.	
	Phy.1.1.2 Analyze motion in one dimension using time, distance, displacement, velocity, and acceleration.	
PS.Phy.1.2 Use models (graphs, equations, diagrams) to infer motion in two dimensions.	Phy.1.1.3 Analyze motion in two dimensions using angle of trajectory, time, distance, displacement, velocity, and acceleration.	

<i>PS.Phy.2 Analyze systems of forces and their interaction with matter.</i>	<i>Phy.1.2 Analyze systems of forces and their interaction with matter.</i>	
PS.Phy.2.1 Use free body models to qualitatively and quantitatively analyze systems of forces in one dimension and two dimensions.	Phy.1.2.2 Analyze systems of forces in one dimension and two dimensions using free body diagrams.	
	Phy.1.2.4 Explain the effects of forces (including weight, normal, tension and friction) on objects.	
PS.Phy.2.2 Carry out investigations to explain the interactions of forces on an object according to Newton's Laws of Motion.	Phy.1.2.1 Analyze forces and systems of forces graphically and numerically using vectors, graphs and calculations.	
	Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation.	
PS.Phy.2.3 Use models to qualitatively and quantitatively analyze basic forces related to movement of an object in a circular path (centripetal force).	Phy.1.2.5 Analyze basic forces related to rotation in a circular path (centripetal force).	
PS.Phy.2.4 Use models to qualitatively and quantitatively explain the relationship among the force of gravity, the distance between two objects, and the mass of the objects, according to the Law of Universal Gravitation.	Phy.1.2.3 Explain forces using Newton's laws of motion as well as the universal law of gravitation.	
PS.Phy.2.5 Analyze and interpret data to explain the effect of elastic force on objects (Hooke's Law).		New - Hooke's Law is foundational to content related to elastic potential energy in 2023 Objective PS.Phy.6.1.
<i>PS.Phy.3 Analyze the motion of objects based on the principles of conservation of momentum and impulse in one dimension.</i>	<i>Phy.1.3 Analyze the motion of objects based on the principles of conservation of momentum, conservation of energy and impulse.</i>	
PS.Phy.3.1 Use models to analyze inelastic and elastic collisions in terms of the conservation of momentum in one dimension.	Phy.1.3.1 Analyze the motion of objects involved in completely elastic and completely inelastic collisions by using the principles of conservation of momentum and conservation of energy.	

PS.Phy.3.2 Use mathematics and computational thinking to analyze the relationship among impulse, momentum, and Newton's 3rd law.	Phy.1.3.2 Analyze the motion of objects based on the relationship between momentum and impulse.	
PS.Phy.4 Explain charge interactions in electrostatic systems and in electric circuits.	<i>Phy.3.1 Explain charges and electrostatic systems.</i>	
	<i>Phy.2.3 Analyze the nature of moving charges and electric circuits.</i>	
PS.Phy.4.1 Use models to qualitatively and quantitatively explain the fundamental properties and interactions (Coulomb's Law) of charged objects along with the conservation of charge.	Phy.3.1.1 Explain qualitatively the fundamental properties of the interactions of charged objects.	
	Phy.3.1.3 Explain how Coulomb's Law relates to the electrostatic interactions among charged objects.	
PS.Phy.4.2 Use models to explain the mechanisms for producing electrostatically charged objects, including charging by friction, conduction, and induction.	Phy.3.1.4 Explain the mechanisms for producing electrostatic charges, including charging by friction, conduction, and induction.	
PS.Phy.4.3 Use circuit models to qualitatively and quantitatively analyze the relationships among current, voltage, resistance, and power in series, parallel, and compound circuits.	Phy.2.3.1 Explain Ohm's Law in relation to electric circuits.	
	Phy.2.3.4 Analyze electric systems in terms of their energy and power.	
	Phy.2.3.5 Analyze systems with multiple potential differences and resistors connected in series and parallel circuits, both conceptually and mathematically, in terms of voltage, current and resistance.	
PS.Phy.5 Explain the concept of magnetism.	<i>Phy.3.2 Explain the concept of magnetism.</i>	
PS.Phy.5.1 Use models to qualitatively explain the relationship between magnetic domains and magnetism.	Phy.3.2.1 Explain the relationship between magnetic domains and magnetism.	

PS.Phy.5.2 Obtain, evaluate, and communicate information about the relationship between magnetism and electric currents to explain the role of magnets in current technology.	Phy.3.2.2 Explain how electric currents produce various magnetic fields.	
	Phy.3.2.3 Explain how transformers and power distributions are applications of electromagnetism.	

Energy		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.Phy.6 Understand the relationship among work, energy, and power.</i>	<i>Phy.2.1 Understand the concepts of work, energy, and power, as well as the relationship among them.</i>	
PS.Phy.6.1 Use models to qualitatively and quantitatively analyze the kinetic and potential energy in a system.	Phy.2.1.1 Interpret data on work and energy presented graphically and numerically.	
	Phy.2.1.2 Compare the concepts of potential and kinetic energy and conservation of total mechanical energy in the description of the motion of objects.	
PS.Phy.6.2 Analyze and interpret data to qualitatively and quantitatively explain the relationship among work, power, and energy.	Phy.2.1.3 Explain the relationship among work, power and energy.	

Waves and Their Applications		
2023 Standards/Objectives	2009 Essential Standards/Clarifying Objectives	Notes
<i>PS.Phy.7 Analyze the behavior of waves and their applications.</i>	<i>Phy.2.2 Analyze the behavior of waves.</i>	
PS.Phy.7.1 Obtain, evaluate, and communicate information to compare mechanical and electromagnetic waves (specifically light and sound) in terms of wave characteristics (frequency, wavelength, period, amplitude, velocity, and energy).	Phy.2.2.1 Analyze how energy is transmitted through waves, using the fundamental characteristics of waves: wavelength, period, frequency, amplitude, and wave velocity.	
	Phy.2.2.3 Compare mechanical and electromagnetic waves in terms of wave characteristics and behavior (specifically sound and light).	

PS.Phy.7.2 Use models to qualitatively and quantitatively compare reflection and refraction (Snell's Law).	Phy.2.2.2 Analyze wave behaviors in terms of transmission, reflection, refraction and interference.	
PS.Phy.7.3 Obtain, evaluate, and communicate information to summarize how instruments that transmit and detect waves are used in everyday life.		New - created based on <i>NRC Framework</i> and stakeholder feedback

Not Addressed:

Phy.2.3.2 Differentiate the behavior of moving charges in conductors and insulators. (Concept covered in Grade 6)

Phy.2.3.3 Compare the general characteristics of AC and DC systems without calculations. (Removed based on data gathered during the revision process)

Phy.3.1.2 Explain the geometries and magnitudes of electric fields. (Removed based on data gathered during the revision process)

Phy.3.1.5 Explain how differences in electrostatic potentials relate to the potential energy of charged objects. (Removed based on data gathered during the revision process)