

# CCS COURSE MAP

## SUBJECT:PHYSICS

**GRADE LEVEL 11-12**  
**COURSE LENGTH Year**

**REVIEWED 2018-2019**

Student Goals:					
		I	To study Classical Physics topics such as forces, movement, mechanics, energy, electricity, magnetism, and optics.		
		II	To introduce Modern Physics topics such as relativity, quantum mechanics, and nuclear physics.		
Student Outcomes					
		I	The students will be able to learn how to solve problems by applying physics principles.		
		II	The students will be able to look at the following six major themes to develop and reinforce a distinctly Christian worldview: Glorifying God with Physics, Loving my Neighbor with Physics, Physics and Modeling, Understanding Science, Operational Science as Dominion Science, and Becoming a Scientist.		
UNIT/ WEEKS	STANDARD	OBJECTIVES	ACTIVITIES/ASSESSMENT	RESOURCES	BIBLICAL INTEGRATION
Module 1: Introduction, Motion in One Dimension  2 weeks	9P.1.3.4.1	Students will: ·learn apply concepts of significant figures, unit conversions, scientific notation, accuracy and precision  ·know the difference between speed and velocity  ·calculate speed, velocity, and acceleration	·class discussions ·worksheets ·experiments ·homework ·quizzes ·tests	· <i>Exploring Creation with Physics</i> 2 <sup>nd</sup> ed. – Apologia ·Quizzes ·Tests ·scientific calculator	·As Thomas Aquinas so elegantly put it, whatever is in motion is put in motion by another... therefore it is necessary to arrive at a first mover, put in motion by not other; and this everyone understands to be God.

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<p>Module 2: One-Dimensional Motion Equations and Free Fall</p> <p>2 weeks</p>	<p>9P.2.2.1.3</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·relate velocity, acceleration, time and displacement</li> <li>·calculate acceleration due to gravity</li> <li>·calculate a person's reaction time</li> <li>·understand terminal velocity and free fall</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·The consistency of mathematical truths demonstrates the orderliness, precision, and consistency of God.</li> <li>·Mathematics should result in greater appreciation of the works of God in His creation.</li> </ul>
<p>Module 3: Two-Dimensional Vectors</p> <p>2 weeks</p>	<p>9P.2.2.1.1 9P.2.2.2.3</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·learn and practice adding and subtracting vectors</li> <li>·draw vectors when given magnitude and direction</li> <li>·calculate magnitude and direction from a set of vectors</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God is concerned that we be accurate and orderly in our use of weights, measures, and numbers.</li> <li>·Man's ability to understand and work with numbers, as well as with other subject matter is a gift from God.</li> </ul>

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<p>Module 4: Motion in Two Dimensions</p> <p>2 weeks</p>	<p>9P.2.2.1.1 9P.2.2.2.3</p>	<p>Student will:</p> <ul style="list-style-type: none"> <li>·understand how projectile motion objects move in two dimensions</li> <li>·calculate using the range equation</li> <li>·calculate two-dimensional situations</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics 2<sup>nd</sup> ed. – Apologia</i></li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<p>·Using the skills in this module, people can help aid other people who are in need. The act of dropping aid packages from a plane rely on such a knowledge as this. God commands us to show love to our fellow man. This is one way to accomplish this.</p>
<p>Module 5: Newton’s Laws</p> <p>2 weeks</p>	<p>9P.2.2.1.2</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·learn Newton’s three laws of motion</li> <li>·explain the difference between mass and weight</li> <li>·calculate frictional force</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics 2<sup>nd</sup> ed. – Apologia</i></li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<p>·God designed us and the universe to be governed by laws. These laws keep the world in order; just like following God’s laws keep’s our lives in order. When we stray from God’s laws, this is when life goes into chaos.</p>

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<p>Module 6: Applications of Newton's Second Law</p> <p>2 weeks</p>	<p>9P.2.2.1.2</p>	<p>Student will:</p> <ul style="list-style-type: none"> <li>·understand the difference between translational and rotational equilibrium</li> <li>·explain translational equilibrium in regards to acceleration in an elevator</li> <li>·calculate Newton's 2<sup>nd</sup> Law of motion to more than one object at a time</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Using God's laws of nature helps man to develop things that allow us the ability to explore beyond Earth. As God has mandated us to have dominion over everything, we must study these things to find ways to better help mankind.</li> </ul>
<p>Module 7: Uniform Circular Motion and Gravity</p> <p>2 weeks</p>	<p>9P.2.2.2.2</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·be able to define uniform circular motion</li> <li>·be able to give the sources of centripetal force</li> <li>·calculate centripetal force and centripetal acceleration</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God designed everything to orbit in just the right way to sustain life. If we orbited just a fraction of a bit closer or further away from the sun, we would die.</li> <li>·God is the perfect designer.</li> </ul>

