

Physics

Time on Task: 4.5 hours per week

Course Philosophy

Science reflects the magnificent order and complexity of God’s creation. It presents God as the great Designer, Sustainer, and Lawgiver. Students will continually be called on to see the divine wisdom of creation and its implications for other subjects. The student’s mind will be challenged to understand the universe and refute the man-made idea of evolution. Science is presented to show how man is created in God’s image in order to fulfill the Genesis command to subdue the earth and exercise the privilege to rule over it (Genesis 1:28a)

Course Description

In Physics, students conduct field and laboratory investigations, use scientific methods 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; force; thermodynamics; characteristics and behavior of waves; and quantum physics. This course provides students with a conceptual framework, factual knowledge, and analytical and scientific skills.

Goals and Objectives Texas Essential Knowledge and Skills (TEKS)	Scope and Sequence Mechanics	Spiritual Goals God’s intended purpose for science:
<p>§112.47. Physics.</p> <p>(a) General requirements. Students shall be awarded one credit for successful completion of this course. Suggested prerequisites: one unit of high school science, Algebra I, and completion of or concurrent enrollment in a second year of mathematics. This course is recommended for students in Grades 10, 11, or 12.</p> <p>(b) Introduction.</p> <p>(1) In Physics, students conduct field and laboratory investigations, use scientific methods 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; force; thermodynamics; characteristics and behavior of waves; and quantum physics. This course provides students with a conceptual framework, factual knowledge, and analytical and scientific skills.</p> <p>(2) Science is a way of learning about the natural world. Students should know how science has built a vast body of changing and</p>	<ul style="list-style-type: none"> • One-Dimensional Kinematics • Vectors in Physics • Two-Dimensional Kinematics • Newton’s Laws of Motion • Applications of Newton’s Laws • Work and Kinetic Energy • Potential Energy and Conservation of Energy • Linear Momentum and collisions • Rotational Kinematics and Energy • Rotational Dynamics and Static Equilibrium 	<ol style="list-style-type: none"> 1. To learn that God looks at the intent of the heart rather than outward beauty. (I Samuel 16:7) 2. To learn that God’s glory is evident in all of nature. (Psalm 19:1) 3. To learn that God created the world. (Genesis 1:16) 4. To learn that all wisdom is found in God. (Proverbs 3:19) 5. To understand that our knowledge of the origin of life comes from God alone. God tells us that we can know of origins only by believing what He says. (Hebrews 11:3) 6. To know that no person was present or had any knowledge of His work at the beginning. (Job 38:4, 21) 7. To understand that all living things have their origin in God. (Genesis

