NORTH CAROLINA STANDARD COURSE OF STUDY

K-12 Science, Physics

The North Carolina 2023 K-12 Science Standards are intended to foster conceptual understanding and help develop scientifically literate students. The standards provide foundational knowledge and practices within each grade band and course. The standards are organized within 11 strands which articulate vertical alignment. As students progress from one grade to the next, the depth of knowledge and level of sophistication increases.

Engaging in science encourages students' curiosity, interests, and prepares them for the broadest range of postsecondary opportunities, be it college, career, or military service. The 2023 K-12 Science Standards are designed to allow students to become active participants in science - building their understanding of the natural world through observations and investigations.

The scientific method provides a common framework for introducing the traditional experimental design and hypothesis-testing process. The methodologies or approaches utilized by scientists can vary depending on the nature of their research questions and available tools. Steps that all scientists follow when conducting scientific investigations usually involve asking questions, the collection and analysis of relevant data, the use of logical reasoning, opportunities to communicate and collaborate with others, and the development of explanations.

The Science and Engineering Practices (SEP) are embedded in the standards to support a greater emphasis on how students develop science knowledge and the durable skills within the NC Portrait of a Graduate. While one practice is identified in each objective, teachers should utilize other practices to support students' progress towards mastering the standards.

The North Carolina Science Standards maintain the respect for local control of each Public School Unit (PSU). These 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 PSU or school. The K-12 Science Standard Course of Study has been developed to serve as the framework for a well-planned science curriculum which provides opportunities for investigations, experimentation, and technological design.

Physics	
Strand: Motion and Stability- Forces and Interactions	
Standard	**Objectives**
PS.Phy.1 Analyze the motion of objects using time, distance, displacement, speed, velocity, and acceleration.	PS.Phy.1.1 Use models (graphs, equations, diagrams) to infer motion in one dimension.
	PS.Phy.1.2 Use models (graphs, equations, diagrams) to infer motion in two dimensions.
Standard	**Objectives**
PS.Phy.2 Analyze systems of forces and their interaction with matter.	PS.Phy.2.1 Use free body models to qualitatively and quantitatively analyze systems of forces in one dimension and two dimensions.
	PS.Phy.2.2 Carry out investigations to explain the interactions of forces on an object according to Newton's Laws of Motion.
	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).
	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.
	PS.Phy.2.5 Analyze and interpret data to explain the effect of elastic force on objects (Hooke's Law).
Standard	**Objectives**
PS.Phy.3 Analyze the motion of objects based on the principles of conservation of momentum and impulse in one dimension.	PS.Phy.3.1 Use models to analyze inelastic and elastic collisions in terms of the conservation of momentum in one dimension.
	PS.Phy.3.2 Use mathematics and computational thinking to analyze the relationship among impulse, momentum, and Newton's 3rd law.
Standard	**Objectives**
PS.Phy.4 Explain charge interactions in electrostatic systems and in electric circuits.	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.

	PS.Phy.4.2 Use models to explain the mechanisms for producing electrostatically charged objects, 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.
Standard	**Objectives**
PS.Phy.5 Explain the concept of magnetism.	PS.Phy.5.1 Use models to qualitatively 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.

Strand: Energy	
Standard	**Objectives**
PS.Phy.6 Understand the relationship among work, energy, and power.	PS.Phy.6.1 Use models to qualitatively and quantitatively analyze the kinetic and potential energy in a system.
	PS.Phy.6.2 Analyze and interpret data to qualitatively and quantitatively explain the relationship among work, power, and energy.

Strand: Waves and Their Applications in Technologies for Information Transfer	
Standard	**Objectives**
PS.Phy.7 Analyze the behavior of waves and their applications.	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).
	PS.Phy.7.2 Use models to qualitatively and quantitatively compare reflection and refraction (Snell's Law).
	PS.Phy.7.3 Obtain, evaluate, and communicate information to summarize how instruments that transmit and detect waves are used in everyday life.