



BIOLOGY – Curriculum Guide 2010 - 2011



Course Description: The students in 10th Grade Biology will explore the characteristics, classification (including baraminology) and life cycles of organisms, explaining their interdependent relationships with one another and their environment. Topics of concentration include the philosophy/theology of science and logikos thinking as applied to: scientific methodology and research, cytology, the molecular basis of heredity, biological change (adaptive creation vs. vertical evolution), organization of living systems, energy relationships within organisms and ecosystems, and contemporary health issues. The development of these concepts is supported by inquiry and laboratory-based instruction.

What is KNOWLEDGE? What is the starting source for *accurate* knowledge of “science”?

The Greek term for "knowledge" is *gnosis*, which is why a person who is not yet convinced that God exists is called an *agnostic*, meaning one "without knowledge". There are numerous realms of *knowledge*, therefore many fields of study, such as cosmology, biology, geology, psychology, sociology, philosophy, etc. Consider for a moment, even if you do not yet believe in God our Creator, what it would mean if a Creator God really does exist.

If He does, then learning and knowing *accurately* who our Creator is (i.e., what *kind* of person, what kind of *character*) would directly impact every other realm of knowledge and study. The study of God's character and his purpose for "his" creation would then logically overshadow and necessarily direct all other areas of *knowledge*. The "logical study of God" is called "Theology" (from *theos* & *logikos*). Consequently, if a Creator God exists, then our first and foremost academic effort should be, *theology*, that is to "know" our Creator in order to develop the most accurate and *full* knowledge of anything else we study in *His* universe. Keep in mind that even agnostics and atheists hold to a *theological* perspective that under girds their worldview. ([John 17:3](#) and 23; [1 Kings 8:43](#); [Isa 45:6](#); [2 Chr 6:33](#); ...)

When the *secular* perspective speaks about a source or method of knowledge for "scientific" study, it is often called the "philosophy of science". [By the way, the Latin term for knowledge is *scientia* from which we get science.] However, remember that if a Creator God does exist as discussed above, then the *first* source of knowledge for scientific study must begin not with mere philosophy but with theology. In fact, the *starting* source of knowledge for any specific field of study would then be best described as a *subset* of theology.

In other words, the best study of "science" in a universe created by a Creator God, an *Intelligent Designer*, should begin by understanding the "*theology* of science". Similarly, in order for any branch of "Psychology" (that is, the study of the *psyche*; Greek for study of the soul) to be the most accurate possible, it would logically need to be based upon a careful "*theology* of the psyche". The same would be true for cosmology, biology, geology, and sociology. Each field of study or realm of knowledge should fit *under* the overarching realm of "Theology".

The existence of God and subsequent *priority* of theology does not negate man's ability to discover some of the "what" or "how" about the Creator's world. However, it does negate man's ability to know fully and most accurately the "WHY" regarding the creation - *apart* from the Creator's revelation about Himself and His purpose. Also, finite and temporal man is especially limited in the ability to "know" the past form and function of creation.

[* Perhaps this is why man's amazing, technological advances have not produced World *Order*, peace, unity, and security, but rather World *Disorder*, wars, ethnic holocausts, and now the threat of biological, chemical, and nuclear annihilation.]

Please consider one more thing. Suppose that in addition to the existence of our Creator, it is also true that one of his most powerful and intelligence creatures (for example an *angelic* creature) had turned through free will, self-serving rebellion against its Creator God. If this is also true, then logically that rebel angel's most effective *attack* against its Creator would be to *deceive* others by *distorting* the Creator's true *character*. This begs the question, is God the Designer of "survival of the fittest", pain, fear, suffering, and death, or is He the Good Shepherd? The theology of science is a foundationally ethical issue, not a peripheral one.

