

Honors Biology – Course Overview

First Quarter	Second Quarter
<p>I. The Science of Life - Introduction</p> <ul style="list-style-type: none">A. Characteristics of Living ThingsB. Science Methods used in Life ScienceC. Importance of Data VerificationD. The Tools of BiologyE. Science and Ethics <p>II. Chemistry</p> <ul style="list-style-type: none">A. Atomic StructureB. Bonding (Ionic, Covalent, Hydrogen)C. Properties of WaterD. Acids and Bases <p>III. Biochemistry</p> <ul style="list-style-type: none">A. CarbohydratesB. LipidsC. Proteins/EnzymesD. Nucleic AcidsE. MineralsF. VitaminsG. Cells exist in a narrow range of conditions (Temperature, pH) <p>BIOLOGICAL MOLECULES BENCHMARK END OF FIRST QUARTER</p>	<p>IV. Cell Biology</p> <ul style="list-style-type: none">A. History (...including the Cell Theory)B. Cell Structure and FunctionC. Diversity (Specialization) of CellsD. Roles of Systems (Excretory, Circulatory, Skeletal/Muscular, Endocrine, Nervous/Sensory, Respiratory, Digestive, Reproductive, Lymphatic, Integumentary)E. Dissection – Lab Practical <p>V. Cell Transport</p> <ul style="list-style-type: none">A. Cell Membrane StructureB. Passive Transport (Diffusion, Osmosis)C. Active Transport (Endocytosis, Exocytosis)D. Maintaining Homeostasis <p>VI. Energy Transfer in Cells</p> <ul style="list-style-type: none">A. PhotosynthesisB. Cellular Respiration <p>VII. Cell Reproduction</p> <ul style="list-style-type: none">A. Chromosomes (Karyotypes)B. The Cell CycleC. Mitosis <p>CELLS AND ORGANISMS BENCHMARK END OF FIRST SEMESTER</p>
<p>Third Quarter</p> <p>VII. DNA and Protein Synthesis</p> <ul style="list-style-type: none">A. Structure of DNA, RNA, and ProteinB. Replication, Transcription, and TranslationC. Gene Mutation <p>VIII. Genetics</p> <ul style="list-style-type: none">A. History (including Mendel's Three Principles)B. Meiosis (link to Sexual Reproduction)C. FertilizationD. Analyzing Genetic Crosses<ul style="list-style-type: none">1. Monohybrid2. Dihybrid3. Co/incomplete dominance4. Sex-linkageE. Human Genetics<ul style="list-style-type: none">1. Pedigrees2. Analyzing Karyotypes3. Chromosomal Mutations <p>IX. Genetic Engineering</p> <ul style="list-style-type: none">A. Gel ElectrophoresisB. Recombinant DNAC. CloningD. Gene SplicingE. Benefits and Consequences of Genetic Engineering <p>INHERITANCE OF TRAITS BENCHMARK END OF THIRD QUARTER</p>	<p>Fourth Quarter</p> <p>X. Evolution</p> <ul style="list-style-type: none">A. History (including Darwin's Theory of Natural Selection)B. Artificial and Natural SelectionC. Adaptation, VariationD. CladisticsE. Evolutionary Relationships (Anatomical Similarities/Embryological & Biochemical Comparisons – DNA & Amino Acid Sequences & Analyzing Results from Gel Electrophoresis) <p>XI. Classification</p> <ul style="list-style-type: none">A. History of TaxonomyB. Linnaeus and Binomial NomenclatureC. Modern Classification (Three Domains and Six Kingdoms)D. Dichotomous Keys <p>XII. Ecology</p> <ul style="list-style-type: none">A. Abiotic/Biotic FactorsB. Biotic Relationships (Predator-Prey, Parasite-Host, Mutualism, Commensalism, Competition)C. Transfer of energy (Producers, Consumers, Trophic Levels)D. SuccessionE. Biogeochemical Cycles (Water, Nitrogen, and Carbon) – Photosynthesis & Cellular Respiration (ATP)F. Factors Influencing Populations (Urbanization/Population Increase, Pollution, Natural Disasters, Disease, Food Depletion, Destruction of Habitat) <p>EVOLUTION AND INTERDEPENDENCE OF ORGANISM BENCHMARK END OF SECOND SEMESTER</p>