

Course Overview	<p>In Advanced Physics, students conduct laboratory and field investigations, use scientific practices during investigations, and make informed decisions using critical thinking and scientific problem solving. Students study a variety of topics that include: laws of motion, changes within physical systems and conservation of energy and momentum, forces, characteristics and behavior of waves, and electricity and magnetism. Students will apply conceptual knowledge and collaborative skills to experimental design, implementation, and interpretation. By the end of Grade 12, students are expected to gain sufficient knowledge of the scientific and engineering practices across the disciplines of science to make informed decisions using critical thinking and scientific problem solving.</p> <p>Advanced Physics meets all the Physics TEKS standards as a minimum standard and uses the College Board AP Physics 1 & 2 standards as a target.</p>
Course Standards	Physics TEKS
Instructional Materials	<p>The IDEA Advanced Physics curriculum is the approved curriculum. Educational technology such as Khan Academy Physics classroom, Physics Aviary, and PhET simulations are embedded into the core curriculum. The CK-12 Online Interactive Textbook is used as a supplemental resource. Lab activities and the proper supplies to conduct them are required to satisfy both the standards and the 40% lab experience required by TEA.</p>

Scope & Sequence

Units/Modules & Instructional Days	Assessments & Scanning Deadlines	Standards
Unit 01: 1D Kinematics 16-17 Days	TX_SCI_AdvancedPhysics_F26_UE1 Scanning Deadline: September 24, 2026	<p>TEKS Standards</p> <p>PHYS.5 Science concepts. The student knows and applies the laws governing motion in a variety of situations.</p> <p>PHYS.5.A The student is expected to analyze different types of motion by generating and interpreting position versus time, velocity versus time, and acceleration versus time using hand graphing and real-time technology such as motion detectors, photogates, or digital applications;</p> <p>PHYS.5.B The student is expected to define scalar and vector quantities related to one- and two-dimensional motion and combine vectors using both graphical vector addition and the Pythagorean theorem;</p> <p>PHYS.5.C The student is expected to describe and analyze motion in one dimension using equations with the concepts of distance, displacement, speed, velocity, frames of reference, and acceleration;</p> <p>College Board Standards</p> <p>1.1.A Describe a scalar or vector quantity using magnitude and direction, as appropriate.</p> <p>1.1.B Describe a vector sum in one dimension.</p> <p>1.2.A Describe a change in an object's position.</p> <p>1.2.B Describe the average velocity and acceleration of an object.</p> <p>1.3.A Describe the position, velocity, and acceleration of an object using representations of that object's motion.</p>

		<p>1.4.A Describe the reference frame of a given observer.</p> <p>1.4.B Describe the motion of objects as measured by observers in different inertial reference frames.</p>
Unit 02: 2D Kinematics 15-16 Days	TX_SCI_AdvancedPhysics_F26_UE2 Scanning Deadline: October 15, 2026	<p>TEKS Standards</p> <p>PHYS.5 Science concepts. The student knows and applies the laws governing motion in a variety of situations.</p> <p>PHYS.5.D The student is expected to describe and analyze acceleration in uniform circular and horizontal projectile motion in two dimensions using equations;</p> <p>College Board Standards</p> <p>1.5.A Describe the perpendicular components of a vector.</p> <p>1.5.B Describe the motion of an object moving in two dimensions.</p>
Unit 03: Dynamics 16-17 Days	TX_SCI_AdvancedPhysics_F26_MUE3 Scanning Deadline: November 05, 2026 TX_SCI_AdvancedPhysics_F26_UE3 Scanning Deadline: November 19, 2026	<p>TEKS Standards</p> <p>PHYS.5 Science concepts. The student knows and applies the laws governing motion in a variety of situations.</p> <p>PHYS.5.E The student is expected to explain and apply the concepts of equilibrium and inertia as represented by Newton's first law of motion using relevant real-world examples such as rockets, satellites, and automobile safety devices;</p> <p>PHYS.5.F The student is expected to calculate the effect of forces on objects, including tension, friction, normal, gravity, centripetal, and applied force, using free body diagrams and the relationship between force and acceleration as represented by Newton's second law of motion;</p> <p>PHYS.5.G The student is expected to illustrate and analyze the simultaneous forces between two objects as represented in Newton's third law of motion using free body diagrams and in an experimental design scenario; and</p> <p>PHYS.5.H The student is expected to describe and calculate, using scientific notation, how the magnitude of force between two objects depends on their mass and the distance between their centers, and predict the effects on objects in linear and orbiting systems using Newton's law of universal gravitation.</p> <p>PHYS.6 Science concepts. The student knows the nature of forces in the physical world. The student is expected to:</p> <p>College Board Standards</p> <p>2.1: Systems and Center of Mass</p> <p>2.1.A Describe the properties and interactions of a system.</p> <p>2.1.B Describe the location of a system's center of mass with respect to the system's constituent parts.</p> <p>2.2 Forces and Free-Body Diagrams</p> <p>2.2.A Describe a force as an interaction between two objects or systems.</p> <p>2.2.B Describe the forces exerted on an object or system using a free-body diagram.</p> <p>2.3: Newton's Third Law</p> <p>2.3.A Describe the interaction of two objects using Newton's third law and a representation of paired forces exerted on each object.</p> <p>2.4: Newton's First Law</p> <p>2.4.A Describe the conditions under which a system's velocity remains constant.</p> <p>2.5: Newton's Second Law</p>