Date	Standards (biblical standards are integrated within scientific standards below)	
	Standard 1	<p><u>Science and Knowledge:</u> Understands and applies epistemological principles from theology of science, philosophy of science, and logikos thinking for scientific inquiry and methodology</p> <p>The student will develop a strong foundation for faith in God as Creator through the practice of critical, analytical, and logical thinking, demonstrating the law of biogenesis (life comes only from life - our Living Creator; Pro 14:15; Isa 1:18; Heb 1:1-3).</p>
	B1.1	Discuss and define the characteristics of life, including the biblical significance of God’s creation of space, time, matter, and energy <i>ex nihilo</i> (out of nothing)
	B1.2	Discuss the biblical distinction between <i>nephesh</i> life and <i>non-nephesh</i> life
	B1.3	Explain the biblical revelation of <i>angelic</i> , transdimensional life forms
	B1.4	Define and differentiate between various types of sciences [<i>historical (origins), experimental, and operational sciences</i>]
	B1.5	Discuss the history of scientific theory in terms of the development of ideas and how cultural attributes of a particular period have affected those ideas.
	B1.6	Differentiate between dependent and independent variables, as well as their place in scientific inquiry
	B1.7	Formulate testable hypotheses
	B1.8	Define the significance of, and be able to perform a controlled experiment
	B1.9	Observe results and develop conclusions to experiments
	B1.10	Write clear and concise laboratory reports
	B1.11	Translate information into a table, graph, or diagram
	B1.12	Interpolate between data points in a table or graph
	B1.13	Extrapolate from data points in a table or graph
	B1.14	Use a complex (e.g., nonlinear) mathematical relationship between data
	B1.15	Compare or combine data from two or more complex data presentations
	B 1.16	Analyze given information when presented with new, complex information
	B1.17	Differentiate between a belief, a hypothesis, a theory and a scientific law
	B1.18	Generate testable questions about objects, organisms, and events that can be answered through scientific investigation
	B1.19	Predict the results of an additional trial or measurement in an experiment
	B1.20	Use evidence to make inferences and predict trends
	B1.21	Determine the experimental conditions that would produce specified results
	B1.22	Identify an alternate method for testing a hypothesis
	B1.23	Understand precision and accuracy issues
	B1.24	Predict how modifying the design or methods of an experiment will affect results
	B1.25	Identify an additional trial or experiment that could be performed to enhance or evaluate experimental results
	B1.26	Determine whether given information supports or contradicts a simple hypothesis or conclusion, and why
	B1.27	Identify strengths and weaknesses in one or more models
	B1.28	Identify similarities and differences between models
	B1.29	Use new information to make a prediction based on a model
	B1.30	Select a complex hypothesis, prediction, or conclusion that is supported by two or more data presentations or models
	B1.31	Determine whether given information supports or contradicts a complex

		hypothesis or conclusion, and why
B1.32		Identify laboratory equipment
B1.33		Implement lab safety standards and procedures
B1.34		Discern using biblical, logical (NT Greek = logikos = of the Word) thinking, which develops rational faith based upon evidence (Proverbs 14:15; Hebrews 11:1-3)
B1.35		Describe how the processes of scientific and biblical thinking are complementary, not contradictory
B1.36		Demonstrate how both processes are founded on faith not absolute knowledge
B1.37		Demonstrate an understanding of how beliefs produce actions (Pro 20:11)
B1.38		Explain the statistical significance of biblical prophecy that leads to the logical inference of uniquely Divine inspiration/authorship
B1.39		Distinguish between a biblical definition of life and a scientific one (Gen 1-9)
B1.40		Describe the implications of the fall of man (sin), the resultant partial separation from God, and escalation of entropy that now affects all of creation (Rom 8:18-28)