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<p>Module 8: Work and Energy</p> <p>2 weeks</p>	<p>9P.2.2.2.1</p>	<p>Student will:</p> <ul style="list-style-type: none"> <li>·define work and energy</li> <li>·understand kinetic versus potential energy</li> <li>·calculate friction, work, energy</li> <li>·apply their understanding of kinetic and potential energy to the swing of a pendulum</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics 2<sup>nd</sup> ed. – Apologia</i></li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Work is not a curse from God.</li> <li>·God gave us the ability to do work so that we can take care of creation.</li> </ul>
<p>Module 9: Momentum</p> <p>2 weeks</p>	<p>9P.2.2.2.3</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·be able to explain momentum and impulse</li> <li>·apply principles to an egg drop experiment</li> <li>·calculate momentum and energy conservation</li> <li>·calculate angular momentum</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics 2<sup>nd</sup> ed. – Apologia</i></li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God has called us to take care and have dominion over the Earth.</li> <li>·Understanding momentum and how different materials respond under different points of impact is knowledge we can use to take care of people.</li> </ul>

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<p>Module 10: Periodic Motion</p> <p>2 weeks</p>	<p>9P.2.3.1.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·explain Hooke's Law</li> <li>·analyze motion on a mass/spring system</li> <li>·calculate the mathematics of a mass/spring system</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Through the study of periodic motion, we can see that everything eventually wears down as God has told us about in the Bible.</li> </ul>
<p>Module 11: Waves</p> <p>2 weeks</p>	<p>9P.2.3.1.1 9P.2.3.1.2 9P.2.3.1.3 9P.2.3.1.4 9P.2.3.3.1 9P.2.3.3.2 9P.2.3.3.5</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand the properties of a wave</li> <li>·calculate the properties of a wave</li> <li>·explain the difference between sound and light waves</li> <li>·explain the dual wave/particle theory of light</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·We can see the details that go into each of God's designs. We can have a greater appreciation for the Designer as we study His designs.</li> </ul>

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<p>Module 12: Geometric Optics</p> <p>2 weeks</p>	<p>9P.2.3.3.3 9P.2.3.3.6</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·explain the properties of light with mirrors and lenses</li> <li>·draw ray tracing diagrams for flat mirrors, convex, and concave lenses</li> <li>·apply ray tracing to the human eye</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Man can apply God’s designs to devices that benefit mankind.</li> <li>·God gives man the ability to understand and put complex things together.</li> </ul>
<p>Module 13: Coulomb’s Law and the Electric Field</p> <p>2 weeks</p>	<p>9P.2.3.2.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand the basics of electric charge</li> <li>·use and electroscopes for testing electric charge</li> <li>·calculate the strength of an electric field</li> <li>·understand and apply Coulomb’s Law</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·In the Bible it talks about God caring for even the little things. When we study the tiny charges that we can not see, we get a clearer view of the care He put into every part of His creation.</li> </ul>

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<p>Module 14: Electric Potential</p> <p>2 weeks</p>	<p>9P.2.3.2.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·know the difference among electric potential, potential energy, and potential difference</li>   <li>·explain how capacitors work</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God is a God of order and design.</li>   <li>·Everything works together because God put it together.</li> </ul>
<p>Module 15: Electric Circuits</p> <p>2 weeks</p>	<p>9P.2.3.2.2 9P.2.3.2.4</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand and draw battery circuits, and conventional current</li>   <li>·calculate resistance, electrical power</li>   <li>·draw series and parallel circuits</li>   <li>·calculate power, voltage, and resistance with series and parallel circuits</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God gives us the knowledge of electricity which has helped us develop many things to help mankind.</li> </ul>



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<p>Module 16: Magnetism</p> <p>2 weeks</p>	<p>9P.2.3.2.3</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·tell how something becomes a magnet</li> <li>·understand why a substance is magnetic</li> <li>·explain the Earth's magnetic field</li> <li>·calculate magnetic properties</li> <li>·explain Faraday's law of electromagnetic induction</li> </ul>	<ul style="list-style-type: none"> <li>·class discussions</li> <li>·worksheets</li> <li>·experiments</li> <li>·homework</li> <li>·quizzes</li> <li>·tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Physics</i> 2<sup>nd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Upon studying magnetism, we see another level to God's protection to man, by the Earth having a protective shield to protect us from the harmful rays of the sun.</li> </ul>
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