		<p>2.5.A Describe the conditions under which a system's velocity changes.</p> <p>2.6: Gravitational Force</p> <p>2.6.A Describe the gravitational interaction between two objects or systems with mass.</p> <p>2.6.B Describe situations in which the gravitational force can be considered constant.</p> <p>2.6.C Describe the conditions under which the magnitude of a system's apparent weight is different from the magnitude of the gravitational force exerted on that system.</p> <p>2.6.D Describe inertial and gravitational mass.</p> <p>2.7 Kinetic and Static Friction</p> <p>2.7.A Describe kinetic friction between two surfaces</p> <p>2.7.B Describe static friction between two surfaces.</p> <p>2.8 Spring Forces</p> <p>2.8.A Describe the force exerted on an object by an ideal spring</p>
<p>Unit 04: Circular Motion</p> <p>9-10 Days</p>	<p>NO UNIT EXAM</p>	<p>TEKS Standards</p> <p>PHYS.5 Science concepts. The student knows and applies the laws governing motion in a variety of situations.</p> <p>PHYS.5.D</p> <p>The student is expected to describe and analyze acceleration in uniform circular and horizontal projectile motion in two dimensions using equations;</p> <p>College Board Standards</p> <p>2.9: Circular Motion</p> <p>2.9.A Describe the motion of an object traveling in a circular path.</p>
<p>Unit 05: Energy</p> <p>17-18 Days</p>	<p>TX_SCI_AdvancedPhysics_S27_UE5</p> <p>Scanning Deadline: February 04, 2027</p>	<p>TEKS Standards</p> <p>PHYS.7 Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum. The student is expected to:</p> <p>PHYS.7.A</p> <p>The student is expected to calculate and explain work and power in one dimension and identify when work is and is not being done by or on a system;</p> <p>PHYS.7.B</p> <p>The student is expected to investigate and calculate mechanical, kinetic, and potential energy of a system;</p> <p>PHYS.7.C</p> <p>The student is expected to apply the concept of conservation of energy using the work-energy theorem, energy diagrams, and energy transformation equations, including transformations between kinetic, potential, and thermal energy;</p> <p>College Board Standards</p> <p>3.1.A Describe the translational kinetic energy of an object in terms of the object's mass and velocity.</p> <p>3.2.A Describe the work done on an object or system by a given force or collection of forces.</p> <p>3.3 Potential Energy 3.3.A Describe the potential energy of a system.</p> <p>3.4.A Describe the energies present in a system.</p> <p>3.4.B Describe the behavior of a system using conservation of mechanical energy principles.</p> <p>3.4.C Describe how the selection of a system determines whether the energy of that system changes.</p> <p>3.5.A Describe the transfer of energy into, out of, or within a system in terms of power.</p>

Semester Exam Window 12/07 – 12/18/26 | Scanning Deadline January 08, 2027

Unit 06: Momentum 13-14 Days	TX_SCI_AdvancedPhysics_S27_UE4 Scanning Deadline: March 04, 2027	TEKS Standards PHYS.7 Science concepts. The student knows that changes occur within a physical system and applies the laws of conservation of energy and momentum . The student is expected to: PHYS.7.D The student is expected to calculate and describe the impulse and momentum of objects in physical systems such as automobile safety features, athletics, and rockets; and PHYS.7.E The student is expected to analyze the conservation of momentum qualitatively in inelastic and elastic collisions in one dimension using models, diagrams, and simulations. College Board Standards 4.1.A Describe the linear momentum of an object or system. 4.2.A Describe the impulse delivered to an object or system. 4.2.B Describe the relationship between the impulse exerted on an object or a system and the change in momentum of the object or system. 4.3.A Describe the behavior of a system using conservation of linear momentum. 4.3.B Describe how the selection of a system determines whether the momentum of that system changes. 4.4.A Describe whether an interaction between objects is elastic or inelastic
Unit 07: Simple Harmonic Motion 6-7 Days	TX_SCI_AdvancedPhysics_S27_UE5 Scanning Deadline: March 11, 2027	TEKS Standards PHYS.8 Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: PHYS.8.A The student is expected to examine and describe simple harmonic motion such as masses on springs and pendulums and wave energy propagation in various types of media such as surface waves on a body of water and pulses in ropes; College Board Standards 7.1.A Describe simple harmonic motion. 7.2.A Describe the frequency and period of an object exhibiting SHM. 7.3.A Describe the displacement, velocity, and acceleration of an object exhibiting SHM. 7.4.A Describe the mechanical energy of a system exhibiting SHM.
Unit 08: Waves, Sound, Light 20-21 Days	TX_SCI_AdvancedPhysics_S27_UE5 Scanning Deadline: April 22, 2027	TEKS Standards PHYS.8 Science concepts. The student knows the characteristics and behavior of waves. The student is expected to: PHYS.8.B The student is expected to compare the characteristics of transverse and longitudinal waves, including electromagnetic and sound waves; PHYS.8.C The student is expected to investigate and analyze characteristics of waves, including velocity, frequency, amplitude, and wavelength, and calculate using the relationships between wave speed, frequency, and wavelength; PHYS.8.D The student is expected to investigate behaviors of waves, including reflection, refraction, diffraction, interference, standing wave, the Doppler effect and polarization and superposition; and PHYS.8.E

