

# CCS COURSE MAP

## SUBJECT: CHEMISTRY

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

**REVIEWED 2018-2019**

Student Goals:					
		I	To gain an appreciation for God and the world He created.		
		II	To learn laws within the study of chemistry that apply to man and the world around him.		
		III	To apply the laws of God and man that relate to matter and motion.		
Student Outcomes					
		I	The students will be able to explain the political, societal, economic, and environmental impact of chemical products and technologies.		
		II	The students will be able to explain the relationship of an element's position on the periodic table to its atomic number and electron configuration.		
		III	The students will be able to explain how elements combine to form compounds through ionic and covalent bonding.		
		IV	The students will be able to classify chemical reactions as double replacement, single replacement, synthesis, decomposition or combustion.		
		V	The students will be able to show their understanding of scientific knowledge through investigations and projects.		
UNIT/ WEEKS	STANDARD	OBJECTIVES	ACTIVITIES/ASSESSMENT	RESOURCES	BIBLICAL INTEGRATION
Module 1: Measurement, Units, and the Scientific Method  2 weeks	9.C.1.3.4.1	Students will  ·experiment if air has mass  ·be able to convert between units in the metric system  ·be able to tell the difference between an accurate measurement and a precise	·Experimentation ·Worksheets ·Homework ·Quizzes ·Tests	· <i>Exploring Creation with Chemistry</i> 3 <sup>rd</sup> ed. – Apologia ·Quizzes ·Tests ·Measurement tools ·Periodic Table ·scientific calculator	·The consistency of mathematical truths demonstrates the orderliness, precision, and consistency of God.  ·God cares about numbers. He knows them all; He has recorded many for our information

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		<p>measurement</p> <ul style="list-style-type: none"> <li>·review the basic processes of the scientific method</li> <li>·learn which numbers are significant figures and report their measurements with the correct number of significant figures</li> </ul>			
<p>Module 2: Atoms and Molecules</p> <p>2 weeks</p>	9C.2.1.2.3	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand the law of mass conservation</li> <li>·understand the law of multiple proportions</li> <li>·apply the law of mass conservation and law of multiple proportions to chemical equations</li> <li>·be able to explain how matter is classified</li> <li>·be able to name compounds and write compound formulas</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Man's ability to understand and work with numbers, as well as with other subjects, is a gift from God</li> <li>·God created all matter at the beginning during Creation week. God is the only one who can create matter.</li> </ul>

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<p>Module 3: Atomic Structure</p> <p>2 weeks</p>	<p>9C.2.1.1.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·be able to determine the number of protons and electrons in an atom</li> <li>·be able to determine the number of neutrons in an atom using the mass number</li> <li>·understand how the eye sees color</li> <li>·be able to explain the electromagnetic spectrum and how light waves frequency and wavelength and energy relate to each other</li> <li>·will be able to write the electron configurations for atoms and the abbreviated electron configurations</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed.</li> <li>– Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·electromagnetic spectrum diagram</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Intelligence and technical ability didn't start with modern man. The Bible tells of many men that used intelligence and technical ability in the things they designed and built</li> <li>·God designed all the little details and complex details from the wavelengths that we can see with our eyes and the wavelengths we cannot see.</li> </ul>
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<p>Module 4: Molecular Structure</p> <p>2 weeks</p>	<p>9C.2.1.1.2</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·be able to draw Lewis structures</li> <li>·be able to apply Lewis structures to bonding of elements</li> <li>·be able to determine the periodic properties of an element using the periodic table</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed.</li> <li>– Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God is a God of order and patterns are an everyday occurrence in His creation.</li> </ul>
<p>Module 5: Polyatomic ions and molecular geometry</p> <p>2 weeks</p>	<p>9C.2.1.2.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·be able to give the 3D structure of an atom using molecular geometry</li> <li>·learn the characteristics of ionic verses covalent compounds</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed.</li> <li>– Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·molecular model sets</li> <li>·Periodic Table</li> </ul>	<ul style="list-style-type: none"> <li>·God is a God of variety. Just like he created much visible variety, He also created much invisible variety as is evident by the variety of ways substances bond together.</li> </ul>

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<p>Module 6: Changes in Matter and Chemical Reactions</p> <p>2 weeks</p>	<p>9C.2.1.3.6 9C.2.1.3.4 9C.2.1.4.2</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·distinguish between physical and chemical changes</li> <li>·determine whether or not an equation is balanced</li> <li>·be able to balance a chemical equation</li> <li>·understand the factors that speed up or slow down chemical and physical changes</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<p>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</p> <ul style="list-style-type: none"> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Man’s ability to think mathematically is part of the image of God in man</li> <li>·Because God is the only Creator of matter, then chemical reactions cannot cause matter to “disappear.” What a reaction starts with it must end with.</li> </ul>
<p>Module 7: Describing Chemical Reactions</p> <p>2 weeks</p>	<p>9C.2.1.3.1 9C.2.1.3.7 9C.1.3.3.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·be able to differentiate between different types of chemical reactions</li> <li>·understand the potential dangers of an incomplete combustion reaction</li> <li>·understand the mole concept of the atom</li> <li>·measure the width of</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<p>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</p> <ul style="list-style-type: none"> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·We can see how and almighty powerful God cares about the littlest things as small as the atom and molecule</li> <li>·Even in the tiniest things God’s power can be seen</li> <li>·Dr. William Prout who contributed to our understanding of the proton; was devoted to describing the work of</li> </ul>