	Standard 2	<u>Origins Science</u>: Compares and contrasts concepts involving biological change and diversity over time as they apply to the opposing models of adaptive creation and vertical evolution Students will learn to discern the scientific and philosophical distinctions as well as the ethical significance between God’s revealed history of our origin as recorded in the Bible and the many hypotheses (Greek = hypo-thesis = underlying presupposition) developed by secularists. In addition, students will examine each of the six kingdoms, comparing and contrasting the structure and systemic functions of organisms within each kingdom.
	B2.1	Discuss the history and development of evolutionary hypotheses
	B2.2	Differentiate various meanings and uses of the term “evolution” (<i>change</i>), in order to distinguish between micro (horizontal) and macro (vertical) evolution
	B2.3	Define and differentiate between natural selection, adaptation, and macroevolution
	B2.4	Differentiate major evolutionary theories (gradualism, punctuated equilibrium)
	B2.5	Identify the common results of evolutionary philosophies (eugenics, racism, etc)
	B2.6	Delineate the limits of mutation as the mechanism theorized by macroevolutionists for the production of new genes and macroevolution
	B2.7	Describe the research and conclusions of world renowned scientists who challenge the prevailing beliefs regarding mutation as the mechanism for vertical evolution
	B2.8	Provide an in-depth discussion of the factors that produce and distribute variation in a population (mutation, migration, genetic drift, random assortment) and how natural selection can only work with these factors to cause horizontal, microevolutionary changes to occur.
	B2.9	Demonstrate a working knowledge of the (Sanford, Baumgardner, et al) computer program, “Mendel’s Accountant”, for the real time simulation of population genetics and mutation accumulation
	B2.10	Explain the interrelationships between individual genetics, natural selection and variation within populations
	B2.11	Analyze the underlying assumptions inherent to dating methods associated with beliefs that the earth and universe are billions of years old, as well as the subsequent reliability of dates.
	B2.12	Demonstrate general knowledge of the fossil record and how it contradicts the

		current theories of vertical evolution
B2.13		Differentiate between homologous and analogous structures
B2.14		Define and describe “species”, addressing the many exceptions to the rule (wolphin, zonkey, comma, etc)
B2.15		Discuss the development of adaptive animal behaviors
B2.16		List and describe the major scientific problems, contradictory evidences, and questions related to the various modern theories of evolution, along with significant recent books written by PhD <i>non</i> -creationists challenging these theories of macroevolution
B2.17		Describe the various models of scientific and biblical creationism
B2.18		Compare and contrast elements among different creation models
B2.19		Demonstrate knowledge of biblical hermeneutics and its application to the meaning of the biblical term for “day” (<i>yom</i>) as evidence for its proper interpretation in context
B2.20		Describe the historical background of the “biblical”, six-day, young earth model of creation as well as the “deep time”, long ages view.
B2.21		Display a coherent knowledge of the biblical, six-day, young earth model of creation as well as the “deep time”, long ages view.
B2.22		Describe theological and ethical problems raised by compromised creation models
B2.23		Differentiate between “species” and the biblical term “kind”
B2.24		Describe evidence supporting the biblical account of a global catastrophic flood and how it fits the geological / biological evidence seen today in the fossil record
B2.25		Delineate evidences that support a young age for the earth and the universe
B2.26		Identify PhD scientists and their books supporting a literal interpretation of Genesis [six 24-hour days of creation approximately 6,000 years ago, followed by a global flood]
B2.27		Explain the biblical principle of God creating out of nothing, <i>ex nihilo</i> (Hebrew “ <i>bara</i> ”) as the only rational solution for the origin of space, time, matter, energy, life, and social relationships (Gen 1:1-3; Heb 11:1-3)
B2.28		Describe the inevitable fruit of different philosophical systems (survival of the fittest vs. cooperation under God’s Way of love) (Gal 5:16-25; 2 Tim 3:1-8)
B2.29		Describe the research and conclusions of world renowned scientists who challenge the prevailing beliefs regarding vertical evolution (i.e., Sanford, Baumgardner, Hartnett, Menton, Wilder-Smith, etc)

	Standard 3	<u>Life: Understands and applies principles related to the characteristics, classification, and compassionate care of life</u>
B3.1		Display knowledge of classification’s historical shift toward evolutionary theories
B3.2		Define binomial nomenclature and discuss its association with Linnaeus
B3.3		Display knowledge of the modern systems (both the five and six kingdom models)
B3.4		Classify selected organisms, using a dichotomous key
B3.5		Explain how the impact of modern genetics is causing constant revisions of current classification systems
B3.6		Compare and contrast the general structural characteristics and functional processes of body systems present in organisms included within major phyla representing each kingdom
B3.7		Discuss the specific characteristics and life cycles of plants
B3.8		Specify the characteristics, life cycles, and behavior patterns of major vertebrates

