

Time Frame/ content	Key Elements Essential Questions	Activities	Assessment & Evaluation	Ministry Learning Outcomes
<p>EVOLUTION Estimated Time: 5–10 hours By the end of this course, students will have an understanding of the mechanics of evolution.</p>	<p>The students will examine carefully what they believe about origins and what their faith has to say about it. Students will look to the Bible for a better understanding of God’s word regarding creation.</p> <p>Students will also look at God’s blueprints for life, DNA and discuss how this points to a creator and not random chance.</p>	<p>-Origins Notes -Origins of Life exploration: What do you believe, what does the world believe? God Worshippers</p> <p>-Sciencism, is science an idol of our time? Idolatry Discerners</p> <p>- Discussion/Debate: Should we study evolution? Are we a product of random chance?</p> <p>- DNA study: Order Discoverers</p> <p>-Study guide Questions.</p>	<p>-Origins Research Project (AO) -Reading Quizzes (AO) -Evolution Discussion Debate (AF) - Solving the DNA mystery (AF, AO) -DNA structure/function review sheet. (AA) -Study Guide questions (AO) -Unit Test (AO)</p>	<p>C1 describe the process of evolution Describe the basic structure of deoxyribonucleic acid (DNA) with reference to the following terms: – double helix – sugar-phosphate backbone – nitrogenous bases (A, T, C, G) – complementary base pairing (A-T, C-G) Explain the role of DNA in evolution Describe the five agents of evolutionary change: mutation, genetic drift, gene flow, non-random mating, and natural selection Differentiate among and give examples of convergent evolution, divergent evolution, and speciation Compare the gradual change model with the punctuated equilibrium model of evolution</p>
<p>MICROBIOLOGY Estimated Time: 20–25 hours By the end of this course, students will have an understanding of characteristics and functions of viruses and bacteria.</p>	<p>The students will come to an awareness of the wonder of God’s handiwork even in the very small.</p> <p>Students will examine the amazingly precise 1 to 1 relationship that exists between virus and cells</p> <p>Students will look at the mechanisms God has put in place to protect our bodies.</p>	<p>-Viruses & Bacteria Notes</p> <p>-Class discussion: What does it mean to be alive? Where do viruses fit? Order Discoverers</p> <p>-Virus Structure Poster</p> <p>-Lab: Culturing, Controlling and Identifying Bacteria. Students culture supplied bacteria samples, observe the effects of antibiotics and move towards identification of with gram staining. The Winogradsky column is a simple device for culturing a large diversity of microorganisms. (Start 2012/2013) Order Discoverers</p> <p>-Activity: Culturing The Bacteria Around us. Students collect swabs from areas around the school and culture the bacteria that are present.</p> <p>-Everything serves a purpose? How do Bacteria and Viruses effect our lives. How are the beneficial? Creation Enjoyers</p> <p>-Study guide Questions.</p>	<p>- Living vs non-living discussion, what do you already know?(AF)</p> <p>-Virus Structure Poster: Students are marked on Attractiveness and neatness, Structure, Infection Method, Replication Method, and Effects (AO)</p> <p>-Lab Report: Culturing, Controlling and Identifying Bacteria. Marked according to lab scoring rubric (AO)</p> <p>-Winogradsky Column lab observation (Start in DEC prep for Feb) (AA, AF)</p> <p>-Reading Quizzes (AF, AA)</p> <p>-Bacteria Viruses Review Worksheet (AA, AF)</p> <p>-Unit Test (AO)</p>	<p>Viruses E1 evaluate the evidence used to classify viruses as living or non-living Identify criteria for classifying organisms as living Describe the basic structure of a virus, including the antigens, the membranous envelope, the protein capsid, and the nucleic acid core (DNA or RNA) Identify the role of the host cell in viral reproduction Compare the lytic and lysogenic cycles</p> <p>E2 evaluate the effects of viruses on human health Define and give examples of viral specificity Describe the body’s basic lines of defence against a viral attack, ncluding – primary line of defence (e.g., skin, mucous membranes_ – secondary line of defence (e.g., phagocytic white blood cells – tertiary line of defence (antibodies) Give examples of ways to reduce the spread of viral diseases</p> <p>Kingdom Monera E3 analyse monerans as a lifeform at the prokaryotic level of organization Identify the characteristics that unify Monerans Use examples to illustrate moneran diversity with respect to the following: – classification, shape and grouping of cells, motility, ecological role, nutrition (fermentation, aerobic respiration, photosynthesis), reproduction (binary fission, conjugation), human diseases Give examples of the beneficial roles of bacteria</p> <p>E4 evaluate the effectiveness of various antibiotics, disinfectants, or antiseptics on bacterial cultures Conduct an experiment using sterile technique to test the effects of various antibacterial agents (e.g., antibiotics, disinfectants, and antiseptics) on bacterial cultures</p>

