

Course Description

High School

Chemistry

Philosophy Statement: Science for the Christian is the study of God's creation. The exploration of the creation should yield a direct appreciation for the creative work of God. All that can be known of God we know through the creation and science is the study of that work. Students will continually be called on to see the divine order of creation and its implications for other subjects and be stirred to think about the work of an infinitely loving, good God who has prepared a place for us to live temporally and eternally.

Course Objectives: Students will explore the incredible richness of the universe that God has created and understand that worldview will shape our beliefs and values pertaining to chemistry. They will have a firm foundation of the fundamentals of chemistry including matter, measurement, atomic structure and composition, chemical bonds and compounds, chemical reactions, solutions, thermochemistry, redox reactions, organic chemistry, biochemistry, and nuclear chemistry. Instruction centers around inquiry based learning that is incorporated into class activities. Learning activities include teacher-lead instruction, group work, student seatwork, and lab exercises with both student-choice and teacher-choice grouping. At times students will work independently from the teacher in order to achieve student autonomy expected of upper school students. Classes are structured to utilize every minute for learning and assessing understanding. Real world application is a daily objective. Higher-level thinking will be incorporated into each lesson as well as use of technology when applicable to increase student achievement. Students are expected to participate in all activities and actively engage and ask questions during teacher-led lectures. Students are also expected to review and study the content covered in class outside of school daily.

Course Materials: *Chemistry-5th Edition* BJU Press, *Chemistry-5th Edition Lab Manual* BJU Press, calculators, computer to access online assignments and slideshows, experiments

Time Allotment: 45 minutes one day per week, 85 minutes 2 days per week

Biblical Integration -

"In the beginning, God created the heavens and the earth." - Genesis 1:1

"Since what may be known about God is plain to them, because God has made it plain to them. For since the creation of the world God's invisible qualities—his eternal power and divine nature—have been clearly seen, being understood from what has been made, so that people are without excuse." -Romans 1: 19-20

"For in Him all things were created: things in heaven and on earth, visible and invisible, whether thrones or powers or rulers or authorities; all things have been created through him and for him. He is before all things, and in him all things hold together." - Colossians 1:16-17

"The Son is the radiance of God's glory and the exact representation of his being, sustaining all things by his powerful word." - Hebrews 1:3

Course Content:

Weeks 1-2

Chapter 1: Foundations of Chemistry

- I can Understand why worldview is important for science
- I can Understand why modeling is used in the sciences
- I can see how worldview effects the reasoning and conclusions to scientific research
- I can identify different types of reasoning and differentiate between theory and law
- I can prevent accidents and injuries in the laboratory

Weeks 3-5

Chapter 2: Matter

- I can identify physical and chemical properties and changes in matter.
- I can Identify physical properties that can be used to separate a mixture.
- I can use lab procedures to separate a mixture into its components.
- I can analyze the composition of a mixture.
- I can List and give examples of the six common forms of energy.
- I can State the three laws of thermodynamics in your own words.
- I can Explain how the origin of energy fits in with the laws of thermodynamics.
- I can Compare temperature, thermal energy, and heat.
- I can Explain exothermic and endothermic processes and give an example of each.
- I can Explain why the Kelvin scale is called the absolute temperature scale.

Weeks 6-9

Chapter 3: Measurements In Chemistry

- I can Explain why we need a measurement system.
- I can List the fundamental units of the SI, including their symbols and the quantities they measure.
- I can Differentiate between fundamental and derived units in the SI.
- I can Explain the benefits of using the SI.
- I can Convert between metric units.
- I can Evaluate the statement, "I can know the measurement of an object."
- I can Explain why accuracy and precision are important.
- I can Describe the factors that affect precision in measurements.
- I can Evaluate the accuracy and precision of measurements.
- I can Explain the role of significant figures in measurement.
- I can Explain the rules for significant figures in mathematical operations.

- I can Apply the rules for significant figures for maintaining precision during mathematical operations.
- I can Explain why orderly problem solving is important in chemistry.
- I can Summarize the process of problem solving.
- I can Solve problems involving measurements and mathematical operations.
- I can Explain why you should check the reasonableness of your answers.
- I can Describe a strategy that applies biblical principles to an ethical issue.

Weeks 10-12

Chapter 4: Atomic Structure

- I can Summarize changes in early theories about matter
- I can Explain changes in the atomic model on the basis of workability.
- I can Apply different notations for communicating information about the subatomic particles in an atom.
- I can Model isotopes in the laboratory.
- I can Summarize the discoveries that led to changes in the atomic model.
- I can Explain how changes to the atomic model made the model more workable.
- I can Sketch each of the historical atomic models.
- I can Summarize the three major subatomic particles, including mass, charge, and location
- I can Determine the number of protons, neutrons, and electrons in an atom of an isotope when given the isotope's name or notation.
- I can Compare mass number and atomic mass.
- I can Calculate the atomic mass of an element when given the relative abundance of its natural isotopes.

Areas to Be Evaluated:

- *Class work assignments
- *Homework assignments
- *Quizzes
- *Tests
- *Projects
- *Participation in experiments