

<b>DEPARTMENT: SCIENCE</b>	<b>COURSE TITLE: BIOLOGY HONORS</b> <b>COURSE NUMBER: 224</b>
<b>GRADE(S): 10</b>	<b>PRE-REQUISITES (IF ANY):</b>

<b>UNIT</b>	<b>LENGTH</b>	<b>CONTENT</b>	<b>SKILLS</b>	<b>METHODS OF ASSESSMENT</b>	<b>FRAMEWORK STRAND(S) &amp; STANDARD(S)*</b>
Introduction	15 Days	<ul style="list-style-type: none"> <li>• Definition of life and characteristics of living things</li> <li>• Intro to 5 kingdoms</li> <li>• Scientific method</li> <li>• Intro to Darwinian theory</li> <li>• Microscopy</li> <li>• Measurement and unit analysis</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Formulate a definition of life and describe characteristics of living organisms.</li> <li>• Compare and contrast the 5 kingdoms.</li> <li>• Describe the Darwinian theory.</li> <li>• Use and care for the microscope.</li> <li>• Convert metric and English units.</li> <li>• Explain and apply the principles of the scientific method.</li> </ul>	<ul style="list-style-type: none"> <li>• Unit exam</li> <li>• Lab: Microscope</li> <li>• Homework</li> <li>• Quizzes</li> <li>• Worksheets</li> </ul>	Inquiry LS 1-11 Domain LS – N/A Sci-Tech and Human Affairs LS 1,2
The Cell	15 Days	<ul style="list-style-type: none"> <li>• Cell theory</li> <li>• Relative size</li> <li>• Cell organelles</li> <li>• Surface area to volume ratio</li> <li>• Prokaryotic vs. eukaryotic</li> <li>• Plant vs. animal cells</li> <li>• Membrane systems</li> <li>• Transport</li> <li>• Cell connections</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Explain the cell theory.</li> <li>• Compare size in the micro and macro world.</li> <li>• Perform organelle identification and description of function.</li> <li>• Demonstrate correct microscope technique—slide prep and staining.</li> <li>• Use microscope in determining size of cells.</li> <li>• Measure and calculate surface area and volume.</li> <li>• Describe various types of cell connections in plant and animal cells.</li> <li>• Formulate hypothesis, observe, gather data and interpret results.</li> </ul>	<ul style="list-style-type: none"> <li>• Unit exam</li> <li>• Lab on the cell</li> <li>• Lab on diffusion</li> <li>• Lab on surface area to volume ratio</li> <li>• Lab on osmosis</li> <li>• Homework</li> <li>• Quizzes</li> </ul>	Inquiry LS 1-8, 10,11 Domain LS 1-3, 8 Sci-Tech and Human Affairs LS 1,2

Chemistry of Life	15 Days	<ul style="list-style-type: none"> <li>Review basic chemistry terminology and concepts necessary for unit</li> <li>Most abundant elements in body</li> <li>Molecular formulas and equations</li> <li>Organic vs. inorganic molecules</li> <li>Acids, bases, pH scale and biological buffers</li> <li>Dehydration synthesis and hydrolysis</li> <li>Organic molecules of life-carbohydrates, lipids, proteins</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Explain basic structure of the atom.</li> <li>Define atom, element, compound, molecule.</li> <li>Determine ion formation.</li> <li>Interpret chemical equations and chemical formulas.</li> <li>Identify and distinguish between inorganic and organic molecules.</li> <li>Explain the relationship between acid, bases and the pH scale and the importance of buffers in living systems.</li> <li>Identify types of reactions (dehydration synthesis vs. hydrolysis).</li> <li>Identify and describe the principle organic compounds as to elements, building blocks, and functions in living systems.</li> <li>Demonstrate use of scientific method—research, experimentation, formulating hypothesis, interpretation of data collected.</li> </ul>	<ul style="list-style-type: none"> <li>Unit exam</li> <li>Quizzes</li> <li>Homework</li> <li>Lab on organic molecule building</li> <li>Lab on homeostasis and buffers</li> <li>Worksheets</li> <li>Lab on biologically important molecules</li> <li>Video essay on fats and cholesterol</li> </ul>	<p>Inquiry LS 1,2 4-11 Domain LS 4 Sci-Tech LS-N/A</p>
Genetics I	15 days	<ul style="list-style-type: none"> <li>Prokaryotic vs. Eukaryotic cell cycles</li> <li>Terminology: chromosomes, chromatid diploid, haploid etc.</li> <li>Stages of mitosis and purpose</li> <li>DNA structure &amp; function</li> <li>DNA replication</li> <li>One gene, one protein hypothesis</li> <li>RNA vs. DNA</li> <li>Protein synthesis</li> <li>Mutations; causes ,types and effects</li> <li>Gene regulation</li> <li>Asexual vs. sexual reproduction</li> <li>Stages of meiosis and purpose</li> <li>Mitosis vs. meiosis</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Compare and contrast cell cycles of prokaryotes and eukaryotes.</li> <li>Define basic terminology involved.</li> <li>Explain the function of mitosis, stages of mitosis and demonstrate ability to recognize and/or diagram.</li> <li>Explain the structure of DNA and how it replicates.</li> <li>Compare and contrast RNA and DNA in terms of structure and function.</li> <li>Explain the steps of protein</li> </ul>	<ul style="list-style-type: none"> <li>Unit exam</li> <li>Quizzes</li> <li>Homework assignments</li> <li>Lab on DNA structure</li> <li>Lab on DNA replication</li> <li>Lab on protein synthesis — worksheet style</li> <li>Lab on protein synthesis and essay</li> <li>Video essay</li> </ul>	<p>Inquiry LS 8 Domain LS 3, 8-13 Sci-Tech and Human Affairs 1-5</p>