				Analyse and interpret data from experiments to draw conclusions about the effectiveness of particular agents on specific bacteria Explain how bacteria mutate to become resistant to antibiotics
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<p>TAXONOMY Estimated Time: 10–12 hours By the end of this course, students will have an understanding of the role various organisms play in an ecosystem.</p>	<p>Mans organization of God’s creation. How do we group life? What elements do we examine in order for organisms to be considered related?</p> <p>How do fossil records effect our understanding of todays life forms?</p>	<p>Taxonomy Notes/Study guide Questions.</p> <p>-Discussion: How do we classify the world around us. Why do we classify the world around us? Students select and classify a random assortment of objects and give reasons for their decisions.</p> <p>- Concept Map: What do you know about the 5 kingdoms</p>	<p>- Table: 5 Kingdom levels: What makes them different (AF, AA)</p> <p>- Concept Map: (AA,AF)</p> <p>- Study Guide Questions (AO)</p> <p>-Unit Test (AO)</p>	<p>B1 Apply the Kingdom method of classification to study the diversity of organisms Explain how the following principles are used in taxonomy to classify organisms: – evolutionary, biochemical, embryological relationships and homologous structures Compare characteristics of a prokaryotic and eukaryotic cell Describe the unifying characteristics of organisms in each of the following kingdoms: – Monera, Protista, Fungi, Plantae, Animalia Classify selected organisms using the following taxons: kingdom, phylum (and sub-phylum), class, order, family, genus, species Apply binomial nomenclature to name selected organisms</p>
<p>ECOLOGY Estimated Time: 10–12 hours By the end of this course, students will have an understanding of the role various organisms play in an ecosystem.</p>	<p>The students will come to an awareness of the complexity of the interactions in an ecosystem, and understand that it must be held together by God.</p> <p>Student will examine the roles of the smallest to the largest organisms in our local (VI) ecosystem and examine the functional inter-relationships between all life.</p> <p>Seeing the perfection of Gods balance between photosynthesis and cellular respiration, the co-dependence of creation.</p>	<p>-Ecology Notes/ Study Guide Questions</p> <p>-Field Exercise: Students visit a Forested site (Westwood) where they do a survey to identify all plant species in a given area. They use dichotomous keys and field guides to identify the organisms that are present. This will be compared on a yearly basis to past surveys and observe changes that may occur. Creation Enjoyers, Earth Keepers</p> <p>-Examining the relationship of Photosynthesis and Cellular respiration. God creates balance. Order Discoverers.</p> <p>- Discussion topics: Populations of the world, look at humans, plants and animals. To have and to have not. Discussion of immortality. Justice Seekers, Servant Workers</p> <p>- Pacific Northwest Food Web: Students create a web connecting a variety of local species.</p>	<p>-Lab Report: Field exercise. (AA)</p> <p>-Pacific North West food web. (AF, AO)</p> <p>-Class discussions (AA, AF)</p> <p>-Study Guide Questions (AO)</p> <p>-Unit Test (AO)</p>	<p>D1 analyse the functional inter- relationships of organisms within an ecosystem Describe the process of ecological succession, with reference to terms such as pioneer species and climax community Explain the roles of producers, consumers, and decomposers in ecosystems Describe a pyramid of energy in terms of energy flow through an ecosystem Describe the roles of photosynthesis and cellular respiration within a pyramid of energy Compare photosynthesis and cellular respiration in terms of the reactants, products, and chemical equations Describe the stages a population goes through as it increases in size, with reference to terms such as exponential growth, logistic growth, cyclic growth, carrying capacity, steady state Describe density-dependent and density-independent factors that limit and control population growth Define symbiosis and types of symbiosis: parasitism, commensalism, and mutualism</p>

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<p>PLANTS Estimated Time: 20–25 hours By the end of this course, students will have an understanding of the increasing complexity of phyla within the Kingdom Plantae and the characteristics that place organisms within each phylum.</p> <p>(Seedless Plants 10 hours)</p>	<p>Has God created life on a spectrum? How blurred are the lines between species?</p> <p>Bio-mimicry: Using the blueprints that God has provided to help solve our problems.</p> <p>How do we create a love/passion for God's creation?</p> <p>Appreciating the beauty of all creation.