B3.9	Demonstrate an understanding that genetic mutations never add new genetic information, which supports the biblical principle of God-created “kinds” (Gen 1)
B3.10	Describe the difference between a creation-based classification system emphasizing and glorifying a common Designer, versus the modern systems emphasizing an assumed common ancestor (Gen 1; Romans 1)
B3.11	Discuss how evolution as a philosophy promotes and encourages racism, while the biblical model of creation stands firmly opposed to all forms of racism (Gen 11)

	Standard 4	<u>Cytology:</u> Understands and applies knowledge regarding cell forms and functions The student will gain a thorough comprehension of God’s detailed design in the principle of irreducible complexity found within cell structure and function, including the differentiation of cell types.
B4.1		Summarize the development of cell theory
B4.2		Demonstrate knowledge of the structure and organelles of a plant and animal cell
B4.3		Recognize the functions of each cell organelle
B4.4		Identify the similarities and differences between a prokaryotic and eukaryotic cell
B4.5		Describe homeostasis and related processes (diffusion, osmosis, active transport)
B4.6		Discuss the ratio of surface area to volume in a cell and how this explains the maintenance of small cell size
B4.7		Distinguish a plant from an animal cell
B4.8		Investigate specialized plant and animal cells
B4.9		Relate cell differentiation to development
B4.10		Explore control of cell differentiation in embryonic development and the fraudulent fallacy of “ <i>ontogeny recapitulates phylogeny</i> ”
B4.11		Describe the organization of cells from simple to complex (from the single cell to the multi-celled organism) and what this means in terms of cell specialization
B4.12		Differentiate cells, tissues, organs, organ systems, body, population, biosphere
B4.13		Discuss the parts of the atom
B4.14		Differentiate between the nature of ionic and covalent bonds
B4.15		Define an isotope
B4.16		Discuss the basic process of a chemical reaction
B4.17		Differentiate between an acid and a base and know how they react in a solution
B4.18		Understand the pH scale and what it indicates
B4.19		Define and discuss the different types of organic and inorganic compounds
B4.20		Discuss polarity of a water molecule and how it results in cohesion and adhesion
B4.21		Describe dehydration synthesis and hydration
B4.22		Define enzyme, how it functions, and what factors may affect that functioning
B4.23		Define and describe irreducible complexity and the evidence it supports faith in an intelligent designer of cells - the basic unit of life (Gen 1)
B4.24		Demonstrate that organisms, in their basic structure and function, were created complete and functional (Gen 1)
B4.25		Specifically apply the post-fall escalation of entropy principle to biochemistry

	Standard 5	<u>Genetics:</u> Understands and applies the latest knowledge in the rapidly expanding field of genetic information - its creation, storage, expression,

