

Chemistry

Time on Task: 3.5 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 Chemistry, 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: characteristics of matter; energy transformations during physical and chemical changes; atomic structure; periodic table of elements; behavior of gases; bonding; nuclear fusion and nuclear fission; oxidation-reduction reactions; chemical equations; solutes; properties of solutions; acids and bases; and chemical reactions. Students will investigate how chemistry is an integral part of our daily lives.

Goals and Objectives	Scope and Sequence	Spiritual Goals
<p>Texas Essential Knowledge and Skills (TEKS)</p> <p>§112.45. Chemistry.</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 math. This course is recommended for students in Grades 10, 11, or 12.</p> <p>(b) Introduction.</p> <p>(1) In Chemistry, 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: characteristics of matter; energy transformations during physical and chemical changes; atomic structure; periodic table of elements; behavior of gases; bonding; nuclear fusion and nuclear fission; oxidation-reduction reactions; chemical equations; solutes; properties of solutions; acids and bases; and chemical reactions. Students will investigate how chemistry is</p>	<ul style="list-style-type: none">• Foundations of Chemistry• Matter• Measuring and Calculating• Atomic Structure• Elements• Chemical Bonds• Bond theories and Molecular Geometry• Chemical Composition and Reactions• Chemical Calculations• Gases• Solids and Liquids• Solutions• Chemical Thermodynamics• Chemical Kinetics	<p>God's intended purpose for science:</p> <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

<p>an integral part of our daily lives.</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 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> <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 investigative procedures including asking questions, formulating testable hypotheses, and selecting equipment and technology;</p>	<ul style="list-style-type: none"> • Chemical Equilibrium • Acids, Bases, and Salts • Oxidation-Reduction • Organic Chemistry and Biochemistry • Modern Materials • Nuclear Chemistry <p>Correlation with TEKS <u>Chemistry</u> BJU Press Student 978-1-59166-540-3 Teacher ISBN 978-1-59166-541-0</p> <p>Ch 2-4, 6-9, 11-12</p> <p>Ch 2-4, 6-9, 11-12</p> <p>Ch 3-4, 6-8, 10-14, 16-17, 20</p>	<p>have their origin in God. (Genesis 1:11-13, 20-27, 31)</p> <p>8. To understand that God cares about all living things. (Matthew 6:26, 28-30)</p> <p>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)</p> <p>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)</p> <p>11. To know that plants, animals, and man were each created with specific purposes. (Psalm 104:14, 15)</p> <p>Biblical Integration Truth Statements</p> <p>1. <i>What is prime reality, the really real?</i> God exists and is the ultimate reality. (Psalm 90:2, Revelation 22:13)</p> <p>a. God designed, created, and sustains His creation. (Genesis 1:1-31)</p> <p>b. God is good, holy, and loving. (Luke 18:19, 1 John 4:16, 1 Peter 1:16, Psalm 145:12)</p> <p>c. God is omniscient – all knowing. (Romans 11:33-36, Psalm 147:5)</p> <p>d. God is sovereign – nothing is beyond His ultimate interest, control, and authority. (Daniel 4:25)</p> <p>e. God is personal and also triune-</p>
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<p>(B) collect data and make measurements with precision;</p> <p>(C) express and manipulate chemical quantities using scientific conventions and mathematical procedures such as dimensional analysis, scientific notation, and significant figures;</p> <p>(D) organize, analyze, evaluate, make inferences, and predict trends from data; and</p> <p>(E) communicate valid conclusions.</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) make responsible choices in selecting everyday products and services using scientific information;</p> <p>(C) evaluate the impact of research on scientific thought, society, and the environment;</p> <p>(D) describe the connection between chemistry and future careers; and</p> <p>(E) research and describe the history of chemistry and contributions of scientists.