

Course Syllabus

Course Name: Physics 1

Description: In this course, students will be immersed in the contributions of scientific geniuses that have changed the way we observe and think about matter, forces, and energy in the universe. Starting with how matter moves, students will learn that all motion can be described, analyzed, and predicted. Then students will explore the causes of changing motion, forces! Energy is a fundamental property essential to human existence, and physics will take students through all the forms of it: electricity, light, sound, heat, and more. Discover how waves travel and interact with matter and the smallest particles in the universe. From tiny atoms to galaxies with millions of stars, the universal laws of physics are explained through real-world examples. Through laboratory activities, simulations, and graphical analysis, combined with rigorous mathematical efforts and problem solving, students follow in the footsteps of some of the world's greatest thinkers and learn to process their world in a unique way.

Prerequisites: Algebra 1 strongly recommended

Estimated Completion Time: 2 segments / 32–36 weeks.

Major Topics and Concepts:

Segment One:

- Learn about the mathematical skills and measurement systems used in physics
- Interpret scientific data and model relationships between variables with graphs
- Differentiate between scalar and vector quantities
- Describe and use the relationship between distance, time, and speed
- Solve problems involving speed, velocity, and acceleration
- Compare accelerated motion to non-accelerated motion
- Analyze motion using various motion graphs
- Explore free fall motion by utilizing the acceleration due to gravity
- Interpret and apply Newton's laws of motion to real-world scenarios
- Compare the four fundamental forces of the universe
- Use mathematical models to compute gravitational and electrostatic forces
- Illustrate the interactions between forces and matter using force diagrams
- Describe the planetary motion and solve circular motion problems
- Apply the law of conservation of momentum to real-world scenarios
- Describe the forms of energy and energy transformations
- Solve problems involving work and power
- Explain the impact of conservative and non-conservative forces on energy conversions
- Solve problems involving the different forms of energy

Segment Two:

- Identify the components of an electrical circuit
- Measure and calculate electrical fields
- Explore the relationship between electrical current and magnetism
- Describe how capacitors are used in electrical circuits and electronics
- Represent electrical circuits using a schematic model
- Apply Ohm's law to explore the impact of resistance in a circuit
- Model and measure simple harmonic motion
- Identify the parts of a wave and use wave measurement calculations
- Explain the different behaviors of waves when they interact with boundaries
- Construct ray diagrams and use the lens and mirror equation to analyze image formation
- Describe properties of waves and their applications in real-world phenomena
- Differentiate between temperature and heat
- Calculate heat transfer between a surrounding and a system
- Explore thermal equilibrium and the conservation of thermal energy
- Discover the contributions of scientists that led to the development of a model of the atom
- Describe the dual nature of light and the photoelectric effect
- Compare types of radiation and describe applications of radioactivity
- Explore the special theory of relativity and scientific explanations about the origin of the universe

Course Assessment and Participation Requirements:

To achieve success, students are expected to submit work in each course weekly. Students can learn at their own pace; however, "any pace" still means that students must make progress in the course every week. To measure learning, students complete self-checks, practice lessons, multiple-choice questions, Discussion-Based Assessments, discussions, and projects. Students are expected to maintain regular contact with teachers; the minimum requirement is monthly. When teachers, students, and parents work together, students are successful.