		reproduction, and adaptation Students will develop an understanding that all life originates from God, the WORD, who encoded information within DNA.
	B5.1	Describe the differences between somatic and sex cells
	B5.2	Explain Mendel's Laws of Inheritance
	B5.3	Describe the transmission of traits from parents to offspring
	B5.4	Predict probabilities for genetic crosses using Punnett Squares
	B5.5	Differentiate between a dominant and recessive allele and be able to define and explain (using a Punnett Square) incomplete dominance and codominance
	B5.6	Differentiate between an allele, a gene, and a chromosome
	B5.7	Demonstrate a working knowledge of the (Sanford, Baumgardner, et al) computer program, "Mendel's Accountant", for the real time simulation of population genetics and mutations
	B5.8	Define a genotype and how it is physically expressed in the phenotype
	B5.9	Use a Punnett Square for monohybrid and dihybrid crosses of traits
	B5.10	Describe chromosomal forms and their parts (chromatin, chromosomes, chromatid, centromere, etc.) and where they are located in the cell
	B5.11	Define the difference between the haploid and diploid number and explain the significance of these in terms of reproduction and body cell specialization
	B5.12	Define a homologous pair and know at what time during division it occurs
	B5.13	Provide an in-depth description of the stages of mitosis and meiosis, the types of cells in which these occur, and how many chromosomes are found in the daughter cells resulting from each
	B5.14	Demonstrate an understanding of the role of mitosis and meiosis in life cycles
	B5.15	Demonstrate knowledge of how the process of meiosis contributes to the variation in a population through random assortment and crossing over, and understand how this variation then affects the survival of the species
	B5.16	Describe the inheritance and origins of sex-linked traits (Punnett Square)
	B5.17	Use pedigrees that illustrate the inheritance of sex-linked traits
	B5.18	Describe the structure of the DNA and RNA molecules
	B5.19	Explain the role of DNA, RNA, and protein in the expression of inherited traits
	B5.20	Define types of genes: repressor genes, regulator genes, operator genes, etc
	B5.21	Demonstrate knowledge of different types of mutations, how they occur, and predict their phenotypic expressions
	B5.22	Describe the replication of DNA (how it is semi-conservative), and the processes of protein synthesis (transcription and translation)
	B5.23	Explore advances in biotechnology
	B5.24	Demonstrate knowledge of the fact that no known mutations ever create new genetic information to the DNA genome, a fact which demonstrates God's principle of creation according to "kinds" (Genesis 1), with <i>limited</i> ability for adaptive variation only <i>within</i> each created kind
	B5.25	Explain God's principle of fruitful multiplication and adaptation made possible by God's built-in <i>potential</i> for variability, which gave rise to such a wide variety of sizes, colors, etc, <i>within</i> each separate kind (Gen 1; Gen 9)

	Standard 6	Energy and Homeostasis: Students will develop an awareness and understanding that all life is dependent upon energy transfer, ultimately originating from our self-

		existent Creator, YHWH (etymology <i>havah</i>), “I AM” (Gen 1:1-3 Hebrew = Spirit of God “vibrating” over the waters).
	B6.1	Identify the initial reactions and end products of photosynthesis and respiration
	B6.2	Compare and contrast the energy relationships in photosynthesis and cellular respiration
	B6.3	Recognize how life on earth is dependent on photosynthesis
	B6.4	Provide an in-depth description of energy, how it is stored in the cell (ATP, ADP), and the details of how it is released
	B6.5	Relate ATP to photosynthesis and cell respiration
	B6.6	Describe major structures and functions of the organ system with an emphasis on the nervous system
	B6.7	Recognize interdependent relationships between the systems
	B6.8	Explain negative feedback mechanisms and their impact
	B6.9	Relate examples of stimuli to their behavioral responses
	B6.10	Describe the similarities and differences between physical birth (biogenesis) and spiritual birth (pneumagenesis) (John 3:1-16)
	B6.11	Demonstrate the spiritual principle of unity (1 Cor 12-13) analogized through the interdependence of the cells, tissues, organs, and systems of the body
	B6.12	List areas of spiritual growth that should accompany physical growth (1 Tim 4:8)
	B6.13	Recognize God as the original source of all energy (Gen 1), from the Holy Spirit’s “moving” (Hebrew – “vibrating”) over the surface of the waters, to the ATP cycle in living creatures
	B6.14	Describe the escalating entropy resulting from the rebellion of Adam, especially how nephesh death entered God’s creation only after sin (Gen 1:31; 3:18; 9:3; Rom 8:22)
	B6.15	Explain the spiritual significance of our dependence upon God as our source of life (John 14:6; 15:1-11)