		<p>The student is expected to compare the different applications of the electromagnetic spectrum, including radio telescopes, microwaves, and x-rays;</p> <p>PHYS.8.F The student is expected to investigate the emission spectra produced by various atoms and explain the relationship to the electromagnetic spectrum; and</p> <p>PHYS.8.G The student is expected to describe and predict image formation as a consequence of reflection from a plane mirror and refraction through a thin convex lens.</p> <p>College Board Standards 14.1.A Describe the physical properties of waves and wave pulses. 14.2.A Describe the physical properties of periodic waves. 14.3.A Describe the interaction between a waves and a boundary 14.4.A Describe the Properties of an Electromagnetic Wave 14.5.A Describe the properties of a wave based on the relative motion between the source of the wave and the observer of the wave. 14.6.A Describe the net disturbance that occurs when two or more wave pulses or waves overlap. 14.6.B Describe the properties of a standing wave. 14.7.A Describe the behavior of a wave and the diffraction pattern resulting from a wave passing through a single opening.</p>
Unit 09: Electrostatics & Circuits 13 Days	NO UNIT EXAM	<p>TEKS Standards PHYS.6.A The student is expected to use scientific notation and predict how the magnitude of the electric force between two objects depends on their charge and the distance between their centers using Coulomb's law; PHYS.6.B The student is expected to identify and describe examples of electric and magnetic forces and fields in everyday life such as generators, motors, and transformers; PHYS.6.C The student is expected to investigate and describe conservation of charge during the processes of induction, conduction, and polarization using different materials such as electroscopes, balloons, rods, fur, silk, and Van de Graaf generators; PHYS.6.D The student is expected to analyze, design, and construct series and parallel circuits using schematics and materials such as switches, wires, resistors, lightbulbs, batteries, voltmeters, and ammeters; and PHYS.6.E The student is expected to calculate current through, potential difference across, resistance of, and power used by electric circuit elements connected in both series and parallel circuit using Ohm's law.</p> <p>College Board Standards 10.1.A Describe the electric force that results from the interactions between charged objects or systems. 10.2.A Describe the behavior of a system using conservation of charge. 11.1.A Describe the movement of electric charges through a medium. 11.2.A Describe the behavior of a circuit. 11.4.A Describe the transfer of energy into, out of, or within an electric circuit, in terms of power.</p>

		11.5.A Describe the equivalent resistance of multiple resistors connected in a circuit. 11.5.C Describe the measurement of current and potential difference in a circuit 11.6.A Describe a circuit or elements of a circuit by applying Kirchhoff's loop rule. 11.7.A Describe a circuit or elements of a circuit by applying Kirchhoff's junction rule.
Final Exam Review 5-10 days	N/A	Targeted review of key skills and content gaps identified from student data.
Advanced Physics Final Exam Window (<i>varies by region</i>) Scanning Deadline: Friday of second to last week of the school (Regional Academic Calendar)		
Unit 10: Quantum Phenomenon 5-10 days	NO UNIT EXAM	TEKS Standards PHYS.9 Science concepts. The student knows examples of quantum phenomena and their applications. The student is expected to: PHYS.9.A The student is expected to describe the photoelectric effect and emission spectra produced by various atoms and how both are explained by the photon model for light; PHYS.9.B The student is expected to investigate Malus's Law and describe examples of applications of wave polarization, including 3-D movie glasses and LCD computer screens; PHYS.9.C The student is expected to compare and explain how superposition of quantum states is related to the wave-particle duality nature of light; and PHYS.9.D The student is expected to give examples of applications of quantum phenomena, including the Heisenberg uncertainty principle, quantum computing, and cybersecurity.

College Board Advanced Placement Alignment

Instruction in this course is aligned to the College Board AP Standards described in the Course and Exam Description (CED) document.

Instructional Materials

Optional Online Textbook – [openstax College Physics for AP Courses \(Chapters 1-12 & 16.1 – 16.5\)](#)

Supplemental instructional materials may be used to support instruction. Supplemental materials do not replace board-approved core instructional materials.

Instructional Expectations

Instruction is delivered using board-approved instructional materials and aligned to the scope and sequence outlined above. Teachers are expected to ensure all required standards are taught within the course timeframe.

Assessment Overview

Student learning is monitored through formative and summative assessments aligned to course standards. Assessment results are used to inform instruction and student supports. Students participate in the College Board AP Exam Testing in May 2027.