

Course Title:	AP Physics 1
Grade(s):	11-12

Course Description
AP Physics 1 is an algebra-based, introductory college-level physics course. Students cultivate their understanding of physics through classroom study, in-class activity, and hands-on, inquiry-based laboratory work as they explore concepts like systems, fields, force interactions, change, and conservation.
Approved Curricular Materials/Textbook(s)

Unit Title	Unit Description (Include Unit Objectives)	Unit Pacing
Unit 1: Kinematics	This unit focuses on describing motion using position, velocity, and acceleration in one and two dimensions. Students learn to represent motion using graphs, equations, and diagrams and to interpret how objects move over time without considering the forces that cause the motion. Students will be able to: • Distinguish between scalar and vector quantities • Calculate and interpret displacement, velocity, and acceleration • Analyze motion using position–time and velocity–time graphs • Solve problems involving constant acceleration • Describe projectile motion and relative motion	3–4 weeks
Unit 2: Force and Translational Dynamics	Students examine how forces influence motion through Newton’s Laws. They model physical situations using free-body diagrams and analyze how multiple forces combine to determine acceleration. Applications include friction, tension, gravity, and circular motion.	4–5 weeks

	Students will be able to: • Draw and interpret free-body diagrams • Apply Newton's First, Second, and Third Laws • Identify and model common forces (gravity, normal, friction, tension, spring) • Predict motion based on net force • Analyze systems involving circular motion	
Unit 3: Work, Energy, and Power	This unit introduces energy as a method for analyzing physical systems. Students explore how work transfers energy and how kinetic and potential energy change during motion. Conservation of energy is emphasized, along with how power describes the rate of energy transfer. Students will be able to: • Calculate work done by a force • Define and compute kinetic and potential energy • Apply conservation of mechanical energy • Analyze the effects of non-conservative forces like friction • Calculate and interpret power	4 weeks
Unit 4: Linear Momentum	Students study momentum and how it changes during interactions. The focus is on impulse and the conservation of momentum in isolated systems, especially during collisions. The unit provides an alternative approach to analyzing motion when forces act over short times. Students will be able to: • Define and calculate linear momentum • Relate impulse to change in momentum • Apply conservation of momentum • Distinguish between elastic and inelastic collisions • Analyze multi-object collision systems	3 weeks
Unit 5: Torque and Rotational Dynamics	This unit extends motion concepts to rotating systems. Students analyze how torque produces angular acceleration and how rotational equilibrium occurs when	4 weeks

	net torque is zero. Rotational motion is compared to linear motion using parallel concepts. Students will be able to: • Define and calculate torque • Determine conditions for rotational equilibrium • Analyze rotational kinematics • Understand rotational inertia and its dependence on mass distribution • Apply Newton's Second Law to rotational motion	
Unit 6: Energy and Momentum of Rotating Systems	Students apply energy and momentum principles to rotating objects. The unit focuses on rotational kinetic energy, work done by torques, and angular momentum. Rolling motion is explored as a combination of translation and rotation. Students will be able to: • Calculate rotational kinetic energy • Apply work–energy principles to rotating systems • Define and conserve angular momentum • Analyze rolling motion • Relate angular momentum to real-world systems	3 weeks
Unit 7: Oscillations	This unit examines periodic motion, particularly simple harmonic motion. Students analyze how position, velocity, and acceleration vary over time and how energy shifts between kinetic and potential forms within oscillating systems. Students will be able to: • Identify systems that exhibit simple harmonic motion • Calculate period and frequency • Relate restoring force to displacement • Analyze energy in oscillating systems • Interpret motion graphs for oscillators	3 weeks
Unit 8: Fluids	Students investigate fluids at rest and in motion. They explore pressure, buoyant force, and fluid flow and connect these ideas to energy conservation and forces in earlier units.	2–3 weeks

	Students will be able to: • Define and calculate density and pressure • Apply Archimedes' principle • Analyze buoyant forces • Use the continuity equation • Apply Bernoulli's principle to flowing fluids	
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