</p>	<p>SECTION 1: Seedless Plants Notes</p> <ul style="list-style-type: none"> - Beach Walk: Students will visit a marine ecosystem and examine the conditions and relationships that exist between algae and other life. Students will collect samples for their lab. Earth Keepers -Discussion Algae as a renewable food and energy source. Earth Keepers -Lab: Algae. Students study the most simple of aquatic plants. Students use a key to identify species. Discussion of cellular organization, photosynthesis, reproduction and unique structures. Order Discoverers - Westwood/Forest Hike: Students get outside and examine seedless plants in nature. What are the conditions they require, why are they so successful here? What is impacting our environment? Collect samples for lab. Earth Keepers, Creation Enjoyers -Lab: Moss and Fern Characteristics. Students collect and examine moss and fern structures and lifecycles. Order Discoverers - Seedless plants comparison project: Students look at three phylum of seedless plants and compare and contrast them. Order Discoverers -Study guide questions 	<p>Lab Reports: Marked according to lab scoring rubric (AA, AF)</p> <ul style="list-style-type: none"> -Seedless plants comparison project (AO) -Plants Review Worksheet (AF) -Study Guide questions (AO) -Unit Test (AO) 	<p>SEEDLESS PLANTS F1 analyse how the increasing complexity of algae, mosses, and ferns represent an evolutionary continuum of adaptation to a land environment</p> <p>Examine green algae and describe the characteristics that unify them Use examples of unicellular, colonial, and multicellular green algae to illustrate their increasing complexity Examine mosses and describe the characteristics that unify them Examine ferns and describe the characteristics that unify them Describe alternation of generations in algae, mosses, and ferns Describe features of mosses and ferns that have enabled adaptation to a land environment</p>
<p>(Seed Plants 10 hours)</p>	<p>Comparison of aquatic and terrestrial plants</p> <p>Reproduction and life cycles: Comparing sexual and asexual reproduction.</p> <p>Producers: Vegetarian diet and our ability to feed the world. What role will plants play in our future?</p>	<p>SECTION 2: Seed Producing Plants</p> <ul style="list-style-type: none"> - Students plant seeds of assorted mono-cot and dicot plants for observation of growth. Beauty Creators, Creation Enjoyers - Scavenger hunt: collect and catalogue plant species based on mono/dicot characteristics. Creation Enjoyers, - Parts of a flower lab: Collect samples of local angiosperms. Creation Enjoyers - Thorne Identity: Students create a seed based web-quest narrative designed for younger grades. Community Builders 	<ul style="list-style-type: none"> -Lab Reports: Marked according to lab scoring rubric (AA, AF) -Scavenger Hunt (AO) - Angiosperm/Gymnosperm (Thorne Identity) project (AO) -Plants Review Worksheet (AF) - Study Guide questions (AO) -Unit Test (AO) 	<p>SEED PRODUCING PLANTS F2 analyse how the increasing complexity of gymnosperms and angiosperms contribute to survival on land</p> <p>Examine gymnosperms and describe the characteristics that unify them Explain how gymnosperms are adapted for survival in a land environment with respect to the following: alternation of generations, roots, stems, leaves, seeds, pollen, vascular tissue Examine angiosperms and describe characteristics that unify them Use specimens to differentiate between monocots and dicots Describe how angiosperms are adapted for survival in a land environment, with respect to alternation of generations, flowers, pollen, enclosed seeds, fruit, roots, stems, leaves, vascular tissue Compare the ways in which mosses, ferns, gymnosperms, and angiosperms have adapted to a land environment</p>

<p>KINGDOM ANIMALIA</p> <p>Estimated Time: 32–35 hours By the end of this course, students will have an understanding of the increasing complexity within the Kingdom Animalia and the characteristics that place organisms within each phylum.</p> <p>Lower Invertebrates: 10 hours</p>	<p>Increasing complexity. Examine the development from cellular to tissue to organ development.</p> <p>Roles of all organisms in an ecosystem. Everything serves a purpose. Parts of the body discussion.</p> <p>The parasitic lifestyle.</p>	<p>SECTION 1: Lower Invertebrate Notes and study guide questions</p> <p>- What makes an animal different? What are the grey areas between plants and animals? Discussion of sponges.</p> <p>- Lab/Dissection: Depending on availability students will examine organisms such as sponges, jellyfish, anemones and nematodes.</p> <p>- Students will study animals in increasing complexity. At the same time we'll discuss how life works together and the function of a parasite in an ecosystem.