<p>increasing knowledge described by physical, mathematical, and conceptual models, and also should know that science may not answer all questions.</p> <p>(3) A system is a collection of cycles, structures, and processes that interact. Students should understand a whole in terms of its components and how these components relate to each other and to the whole. All systems have basic properties that can be described in terms of space, time, energy, and matter. Change and constancy occur in systems and can be observed and measured as patterns. These patterns help to predict what will happen next and can change over time.</p> <p>(4) Investigations are used to learn about the natural world. Students should understand that certain types of questions can be answered by investigations, and that methods, models, and conclusions built from these investigations change as new observations are made. Models of objects and events are tools for understanding the natural world and can show how systems work. They have limitations and based on new discoveries are constantly being modified to more closely reflect the natural world.</p>	<ul style="list-style-type: none"> • Gravity • Oscillations About Equilibrium • Waves and Sound • Fluids <p>Thermal Physics</p> <ul style="list-style-type: none"> • Temperature and Heat • Phases and Phase Changes • The Laws of Thermodynamics <p>Electromagnetism</p> <ul style="list-style-type: none"> • Electric Charges, Forces, and Fields • Electric Potential and Electric Potential Energy • Electric Current and Direct-Current Circuits • Magnetism • Magnetic Flux and Faraday’s Law of Induction • Alternating-Current Circuits <p>Light and Optics</p> <ul style="list-style-type: none"> • Electromagnetic Waves • Geometrical Optics • Optical Instruments • Physical Optics: Interference and Diffraction <p>Modern Physics</p> <ul style="list-style-type: none"> • Relativity • Quantum Physics • Atomic Physics • Nuclear Physics and Nuclear Radiation 	<p>1:11-13, 20-27, 31)</p> <ol style="list-style-type: none"> 8. To understand that God cares about all living things. (Matthew 6:26, 28-30) 9. To understand that God controls the ecological system. He can make things grow or not grow, be sturdy or diseased. (Psalm 65:9-13) 10. To understand that God is the beginning of life on earth. Organisms were first created as mature, complete, and perfect. (Genesis 1:27, 28; 2:19, 20, 23, 24) 11. To know that plants, animals, and man were each created with specific purposes. (Psalm 104:14, 15) <p>Biblical Integration Truth Statements</p> <ol style="list-style-type: none"> 1. <i>What is prime reality, the really real?</i> God exists and is the ultimate reality. (Psalm 90:2, Revelation 22:13) <ol style="list-style-type: none"> a. God designed, created, and sustains His creation. (Genesis 1:1-31) b. God is good, holy, and loving. (Luke 18:19, 1 John 4:16, 1 Peter 1:16, Psalm 145:12) c. God is omniscient – all knowing. (Romans 11:33-36, Psalm 147:5) d. God is sovereign – nothing is beyond His ultimate interest, control, and authority. (Daniel 4:25) e. God is personal and also triune-
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<p>(c) Knowledge and skills.</p> <p>(1) Scientific processes. The student, for at least 40% of instructional time, conducts field and laboratory investigations using safe, environmentally appropriate, and ethical practices. <i>The student is expected to:</i></p> <p>(A) demonstrate safe practices during field and laboratory investigations; and</p> <p>(B) make wise choices in the use and conservation of resources and the disposal or recycling of materials.</p> <p>(2) Scientific processes. The student uses scientific methods during field and laboratory investigations. <i>The student is expected to:</i></p> <p>(A) plan and implement experimental procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;</p> <p>(B) make quantitative observations and measurements with precision;</p> <p>(C) organize, analyze, evaluate, make inferences, and predict trends from data;</p> <p>(D) communicate valid conclusions;</p> <p>(E) graph data to observe and identify relationships between variables; and</p> <p>(F) read the scale on scientific instruments with precision.