	Standard 7	<u>Ecological Sustainability:</u> Students will demonstrate an understanding of the stewardship privilege and responsibility that God delegated to man as overseer of His creation.
	B7.1	Illustrate the biogeochemical cycles and their importance
	B7.2	Diagram trophic levels and energy flow in ecosystems
	B7.3	Explore the role of population dynamics in ecosystems
	B7.4	Compare and contrast renewable vs. non-renewable resources
	B7.5	Explore the human impact on ecosystems
	B7.6	Define man’s God-delegated privilege and responsibility as stewards over creation (Gen 1-2)
	B7.7	Describe God’s spiritual purpose for creating ecological interdependence (Psalm 147:9; Matt 6:25-34)
	B7.8	Explain the evangelistic potential for Christians who understand and proclaim God’s good news about the ecology of creation
		All Biblical Standards Integrated Above

1st Quarter:

Unit One - Philosophy-Theology of Science / Logikos Thinking

Time Frame - 3 weeks

Topics Covered: **The philosophical and psychophysiological background for analytical thinking, scientific inquiry, and the process of formulating conclusions based upon supportive evidence instead of irrationally blind faith.**

Subtopics Covered:

- Why Study Science? “*Why do I have to take this course*”?
- Epistemology: *What is knowledge and where is its most accurate source?*
- What is Science: *Scientific Continuum and the Theology of Biology?*
- How are hypotheses, theories, and laws similar / distinct?
- Science of Life: *What constitutes “life” and why?*
- Measurement: *Purpose and Methods*
- Themes of Biological Science
- Microscopy: *Light, Electron, Digital, Computerized*

Activities:

- Areopagus Group Dialogos: *How do you know something is true, good, or trustworthy?*
- DVD Presentation / Evaluation: *Dr. Stephen Meyer, Oxford and Discovery Institute*
- Media Search for Pseudoscience Claims: *Find a questionable claim regarding truth.*
- Nature / Creation Adventure Hike: *Environment surrounding NCS*
- Microscope Laboratory – Light and Digital Microscopes: *Overview / Review*
- Measurement Laboratory: *How a standard system helps to ensure community accuracy.*
- Freshwater Aquarium Laboratory: *Overview of course plan for aquarium labs*
- Classroom Zoo Laboratory: *Overview of course plan for our NCZoo animals*
- Special Unit Laboratory: *Optical illusions showing tendency toward wrong assumptions*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit’s subject*

Unit Two - Origins: Space/Time/Matter/Energy/Life/Kinds

Time Frame – 3 weeks

Topics Covered: **An in-depth study of the *indirect* realm within “historical” science, comparing and contrasting the models of adaptive creation vs. vertical evolution as they speak to the probable origins of space, time, matter, energy, life/DNA, and new “kinds” of life.**

Subtopics Covered (Outline):

I. Significance of Origin Hypotheses

- A. God’s Character (*Good Shepherd or Great Predator*)
- B. Graphae (*God’s Word – Greek term = “written” / Scripture*)
- C. Gospel (*The cross of Jesus, the 2nd Adam, depends on the 1st Adam’s sin*)
- D. Glorifying His Character (*The Cornerstone of Counseling / Practical Fruit*)

II. Evidence for Origin Hypotheses

- A. Scholars (*1000’s of scientists and theologians reject macroevolution*)
- B. Science (*2nd strongest evidence; theories cannot be proven / often are falsified.*)

- C. Scripture (*Strongest evidence, verified by 100's of prophetic proofs – Isa 41-48*)
* Prophecy demonstrates that God who transcends time led the writing of the Bible.

Activities:

- Areopagus Group Dialogos: *Daily compare, contrast, defend your current worldview*
- DVD Presentation / Evaluation: *Dr. Sanford of Cornell University, etc*
- Media Search for Pseudoscience Claims: *Find questionable claims regarding origins*
- Nature / Creation Education Hike: *Environment surrounding NCS*
- Microscope Laboratory – Light and Digital Microscopes: *Microfossils*
- Measurement Laboratory: *Radioisotope dating assumptions and reliability*
- Freshwater Aquarium Laboratory: *Fossil Fish Don't Float*
- Classroom Zoo Laboratory: *Why do baby animals look so cute?*
- Special Unit Laboratory: *Fossil formation and interpretation*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Three - Classification, Cladistics, & Baraminology

