

Course Title:	Physics (H)
Grade(s):	11-12

Course Description
Physics is one of the core sciences that involves studying the aspects of the physical world around us: things that you have been interacting with for years, but may not have been aware of. Physics focuses on the concepts of linear motion, such as driving a vehicle, and exploring when objects are tossed, kicked or launched. Physics also studies momentum, impulse and forces, all of which are all related to collisions. Other topics include magnetism, electrostatics, electrodynamics, power generation, alternating and direct electric current, sound waves, lasers, optics, light and mirrors. Physics is a lab science and as such a majority of the course is lab work. This includes experimentation, data analysis, and written communication of lab results. An algebraic lens is used to explain and support the concepts of physics throughout the year. It is recommended that all wishing to pursue a career in the STEM fields take physics. Honors-level courses are designed to challenge the advanced learner. Students should expect to reach a deeper scope of skills than the academic class: a higher reading stamina, the motivation to revise work, critical thinking skills, and the propensity to finish complex tasks in a timely manner. Students in honors-level classes are expected to have a solid foundation of skills from previous courses and an ability to connect these skills to new learning and apply these skills in problem solving. Students taking an honors-level class have demonstrated the ability to take responsibility for their own learning, work fluidly both independently and collaboratively, and display the propensity to finish complex tasks in a timely manner. These students should consistently aspire to achieve higher-level quality work through self-reflection and self-advocacy. These classes are recommended to students by teachers who have evaluated a student's past practice and achievement.
Approved Curricular Materials/Textbook(s)

Unit Title	Unit Description (Include Unit Objectives)	Unit Pacing
Unit 1: Intro to Physics and	To understand and describe the universe, scientists use measurements of physical quantities such as length, mass, and time. Students will learn how to	1 week (September)

Measurement	take appropriate measurements, and recognize how an understanding of the precision and accuracy of those measurements is an important part of using them.	
Unit 2: Forces and Vectors	We begin our study of physics by introducing the concept of forces. An interaction between two objects can be described in terms of two forces. To understand the motion of objects, we must analyze forces. Forces are one of many vector quantities in physics. In the context of forces, we will introduce the concept of vectors, and the vector operations we will use.	3 weeks (September)
Unit 3: Motion in 1 Dimension	Students will learn to describe the motion of objects in terms of position, displacement, velocity, and acceleration. This includes looking at the process of taking appropriate measurements. They will learn to distinguish between the vector and scalar quantities that describe motion, and represent each appropriately. These quantities will be used to model and solve problems using kinematic relationships, algebra, and vector operations. Interpreting graphs that represent motion is a key element in the study of motion.	4 weeks (September-October)
Unit 4: Motion in 2 Dimensions	Students will learn to describe and analyze the two dimensional motion of a projectile. They will see how the descriptions, quantities, modeling, graphing and other techniques they learned to analyze one dimensional motion can be applied to the analysis of two dimensional motion.	3 weeks (November)
Unit 5: Forces and Motion	Students will explore the fundamental principles that explain why objects move and how forces shape the motion of objects. Beginning with Newton's Laws, students will investigate the relationships between force, mass, and acceleration to understand their effect on motion. Through hands-on experiments, data analysis, students will examine different types of forces—including gravity, friction, tension, and normal force—and learn how they interact in everyday situations. By the end of this unit, students will be able to analyze motion using free-body diagrams, predict the effects of balanced and unbalanced forces, and apply mathematical models to describe dynamic systems.	3 weeks (December)
Unit 6: Circular Motion	Students are introduced to the quantities that can be used to describe an object	2 weeks

	moving in a circle, and dynamics of such movement. The concepts of centripetal acceleration and centripetal force are studied.	(December-January)
Unit 7: Energy	This unit explores how and why things move and change in the world around us in the context of energy. Students learn that energy is present in different forms, and can be transformed from one form to another but is never created or destroyed. The unit emphasizes the law of conservation of energy, and the relationship between work and energy. Students will learn to model and solve problems by analyzing the transformation of energy in a system to different forms.	3 weeks (January-February)
Unit 8: Momentum	The momentum unit introduces students to the idea that a system of objects can be described in terms of a measurable quantity called momentum, which depends on both mass and velocity. Students explore how momentum is transferred by forces and that momentum is conserved during interactions like collisions and explosions. Through hands-on activities, and mathematical modeling, students will learn to model and solve problems by analyzing the momentum in a system, and distinguish between elastic and inelastic collisions. By the end of the unit, students gain a deeper understanding of how momentum can be used to explain and predict the motion of objects in everyday situations.	3 weeks (February-March)
Unit 9: Rotational Motion	Students are introduced to the principles that govern objects rotating. Students learn key quantities such as angular displacement, angular velocity, and angular acceleration, and explore how these relate to their linear counterparts. The unit also covers the concepts of torque, rotational inertia, and rotational energy helping students understand why some objects rotate easier than others and how forces change rotational motion. Through experiments, mathematical modeling, students develop a deeper understanding of how rotational motion can be used to explain and predict the motion of objects.	3 weeks (March-April)
Unit 10: Waves, Sound and Optics	Students are introduced to the behavior of waves and how waves transfer energy. Students learn key wave properties—such as wavelength, frequency, amplitude, and speed—and explore how these characteristics determine the nature of sound and light. Students also investigate how waves can be reflected, refracted, and how interference affects waves. The unit explains how sound waves travel through matter, how pitch and loudness relate to waves, and how	5 weeks (April-May)

	resonance shapes musical tones. Through demonstrations, and investigations, students discover how waves are related to vision, hearing and other everyday experiences.	
Unit 11: Electricity	Students are introduced to the principles that govern electric charges and the forces between them. Students learn about electric fields, electric potential, voltage, current, and resistance, and how these concepts come together to describe the behavior of electric circuits. Investigations include creating and analyzing series and parallel circuits to observe how the components of a circuit affect each other. By the end of the course, students will gain a better understanding of the role electricity plays in everyday life.	1 week (June)