Course Overview Physics

Content Area: **Science**
Course(s): **AP Language & Composition, Physics**
Time Period: **Year**
Length: **180**
Status: **Published**

Course Overview

Aligned to Standards: NJSLS 2020

Revision Date: Summer 2025

In compliance with the NJ Student Learning Standards, climate change, career readiness, DEI (Diversity, Equity, & Inclusivity), as well as other standards have been integrated within the NBCRSD curricula (NJ Administrative Code Title 6A: chapter 8; Title 18A: chapter 35).

Course Overview

Sequence- Unit Titles, Summaries, and Number of weeks per unit (total = 18 semester/36 year)

Unit 1: Force and Motion

In this unit of study, students are expected to *plan and conduct investigations, analyze data and using math to support claims*, and *apply scientific ideas to solve design problems* students in order to develop an understanding of ideas related to why some objects keep moving and some objects fall to the ground. Students will also build an understanding of forces and Newton's second law. Finally, they will develop an understanding that the total momentum of a system of objects is conserved when there is no net force on the system. Students are also able to apply science and engineering ideas to design, evaluate, and refine a device that minimizes the force on a macroscopic object during a collision. The crosscutting concepts of *patterns, cause and effect*, and *systems* and *systems models* are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in *planning and conducting investigations, analyzing data and using math to support claims*, and *applying scientific ideas to solve design problems* and to use these practices to demonstrate understanding of the core ideas.

Unit 2: Fundamental forces

In this unit of study, students plan and conduct investigations and apply scientific ideas to make sense of Newton's law of gravitation and Coulomb's Law. They apply these laws to describe and predict the gravitational and electrostatic forces between objects. The crosscutting concepts of *patterns, cause and effect*, and *systems* and *systems models* are called out as organizing concepts for these disciplinary core idea. Students are expected to demonstrate proficiency in *planning and conducting investigations, analyzing data and using math to support claims*, and *applying scientific ideas to solve design problems* and to use these practices to demonstrate understanding of the core ideas.

Unit 3: Kepler's Law

In this unit of study, students use *mathematical and computational thinking* to examine the processes governing the workings of the solar system and universe. The crosscutting concepts of *scale*, *proportion*,

and quantity are called out as organizing concepts for these disciplinary core ideas. Students are expected to demonstrate proficiency in *using mathematical and computational thinking* and to use this practice to demonstrate understanding of core ideas.

Unit 4: Energy

In this unit of study, students *develop and use models, plan and carry out investigations, use computational thinking and design solutions* as they make sense of the disciplinary core idea. The disciplinary core idea of Energy is broken down into subcore ideas: *definitions of energy, conservation of energy and energy transfer,* and *the relationship between energy and forces*. Energy is understood as a quantitative property of a system that depends on the motion and interactions of matter, and the total change of energy in any system is equal to the total energy transferred into and out of the system. Students also demonstrate their understanding of engineering principles when they design, build, and refine devices associated with the conversion of energy. The crosscutting concepts of *cause and effect, systems and systems models, energy and matter, and the influence of science, engineering, and technology on society and the natural world* are further developed in the performance expectations. Students are expected to demonstrate proficiency in *developing and using models, planning and carry out investigations, using computational thinking and designing solutions,* and they are expected to use these practices to demonstrate understanding of core ideas.

Unit 5: **Wave Properties**

In this unit of study, students apply their understanding of how wave properties can be used to transfer information across long distances, store information, and investigate nature on many scales. The crosscutting concept of *cause and effect* is highlighted as an organizing concept for these disciplinary core ideas. Students are expected to demonstrate proficiency in using *mathematical thinking*, and to use this practice to demonstrate understanding of the core idea.

Unit 6: **Electromagnetic Radiation**

In this unit of study, students are able to apply their understanding of wave properties to make sense of how electromagnetic radiation can be used to transfer information across long distances, store information, and be used to investigate nature on many scales. Models of electromagnetic radiation as both a wave of changing electrical and magnetic fields or as particles are developed and used. Students also demonstrate their understanding of engineering ideas by presenting information about how technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy. The crosscutting concepts of *systems and system models*; *stability and change; interdependence of science, engineering, and technology; and influence of engineering, technology, and science on society and the natural world* are highlighted as organizing concepts. Students are expected to demonstrate proficiency in *asking questions, engaging in argument from evidence, and obtaining, evaluating, and communicating information*, and they are expected to use these practices to demonstrate understanding of the core ideas.

Unit 7: Electricity and Magnetism

In this unit of study, students' understanding of how forces at a distance can be explained by fields, why some materials are attracted to each other while others are not, how magnets or electric currents cause magnetic fields, and how charges or changing magnetic fields cause electric fields. The crosscutting concept of *cause and effect* is called out as an organizing concept. Students are expected to demonstrate proficiency in *planning and conducting investigations and developing and using models.*

Reporting Student Progress (link to NB's Assessment System) All courses follow a balanced assessment system with Practice and Assessments. Each category includes formative, summative and alternative assessments.
Accommodations and Modifications (link to menu) Integrated accommodations and modifications for special education students, English language learners, students at risk of school failure, gifted and talented students, and students with 504 plans.