Time Frame – 3 weeks

Topics Covered: **Analytical comparison / contrast of classical classification methodologies with the new fields of cladistics and baraminology.**

Subtopics Covered:

- History of Classification
- Evolutionary Systems of Classification
- God's "Creative" Graphic Organizer: Visible Hierarchical Order
- Biblical Baraminology vs. Evolutionary Cladistics
- Creation Classification: Comparing and Contrasting Models
- What about Angels, Cherubim, Seraphim, Nephilim?
- JESUS (The Only Begotten Son - God/Man)

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

2nd Quarter:

Unit Four - Chemistry (Atom to Adam)

Time Frame – 3 weeks

Topics Covered: **Exploration of the fundamental parts and properties of space, time, matter, and energy as they interact to form the wonderful world we are privileged to inhabit.**

Subtopics Covered:

- Composition of Matter
- Energy and Chemical Reactions
- Solutions, Solvents, Solutes, pH
- Wonders of Water
- Carbon-Based Life Forms
- Molecules of Life – Nucleic Acids, Proteins, Carbohydrates, Lipids

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Five - Cytology: Cell Form and Function

Time Frame - 2 weeks

Topics Covered: **Examination of the smallest unit of life, the cell's intricately complex, miniature city of factories, packaging facilities, transport systems, storage containers, etc, all controlled by the most compressed and yet complicatedly digitized information system ever known or imagined.**

Subtopics Covered:

- History of the cell's discovery
- Cell size, limits, and diversity
- Cell forms – membrane, organelles, nucleus
- Cell functions – homeostasis, passive transport, active transport,

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*

- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Six - Homeostasis and Cellular Transport

Time Frame - 2 weeks

Topics Covered: **How biological systems maintain intracellular and intercellular sustainability.**

Subtopics Covered:

- Homeostasis
- Passive Transport – diffusion, osmosis, facilitation
- Tonicity – the affect of isotonic, hypotonic, hypertonic solutions on cells and systems
- Active Transport – pumps, cytosis

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Seven - Photosynthesis and Cellular Respiration

Time Frame - 2 weeks

Topics Covered: **The recycling circle of life, from the electromagnetic energy of the sun through organic solar cells to the chemical energy of ATP and the productive function of organic compounds – around and around.**

Subtopics Covered:

- Balanced equations for life – photosynthesis and respiration
- Biochemical pathways and evidence for designed efficiency
- The light-dependent reactions (light cycle)
- The electron transport system
- The light-independent reactions (dark or Calvin cycle)
- Restoring photosystem II electrons via water molecules
- Chemiosmosis
- Cellular respiration (Glycolysis, fermentation, aerobic process, Kreb's cycle)

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

3rd Quarter:

Unit Eight - Cell Reproduction: Mitosis and Meiosis

Time Frame - 3 weeks

Topics Covered: **How a cell becomes a body that becomes a family that becomes a species that becomes a kingdom.**

Subtopics Covered:

- Chromosomes
- The mitotic division of somatic cells
- The meiotic division of gametes
- Differentiation and specialization of cells into tissues, organs, systems, etc

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Nine - Monk Mendel's Mathematical Methods: Inheritance

Time Frame - 3 weeks

Topics Covered: **The historical progression of one man's curiosity and mathematical analysis led first to hypothetical speculation that culminated in the laws of biological inheritance.**

Subtopics Covered:

- Mendel's legacy, experiments, conclusions, and contributions

- Practical prediction of genetic crosses using graphs and mathematical calculations
- Hardy-Wienberg analysis for population genetics
- Computer simulation of population genetics using the Sanford/Baumgardner program, “Mendel’s Accountant”

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Drs. Sanford and Baumgardner on “Mendel’s Accountant”*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit’s subjects*
- Measurement Laboratory: *Applied to the unit’s subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit’s subjects*
- Classroom Zoo Laboratory: *Applied to the unit’s subjects*
- Special Unit Laboratory: *Computer simulation using “Mendel’s Accountant” program*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit’s subject*