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		a molecule			God in creation
Module 8: Stoichiometry  2 weeks	9C.2.1.3.5 9C.2.1.2.5	Students will: ·understand how limiting reactants effect a chemical reaction  ·use the mole relationship in chemical equations  ·be able to write empirical and molecular formulas  ·use stoichiometry to write chem. formulas	·Experimentation ·Worksheets ·Homework ·Quizzes ·Tests	· <i>Exploring Creation with Chemistry</i> 3 <sup>rd</sup> ed. – Apologia ·Quizzes ·Tests ·Periodic Table ·scientific calculator	·The world about us with its intricate design and beautiful features bear the signature of its Creator, graven in its works.  ·God gives us tools to help us study His creation, so that we can better take care of it.

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<p>Module 9: Acid-Base Chemistry</p> <p>2 weeks</p>	<p>9C.2.1.3.3 9C.2.1.2.6</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·know the chemical definitions of an acid and base</li> <li>·recognize and predict the reactions between acids and base</li> <li>·understand concentration and how to dilute a substance</li> <li>·perform an acid and base titration</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<p>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</p> <ul style="list-style-type: none"> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·We can see the work of a sovereign, unchanging God in the way the world is so regular that by studying it through science, like chemistry, we can predict reaction outcomes.</li> </ul>
<p>Module 10: The Chemistry of Solutions</p> <p>2 weeks</p>	<p>9C.2.1.3.2 9C.2.1.4.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand how solutes dissolve in solvents</li> <li>·apply stoichiometry to solutions</li> <li>·understand and apply molality</li> <li>·understand the freezing-point depression and boiling-point elevation</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<p>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</p> <ul style="list-style-type: none"> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God cares for mankind. By studying chemistry, specifically solutions, we can learn many things that will help benefit man in everyday life, like what salt to put on the roads to melt the ice and keep drivers safer.</li> </ul>

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<p>Module 11: The Gas Phase</p> <p>2 weeks</p>	<p>9C.2.1.2.4 9C.2.1.4.2</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand and explain the gas laws</li> <li>·be able to calculate the partial pressures of a gas</li> <li>·be able to use the ideal gas equation</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<p>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</p> <ul style="list-style-type: none"> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Gases are an important part of God’s creation, and we see them every day in the sky.</li> <li>·God has given us the perfect mixture of gases in the sky to support life on Earth.</li> </ul>
<p>Module 12 Energy, Heat and Temperature</p> <p>2 weeks</p>	<p>Exceeds MN state standards</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·learn the units for measuring heat and energy</li> <li>·use a calorimeter to measure the specific heat of a metal</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<p>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</p> <ul style="list-style-type: none"> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God has provided us with a forever energy source for life on Earth.</li> <li>·As Robert Boyle said, “remember to give thanks to the One who authored nature.”</li> </ul>



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<p>Module 13 Thermo- dynamics</p> <p>2 weeks</p>	<p>Exceeds MN state standards</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·understand and explain enthalpy</li> <li>·determine the <math>\Delta H</math> of a chemical reaction</li> <li>·apply enthalpy to stoichiometry</li> <li>·use energy diagrams</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·Because of man’s sin, all things are moving toward more disorder.</li> <li>·The Bible talks about this when it uses the statement <i>wax old like a garment</i>.</li> <li>·Ecclesiastes 1:10 says there is nothing new, it was here before our time.</li> </ul>
<p>Module 14: Kinetics</p> <p>2 weeks</p>	<p>Exceeds MN state standards</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·know the factors that affect the kinetics of a chemical reaction</li> <li>·know how to use the rate equation</li> <li>·know the effect of a catalyst</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·God designed our body with special enzymes so chemical reactions will occur at just the right rate to keep us thriving.</li> <li>·God thinks through every detail.</li> </ul>

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<p>Module 15: Chemical Equilibrium</p> <p>2 weeks</p>	<p>9C.1.3.3.1</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·know the definition of chemical equilibrium</li> <li>·understand Le Chatelier's principle with pressure and temperature</li> <li>·review the pH scale</li> <li>·learn the effects of acid rain</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·We can be amazed by a God who cares about every aspect of life.</li> <li>·God takes care of nature using natural means.</li> </ul>
<p>Module 16: Reduction- Oxidation Reactions</p> <p>2 weeks</p>	<p>Exceeds MN state standards</p>	<p>Students will:</p> <ul style="list-style-type: none"> <li>·learn how to determine the oxidation numbers</li> <li>·use oxidation numbers in determining the redox reactions</li> <li>·learn the chemical processes behind the workings of a battery</li> </ul>	<ul style="list-style-type: none"> <li>·Experimentation</li> <li>·Worksheets</li> <li>·Homework</li> <li>·Quizzes</li> <li>·Tests</li> </ul>	<ul style="list-style-type: none"> <li>·<i>Exploring Creation with Chemistry</i> 3<sup>rd</sup> ed. – Apologia</li> <li>·Quizzes</li> <li>·Tests</li> <li>·Periodic Table</li> <li>·scientific calculator</li> </ul>	<ul style="list-style-type: none"> <li>·For since the creation of the world God's invisible qualities – his eternal power and divine nature – have been clearly seen, being made, so that people are without excuse" Romans 1:20</li> </ul>