</p> <p>(4) Science concepts. The student knows the characteristics of matter. <i>The student is expected to:</i></p> <p>(A) differentiate between physical and chemical properties of matter;</p> <p>(B) analyze examples of solids, liquids, and gases to determine their compressibility, structure, motion of particles, shape, and volume;</p> <p>(C) investigate and identify properties of mixtures and pure substances; and</p> <p>(D) describe the physical and chemical characteristics of an element using the periodic table and make inferences about its chemical behavior.</p> <p>(5) Science concepts. The student knows that energy transformations occur during physical or chemical changes in matter.</p>	<p>Ch 3-4, 6-8, 10-14, 16-17, 20 Ch 3-4, 6-8, 10-14, 16-17, 20</p> <p>Ch 3-4, 6-8, 10-14, 16-17, 20</p> <p>Ch 3-4, 6-8, 10-14, 16-17, 20</p> <p>Ch 1-4</p> <p>Ch 1-3</p> <p>Ch 1-3</p> <p>Ch 1</p> <p>Ch 1-3</p> <p>Ch 2</p> <p>Ch 2, 10-12</p> <p>Ch 2, 6, 8</p> <p>Ch 5</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><i>The student is expected to:</i></p> <p>(A) identify changes in matter, determine the nature of the change, and examine the forms of energy involved;</p> <p>(B) identify and measure energy transformations and exchanges involved in chemical reactions; and</p> <p>(C) measure the effects of the gain or loss of heat energy on the properties of solids, liquids, and gases.</p> <p>(6) Science concepts. The student knows that atomic structure is determined by nuclear composition, allowable electron cloud, and subatomic particles.</p> <p><i>The student is expected to:</i></p> <p>(A) describe the existence and properties of subatomic particles;</p> <p>(B) analyze stable and unstable isotopes of an element to determine the relationship between the isotope's stability and its application; and</p> <p>(C) summarize the historical development of the periodic table to understand the concept of periodicity.</p> <p>(7) Science concepts. The student knows the variables that influence the behavior of gases.</p> <p><i>The student is expected to:</i></p> <p>(A) describe interrelationships among temperature, particle number, pressure, and volume of gases contained within a closed system; and</p> <p>(B) illustrate the data obtained from investigations with gases in a closed system and determine if the data are consistent with the Universal Gas Law.</p> <p>(8) Science concepts. The student knows how atoms form bonds to acquire a stable arrangement of electrons.</p> <p><i>The student is expected to:</i></p> <p>(A) identify characteristics of atoms involved in chemical bonding;</p> <p>(B) investigate and compare the physical and chemical properties of ionic and covalent compounds;</p> <p>(C) compare the arrangement of atoms in molecules, ionic crystals, polymers, and metallic substances; and</p> <p>(D) describe the influence of intermolecular forces on the physical and chemical properties of covalent compounds.</p>	<p>Ch 2, 10-11, 13-14</p> <p>Ch 8, 10-11, 13-14, 17</p> <p>Ch 2, 10-11</p> <p>Ch 4-5, 20</p> <p>Ch 4-5, 20</p> <p>Ch 4-5</p> <p>Ch 2, 10</p> <p>Ch 10</p> <p>Ch 6-8</p> <p>Ch 6-8</p> <p>Ch 6-8</p> <p>Ch 6-8</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. What happens to a person at death?</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. Why is it possible to know anything at all?</p>
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<p>(9) Science concepts. The student knows the processes, effects, and significance of nuclear fission and nuclear fusion. <i>The student is expected to:</i></p> <p>(A) compare fission and fusion reactions in terms of the masses of the reactants and products and the amount of energy released in the nuclear reactions;</p> <p>(B) investigate radioactive elements to determine half-life;</p> <p>(C) evaluate the commercial use of nuclear energy and medical uses of radioisotopes; and</p> <p>(D) evaluate environmental issues associated with the storage, containment, and disposal of nuclear wastes.</p> <p>(10) Science concepts. The student knows common oxidation-reduction reactions. <i>The student is expected to:</i></p> <p>(A) identify oxidation-reduction processes; and</p> <p>(B) demonstrate and document the effects of a corrosion process and evaluate the importance of electroplating metals.