Unit Ten - Molecular Genetics: DNA’s Generation/Degeneration Time Frame - 3 weeks

Topics Covered: **An in-depth examination of the incredible information system underlying and controlling biological systems.**

Subtopics Covered:

- Molecular structure of DNA information coding
- Expression of DNA information coding (replication, transcription, translation)
- Devolving of DNA genomes (mutation meltdown – the inevitability of entropy)
- Mutations, Mechanisms, Myths, and Macroevolution (vertical change into new kinds)
- The fallacy of “Junk DNA” – Regulatory Genes
- Recent revelations in genetics (epigenetic inheritance, genetic engineering, cloning)

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit’s subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit’s subjects*
- Measurement Laboratory: *Applied to the unit’s subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit’s subjects*
- Classroom Zoo Laboratory: *Applied to the unit’s subjects*
- Special Unit Laboratory: *DNA extraction*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit’s subject*

4th Quarter:

Unit Eleven - Microbiology: The Invisible Kingdoms

Time Frame - 2 weeks

Topics Covered: **The hidden yet vital realm of microscopic creatures (viruses, bacteria, protists, etc), upon which the entire rest of the biosphere depends.**

Subtopics Covered:

- Microscopic Measuring
- Viruses – Are they alive?
- Bacteria, Protozoa, Fungi
- Disease pathology, prevention, treatment

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Twelve - Botany: Primary Producers of the Planet

Time Frame - 2 weeks

Topics Covered: **The unique form and function of plants from beauty to sustenance**

Subtopics Covered:

- The importance of plants (oxygen, food, clothing, building materials, medicines)
- The biblical worldview of plants (non-nephesh, organic machines)
- Plant cell parts and processes
- Plant classification, forms and functions
- Seedless vs. Seed Plants
- Plant reproductive cycles
- Tropism

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*

- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Thirteen - Zoology: Invertebrates and Vertebrates

Time Frame - 2 weeks

Topics Covered: **The diversity of the animal kingdom and how they represent the pinnacle of complexity in the hierarchy of creation**

Subtopics Covered:

- Introduction to the Kingdom Animalia
- Animal symmetry and body direction
- Animal development (acoelomates, pseudocoelomates, coelomates)
- Invertebrata
- Vertebrata

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*

Unit Fourteen - Ecology / Ethology / Ethics

Time Frame - 2 weeks

Topics Covered: **The inescapably interdependent relationships among all of life, especially nephesh beings that lead to the inference of a moral mandate for mankind as “keepers” of creation**

Subtopics Covered:

- Worldview: from Eden to Escalating Entropy to a promised New Earth
- Hierarchical organization of ecological systems
- Biodiversity on the Earth
- Extinction and its causes
- Ecological sub-disciplines
- Ecological relationships among organisms and species
- Energy flow through an ecosystem (graphic chains and pyramids)
- Abiotic cycles vital to the biosphere

- Ethology and the ethical implications of nephesh (sentience)
- Competing concerns: protecting individuals from suffering vs. species from extinction
- Sustainable development – according to whose standards?

Activities:

- Areopagus Group Dialogos: *Learn to defend views using subjects in this unit*
- DVD Presentation / Evaluation: *Including world renowned experts on the unit's subjects*
- Nature / Creation Adventure Hike: *Applying this unit to our NCS grounds*
- Media Search for Pseudoscience Claims: *Learning to discern using subjects in this unit*
- Microscope Laboratory – Light and Digital Microscopes: *Applied to the unit's subjects*
- Measurement Laboratory: *Applied to the unit's subjects*
- Freshwater Aquarium Laboratory: *Applied to the unit's subjects*
- Classroom Zoo Laboratory: *Applied to the unit's subjects*
- Special Unit Laboratory: *As time allows – specific to this unit*
- Science Journal Writing Project: *Critical Evaluation using principles of logikos thinking*
- Graph Analysis & Interpretation: *Specifically related to this unit's subject*