

## Biology – Course Overview

<p style="text-align: center;"><b>FIRST QUARTER</b></p> <p><b>I. The Science of Life – Introduction</b></p> <ul style="list-style-type: none"> <li>A. Characteristics of Living Things</li> <li>B. Science Methods used in Life Sciences</li> <li>C. The Tools of Biology</li> </ul> <p><b>II. Chemistry</b></p> <ul style="list-style-type: none"> <li>A. Atomic Structure</li> <li>B. Bonding (Ionic, Covalent, Hydrogen)</li> <li>C. Properties of Water</li> <li>D. Acids and Bases; pH</li> </ul> <p><b>III. Biochemistry – Four Basic Molecules in Living Systems</b></p> <ul style="list-style-type: none"> <li>A. Carbohydrates</li> <li>B. Lipids</li> <li>C. Protein/Enzymes</li> <li>D. Nucleic Acid</li> <li>E. Minerals</li> <li>F. Vitamins</li> <li>G. Cells exist in a narrow range of conditions (temperature, pH)</li> </ul> <p style="text-align: center;"><b>BIOLOGICAL MOLECULES BENCHMARK</b></p> <p style="text-align: center;"><b>END OF FIRST QUARTER</b></p>	<p style="text-align: center;"><b>SECOND QUARTER</b></p> <p><b>IV. Cell Biology</b></p> <ul style="list-style-type: none"> <li>A. History (...including the Cell Theory)</li> <li>B. Cell Structure and Function</li> <li>C. Diversity (Specialization) of Cells</li> <li>D. Roles of Systems (Excretory, Circulatory, Skeletal/Muscular, Endocrine, Nervous/Sensory)</li> </ul> <p><b>V. Cell Transport</b></p> <ul style="list-style-type: none"> <li>A. Cell Membrane Structure</li> <li>B. Passive Transport (Diffusion and Osmosis)</li> <li>C. Active Transport (Endocytosis and Exocytosis)</li> <li>D. Maintaining Homeostasis</li> </ul> <p><b>VI. Cell Reproduction</b></p> <ul style="list-style-type: none"> <li>A. Chromosomes (Karyotypes)</li> <li>B. The Cell Cycle</li> <li>C. Mitosis</li> </ul> <p style="text-align: center;"><b>CELLS AND ORGANISMS BENCHMARK</b></p> <p style="text-align: center;"><b>END OF FIRST SEMESTER</b></p>
<p style="text-align: center;"><b>THIRD QUARTER</b></p> <p><b>VII. DNA and Protein Synthesis</b></p> <ul style="list-style-type: none"> <li>A. Structure of DNA, RNA, and Protein</li> <li>B. Replication, Transcription, and Translation</li> <li>C. Gene Mutations</li> </ul> <p><b>VIII. Genetics</b></p> <ul style="list-style-type: none"> <li>A. History (including Mendel’s Three Principles)</li> <li>B. Meiosis</li> <li>C. Fertilization</li> <li>D. Analyzing Genetic Crosses <ul style="list-style-type: none"> <li>1. Monohybrid</li> <li>2. Sex-linked</li> </ul> </li> <li>E. Human Genetics <ul style="list-style-type: none"> <li>1. Pedigrees</li> <li>2. Analyzing Karyotypes</li> <li>3. Chromosomal Mutations</li> </ul> </li> </ul> <p><b>IX. Genetic Engineering</b></p> <ul style="list-style-type: none"> <li>A. DNA Electrophoresis</li> <li>B. Recombinant DNA</li> <li>C. Cloning</li> </ul> <p style="text-align: center;"><b>INHERITANCE OF TRAITS BENCHMARK</b></p> <p style="text-align: center;"><b>END OF THIRD QUARTER</b></p>	<p style="text-align: center;"><b>FOURTH QUARTER</b></p> <p><b>X. Evolution</b></p> <ul style="list-style-type: none"> <li>A. History (including Darwin’s Theory of Natural Selection)</li> <li>B. Artificial and Natural Selection</li> <li>C. Adaptation</li> <li>D. Variation</li> <li>E. Evolutionary Relationships (Anatomical similarities/Embryological &amp; Biochemical comparisons - DNA &amp; Amino Acid Sequences &amp; Analyzing Results From Gel Electrophoresis)</li> </ul> <p><b>XI. Classification</b></p> <ul style="list-style-type: none"> <li>A. History of Taxonomy</li> <li>B. Linnaeus and Binomial Nomenclature</li> <li>C. Modern Classification (Three Domains and Six Kingdoms)</li> </ul> <p><b>XII. Ecology</b></p> <ul style="list-style-type: none"> <li>A. Abiotic/Biotic Factors</li> <li>B. Biotic Relationships (Predator-Prey, Parasite-Host, Mutualism, Commensalism, Competition )</li> <li>C. Transfer of Energy (Producers, Consumers, Trophic Levels)</li> <li>D. Succession</li> <li>E. Biogeochemical Cycles (Water, Nitrogen, and Carbon) – Photosynthesis &amp; Cellular Respiration (ATP) {Snail and Elodea with Bromthymol Blue}</li> <li>F. Factors Influencing Populations (Urbanization/Population Increase, Pollution, Natural Disasters, Disease, Food Depletion, Destruction of Habitats)</li> </ul> <p style="text-align: center;"><b>EVOLUTION AND INTERDEPENDENCE OF ORGANISMS BENCHMARK</b></p> <p style="text-align: center;"><b>END OF SECOND SEMESTER</b></p>