</p> <p>(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. <i>The student is expected to:</i></p> <p>(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;</p> <p>(B) express laws symbolically and employ mathematical procedures including vector addition and right-triangle</p>	<p>Correlation with TEKS <u>Physics</u> Addison-Wesley (Pearson) Student ISBN 978-0-13-700734-9 Teacher ISBN 978-1-59166-541-0</p> <p>Chapter 1</p> <p>Chapter 1</p> <p>Chapter 1</p> <p>Chapter 1</p> <p>Chapter 1</p> <p>Chapter 1</p> <p>Chapters 1, 2, 3, 5, 6, 12, 18, 19</p> <p>Chapters 5, 6, 18, 19</p>	<p>He is coequally and coeternally God the Father, God the Son, Jesus, and God the Holy Spirit. (Hebrews 1:3)</p> <p>2. <i>What is the nature of external reality, that is, the world around us?</i></p> <p>a. God is the source of everything and created the universe out of nothing. (Genesis 1:1)</p> <p>b. The universe was created by God to be orderly. (Isaiah 45:18, Psalm 147:4)</p> <p>c. God is constantly involved in the unfolding pattern of the ongoing operation of the universe. (Psalm 24:1-2, Psalm 32:13-15)</p> <p>d. The universe reflects His glory. (Psalm 8:1, Psalm 19:1)</p> <p>3. <i>What is a human being?</i></p> <p>a. God created humans to know Him intimately and to have a loving relationship with Him. (Psalm 100:3)</p> <p>b. Human beings are created in the image of God with the capacity to choose. (Genesis 1:27, Proverbs 8:10)</p> <p>c. Adam and Eve chose disobedience and brought death to themselves and sin entered the world. (Romans 5:12)</p> <p>d. All human beings have a choice and all have chosen sin that brings separation from God. (Romans 3:23)</p> <p>e. Sin is rebellion against God's wishes and ways and this</p>
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<p>geometry to solve physical problems;</p> <p>(C) evaluate the impact of research on scientific thought, society, and the environment;</p> <p>(D) describe the connection between physics and future careers; and</p> <p>(E) research and describe the history of physics and contributions of scientists.</p> <p>(4) Science concepts. The student knows the laws governing motion.</p> <p><i>The student is expected to:</i></p> <p>(A) generate and interpret graphs describing motion including the use of real-time technology;</p> <p>(B) analyze examples of uniform and accelerated motion including linear, projectile, and circular;</p> <p>(C) demonstrate the effects of forces on the motion of objects;</p> <p>(D) develop and interpret a free-body diagram for force analysis; and</p> <p>(E) identify and describe motion relative to different frames of reference.</p> <p>(5) Science concepts. The student knows that changes occur within a physical system and recognizes that energy and momentum are conserved.</p> <p><i>The student is expected to:</i></p> <p>(A) interpret evidence for the work-energy theorem;</p> <p>(B) observe and describe examples of kinetic and potential energy and their transformations;</p> <p>(C) calculate the mechanical energy and momentum in a physical system such as billiards, cars, and trains; and</p> <p>(D) demonstrate the conservation of energy and momentum.</p> <p>(6) Science concepts. The student knows forces in nature.</p> <p><i>The student is expected to:</i></p> <p>(A) identify the influence of mass and distance on gravitational forces;</p> <p>(B) research and describe the historical development of the concepts of gravitational, electrical, and magnetic force;</p> <p>(C) identify and analyze the influences of charge and distance on electric forces;</p> <p>(D) demonstrate the relationship between electricity and</p>	<p>Chapter 1</p> <p>Chapter 1</p> <p>Chapters 1, 5, 6, 18, 19</p> <p>Chapters 2, 4</p> <p>Chapters 2, 4, 6</p> <p>Chapters 5, 6</p> <p>Chapters 5, 6</p> <p>Chapters 2, 4</p> <p>Chapter 7</p> <p>Chapters 7, 8</p> <p>Chapters 7, 8, 9</p> <p>Chapters 7, 8, 9</p> <p>Chapter 12</p> <p>Chapters 1, 12, 19</p> <p>Chapter 19</p> <p>Chapters 22, 23</p>	<p>destroys our relationship with God. (Romans 8:7-8)</p> <p>f. God provides a way back to Himself through the death of His son Jesus (the second person of the Trinity), on the cross. (John 3:16, Romans 6:23)</p> <p>g. Human beings must respond to God with repentance of our sins, receiving forgiveness, and accepting Jesus as our Savior. (Romans 10:9-10)</p> <p>4. <i>What happens to a person at death?</i></p> <p>a. For each person death is either the gate to life with God and His people or the gate to eternal separation from God. (1 Corinthians 50:52)</p> <p>b. After death, your soul will continue to exist in an eternal way and there is a final judgment by God. (Revelation 20:12)</p> <p>c. Everyone chooses to honor and love Him by accepting Jesus as our Lord and Savior or makes a choice to reject Jesus and grasp for self-fulfillment and personal glory. (Romans 6:23)</p> <p>d. Those who received Jesus as Savior will spend eternity in Heaven with God. (Philippians 4:10-21)</p> <p>e. Those who rejected Jesus as Savior will spend eternity in Hell without God. (Hebrews 10:26-27)</p> <p>5. <i>Why is it possible to know anything at all?</i></p>