</p> <p>(11) Science concepts. The student knows that balanced chemical equations are used to interpret and describe the interactions of matter. <i>The student is expected to:</i></p> <p>(A) identify common elements and compounds using scientific nomenclature;</p> <p>(B) demonstrate the use of symbols, formulas, and equations in describing interactions of matter such as chemical and nuclear reactions; and</p> <p>(C) explain and balance chemical and nuclear equations using number of atoms, masses, and charge.</p> <p>(12) Science concepts. The student knows the factors that influence the solubility of solutes in a solvent. <i>The student is expected to:</i></p> <p>(A) demonstrate and explain effects of temperature and the nature of solid solutes on the solubility of solids;</p> <p>(B) develop general rules for solubility through investigations with aqueous solutions; and</p> <p>(C) evaluate the significance of water as a solvent in living organisms and in the environment.</p>	<p>Ch 20</p> <p>Ch 20 Ch 20</p> <p>Ch 20</p> <p>Ch 17 Ch 17, 19</p> <p>Ch 8</p> <p>Ch 8-9, 20</p> <p>Ch 8, 20</p> <p>Ch 11-12</p> <p>Ch 11-12</p> <p>Ch 11-12</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>(13) Science concepts. The student knows relationships among the concentration, electrical conductivity, and colligative properties of a solution. <i>The student is expected to:</i></p> <p>(A) compare unsaturated, saturated, and supersaturated solutions;</p> <p>(B) interpret relationships among ionic and covalent compounds, electrical conductivity, and colligative properties of water; and</p> <p>(C) measure and compare the rates of reaction of a solid reactant in solutions of varying concentration.</p> <p>(14) Science concepts. The student knows the properties and behavior of acids and bases. <i>The student is expected to:</i></p> <p>(A) analyze and measure common household products using a variety of indicators to classify the products as acids or bases;</p> <p>(B) demonstrate the electrical conductivity of acids and bases;</p> <p>(C) identify the characteristics of a neutralization reaction; and</p> <p>(D) describe effects of acids and bases on an ecological system.</p> <p>(15) Science concepts. The student knows factors involved in chemical reactions. <i>The student is expected to:</i></p> <p>(A) verify the law of conservation of energy by evaluating the energy exchange that occurs as a consequence of a chemical reaction; and</p> <p>(B) relate the rate of a chemical reaction to temperature, concentration, surface area, and presence of a catalyst.</p>	<p>Ch 11-12</p> <p>Ch 8, 11-12</p> <p>Ch 11-12</p> <p>Ch 16</p> <p>Ch 16</p> <p>Ch 16</p> <p>Ch 1, 8-14, 17</p> <p>Ch 1, 8-14, 17</p> <p>Student Activities Role Play Games/Puzzles Stories Songs</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> <p>a. Ethics or the knowledge of right and wrong is based on the character of God as good (holy and loving). (Psalm 33:4)</p> <p>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)</p> <p>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)</p> <p>d. God has revealed His standard in the various laws and principles expressed in the Bible. (Psalm 111:10)</p> <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. ➤ We must promote, defend,
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	<p>Projects Cooperative Learning Journaling Graphic Organizers 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>and teach these truths to others.</p> <p>7. <i>What is the meaning of human history?</i></p> <ol style="list-style-type: none"> a. History is a meaningful sequence of events leading to the fulfillment of God’s purposes for humanity. (Psalm 22:27-28, Psalm 47:3) b. History is going somewhere, directed toward a known end. (Matthew 25:34) c. History is a form of revelation, not only does God reveal Himself in history, but the very sequence of events is revelation. (Psalm 33:13-14, Psalm 47:9) d. History has meaning because God is behind all events, not only sustaining all things by His powerful word but also in all things working for the good of those who love Him. (Psalm 40:5, Romans 8:28) <p><i>What should our response be to God? What were we made for?</i></p> <p>We were made to Love – Matthew 22:37, Worship – Romans 12:1, Obey – 2 John 6, and Give Glory – Psalm 96:3.</p>
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