</p> <p>Order discoverers, Earth Keepers</p> <p>-Field Exercise: Students visit a coastal site where they do a survey to identify all marine invertebrate. They use dichotomous keys and field guides to identify the organisms that are present. (timing will be coordinated with Shaw discovery visit)</p> <p>Creation Enjoyers, Order discoverers, Earth Keepers</p>	<p>-Lab work: Viewing of sponges and beach sand. Students are marked according to the dissection scoring rubric. (AF, AO)</p> <p>-Complexity, unity, parasites. General group discussion. (AF, AA)</p> <p>-Vertebrate Review Worksheet -Reading Quizzes (AO)</p> <p>-Unit Test (AO)</p> <p>-Field Exercise: Students are marked on the number and quality of the observations that they make</p>	<p>G1 analyse how the increasing complexity of animal phyla represents an evolutionary continuum Compare phyla in terms of – levels of organization – cell, tissue, organ, organ system. Cephalization, development of a coelom, symmetry, reproduction Describe the life functions animals need to survive, including feeding, respiration, internal transport, excretion, reproduction, response and motility Compare the advantages and disadvantages of different ways animals carry out their life functions (e.g., filter feeding vs. fluid feeding, parasitic vs. free-living, asexual vs. sexual reproduction, sessile vs. motile)</p> <p>G2 analyse the increasing complexity of the Phylum Porifera and the Phylum Cnidaria Examine members of the Phylum Porifera and identify their unifying characteristics Describe how poriferans carry out their life functions Examine members of the Phylum Cnidaria and identify their unifying characteristics Describe how cnidarians carry out their life functions Compare polyp and medusa with respect to structure, general function, and motility Suggest the advantages of a motile form in the life cycle of a cnidarian Explain the evolutionary significance of colonial porifera versus multicellular (cnidarian) lifeforms Describe the ecological roles of sponges and cnidarians</p> <p>G3 analyse the increasing complexity of the Phylum Platyhelminthes, Nematoda, and Annelida Examine members of Platyhelminthes and describe their unifying characteristics Describe how platyhelminthes carry out their life functions Examine members of Nematoda and describe their unifying characteristics Describe how nematodes carry out their life functions Examine members of the Phylum Annelida and describe their unifying characteristics Describe how annelids carry out their life functions Describe the physical changes that were necessary for flatworms and roundworms to become parasitic</p>
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<p>Higher Invertebrates 10 hours</p>	<p>Diverse roles and unique ways to survive.</p> <p>What is our obligation to protecting creation?</p> <p>How do we share and present knowledge to our peers?</p>	<p>SECTION 2: Higher Invertebrates</p> <p>-lab dissection: TBD (starfish) An examination of the systems of starfish function. Unique structures. Order Discoverers.</p> <p>-Field Trip to Shaw Ocean discovery center. Students study four phylum, Cnidarian, Echinodermata, Mollusca, Arthropoda. Students get hands on experience with all four phylum. Creation Enjoyers, Order discoverers, Earth Keepers</p> <p>- Final presentation on H.I. Students select a class and 3 orders of H.I. Students compare and contrast the characteristics which unify and divide the orders. Students are also peer assessed. Community Builders</p>	<p>Lab Reports: Marked according to lab scoring rubric (AA, AF)</p> <p>-Shaw ocean discovery worksheet and reflection. (AF, AA)</p> <p>-Study Guide questions (AO)</p> <p>- Final presentations on HI (AA, AO)</p> <p>- Quiz (AO)</p>	<p>G4 analyse the increasing complexity of the Phylum Mollusca, Echinodermata, and Arthropoda</p> <p>Examine members of the Phylum Mollusca and describe their unifying characteristics</p> <p>Describe how molluscs carry out their life functions</p> <p>Examine members of the Phylum Echinodermata and describe their unifying characteristics</p> <p>Describe how echinoderms carry out their life functions</p> <p>Examine members of the Phylum Arthropoda and describe their unifying characteristics</p> <p>Describe how arthropods carry out their life functions</p> <p>Compare how molluscs, echinoderms, and arthropods have evolved to adapt to different niches</p> <p>Demonstrate a knowledge of the diverse ecological roles of molluscs, echinoderms, and arthropods</p>
<p>Phylum Chordata 10 hours</p>	<p>What makes humans so different?</p> <p>What is our obligation to protecting creation?</p> <p>How do we share and present knowledge to our peers?</p>	<p>SECTION 3: Chordates.</p> <p>-lab dissection: TBD (Rat/Pig) An examination of the systems of the chordates function together. Order Discoverers.</p> <p>- Final presentation on Phylum Chordata. Students select a class and 3 orders within Phylum Chordata. Students compare and contrast the characteristics which unify and divide the orders. Students are also peer assessed. Community Builders</p>	<p>Lab Reports: Marked according to lab scoring rubric (AA, AF)</p> <p>- Final presentations on phylum chordata. (AA, AO)</p> <p>- Study Guide Questions (AO)</p> <p>-Quiz (AO)</p>	<p>G5 relate the complexity of the form and function of vertebrates to the evolutionary continuum of animals</p> <p>Examine members of the Subphylum Vertebrata and describe their unifying characteristics</p> <p>Compare members of two or more classes of vertebrates</p> <p>Compare the vertebrates and invertebrates in terms of increasing complexity, with reference to characteristics including</p> <ul style="list-style-type: none"> - endoskeleton vs. exoskeleton - presence or absence of vertebral column - closed vs. open circulatory system <p>Describe the diverse ecological role of vertebrates</p>