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<p>magnetism;</p> <p>(E) design and analyze electric circuits; and</p> <p>(F) identify examples of electrical and magnetic forces in everyday life.</p> <p>(7) Science concepts. The student knows the laws of thermodynamics. <i>The student is expected to:</i></p> <p>(A) analyze and explain everyday examples that illustrate the laws of thermodynamics; and</p> <p>(B) evaluate different methods of heat energy transfer that result in an increasing amount of disorder.</p> <p>(8) Science concepts. The student knows the characteristics and behavior of waves. <i>The student is expected to:</i></p> <p>(A) examine and describe a variety of waves propagated in various types of media and describe wave characteristics such as velocity, frequency, amplitude, and behaviors such as reflection, refraction, and interference;</p> <p>(B) identify the characteristics and behaviors of sound and electromagnetic waves; and</p> <p>(C) interpret the role of wave characteristics and behaviors found in medicinal and industrial applications.</p> <p>(9) Science concepts. The student knows simple examples of quantum physics. <i>The student is expected to:</i></p> <p>(A) describe the photoelectric effect; and</p> <p>(B) explain the line spectra from different gas-discharge tubes.</p>	<p>Chapter 24 Chapters 19, 22</p> <p>Chapters 16 17, 18</p> <p>Chapters 16, 17, 18</p> <p>Chapter 14</p> <p>Chapters 14, 25</p> <p>Chapters 14, 25</p> <p>Chapter 30 Chapter 31</p> <p>Student Activities Role Play Games/Puzzles Stories Songs Projects Cooperative Learning Journaling Graphic Organizers</p>	<p>a. Human beings can both know the world around them and God Himself because God has built within them the capacity to do so and because He takes an active role in communicating with them. (John 16:13)</p> <p>b. God’s own intelligence is the basis of human intelligence. Knowledge is possible because there is something to be known (God and His creation) and someone to know (God and human beings made in His image). (Genesis 1:27)</p> <p>c. God reveals, Himself to us in two basic ways: by general revelation and by special revelation. (Exodus 3:2, Psalm 19:1-4)</p> <p>d. In general revelation, God speaks through the creation of the universe and through His word, the Bible. (2 Samuel 22:31, Psalm 19:1)</p> <ul style="list-style-type: none"> ➤ The Bible is internally consistent and unified in its principles and claims. ➤ There is tremendous coherence across the many authors and centuries during which the various books were written and in which its stories unfold. ➤ It is relevant to all the cultures of the world <p>e. Special revelation is God revealing Himself through</p>
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	<p>Small Groups Drawing Manipulatives Writer’s Workshop Portfolio</p> <p>Teaching Strategies Direct Instruction Open-ended Questions Discussion Demonstration Brainstorming Problem Solving Read Aloud Facilitating Cooperative Learning</p> <p>Evaluation Procedures Observation Class Participation Quizzes/Tests Projects Reports Survey (oral/written) Portfolio</p> <p>Other Resources and Bibliography None</p>	<p>supernatural ways. Jesus Christ is the ultimate special revelation. He showed us what God is like more fully than any other form of revelation can. Because Jesus was also completely human, he spoke more clearly to us than any other form of revelation can. (John 14:7)</p> <p>6. <i>How do we know what is right and wrong?</i></p> <ol style="list-style-type: none"> a. Ethics or the knowledge of right and wrong is based on the character of God as good (holy and loving). (Psalm 33:4) b. There is an absolute standard by which all moral judgments are measured and God Himself – His character of goodness (holiness and love) – is the standard. (1 Samuel 2:3) c. As a result of sin, morally, we have become less able to discern good and evil and less able to know God as He truly is. (Proverbs 1:7) d. God has revealed His standard in the various laws and principles expressed in the Bible. (Psalm 111:10) <ul style="list-style-type: none"> ➤ He has dictated absolute moral truth to us. ➤ Every truth must conform to Biblical principles. ➤ Every choice must reflect God’s moral truth.
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