			<p>synthesis and the one gene, one protein hypothesis.</p> <ul style="list-style-type: none"> <li>• Explain what mutations are, what causes them, the types and the effects on the organism.</li> <li>• Compare and contrast asexual vs. sexual reproduction.</li> <li>• Explain the importance of meiosis and describe the stages.</li> <li>• Compare and contrast mitosis and meiosis.</li> </ul>		
Genetics II	10 Days	<ul style="list-style-type: none"> <li>• Gregor Mendel's classical work laying the foundations of inheritance</li> <li>• Punnett square analysis of inheritance patterns</li> <li>• Fundamental influences on patterns of inheritance</li> <li>• Introduction to probability theory</li> <li>• Biotechnology concepts</li> <li>• Human genetic diseases</li> <li>• Medical ethics</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>• Examine Mendel's experiments on heredity and explain how they led to Mendel's principles of dominance, segregation, and independent assortment.</li> <li>• Use Punnett squares to illustrate monohybrid and dihybrid crosses.</li> <li>• Examine incomplete dominance, codominance, multiple alleles, polygenic inheritance, gene interactions, and environmental influence.</li> <li>• Explain how to use a test cross.</li> <li>• Solve genetics problems using probabilities.</li> <li>• Discuss the importance of genetic diversity.</li> <li>• Examine basic concepts of Biotechnology, including various cloning techniques.</li> <li>• Interpret simple pedigrees.</li> <li>• Examine some genetic diseases.</li> <li>• Discuss ethical issues in medical genetics.</li> </ul>	<ul style="list-style-type: none"> <li>• Unit exam</li> <li>• Quizzes</li> <li>• Homework assignments</li> <li>• Worksheets</li> <li>• Lab on the Human Face</li> <li>• Forensics exercise on DNA fingerprinting</li> <li>• Pedigree charts</li> <li>• Activity on frequency of human genetic traits</li> <li>• Video on the Human Genome Project and discussion</li> <li>• Video essay (DNA and cloning concepts)</li> </ul>	<p>Inquiry LS 1, 2, 3, 6, 7, 8, 9, 11 Domain LS 8, 9, 10, 12, 13 Sci-Tech and Human Affairs LS 1-5</p>

Evolution	10 Days	<ul style="list-style-type: none"> <li>History of evolutionary thought</li> <li>Evidence for evolution</li> <li>Mutations and significance of variability</li> <li>Hardy-Weinberg theory</li> <li>Gradualism and Punctuated Equilibrium</li> <li>History of life on earth</li> <li>Origins of life</li> <li>Origins of the eukaryotic cell</li> </ul>	<ul style="list-style-type: none"> <li>Define basic terminology involved.</li> <li>Discuss contributions to theories of evolution.</li> <li>Examine four areas of evidence for evolution.</li> <li>Explain how mutations contribute to variability in a species.</li> <li>Explain the significance of changes in gene frequencies.</li> <li>Examine differences in theories of gradualism and punctuated equilibrium.</li> <li>Discuss the history of life on earth, including origins of various life forms.</li> </ul>	<ul style="list-style-type: none"> <li>Unit exam</li> <li>Quizzes</li> <li>Homework assignments</li> <li>Group presentations</li> <li>Time line</li> <li>Video essays</li> <li>Lab on change over time</li> </ul>	Inquiry LS 1,2,7,9,10,11 Domain LS 5-7 Sci-Tech and Human Affairs LS 1,2
Taxonomy	5 Days	<ul style="list-style-type: none"> <li>Taxonomic hierarchy</li> <li>Contributions of Aristotle and Linnaeus</li> <li>Detailed look at five kingdoms of life, and consideration of a six kingdom scheme</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Define basic terminology involved.</li> <li>Solve and construct dichotomous taxonomic keys.</li> <li>Outline the basic characteristics of each of the five kingdoms.</li> <li>Compare and contrast the five kingdom vs. six kingdom scheme.</li> </ul>	<ul style="list-style-type: none"> <li>Unit exam</li> <li>Quizzes</li> <li>Homework assignments</li> <li>Worksheets</li> <li>Lab on how to use a dichotomous key</li> <li>Group research and presentations</li> </ul>	Inquiry LS 1 Domain LS – N/A Sci-Tech and Human Affairs LS 1
Photosynthesis and Cell Respiration	5 Days	<ul style="list-style-type: none"> <li>Enzymes and selected factors that influence their activities</li> <li>Structure and function of ATP</li> <li>Major stages and purpose of cell respiration</li> <li>Major stages and purpose of photosynthesis</li> </ul>	<p>Students will:</p> <ul style="list-style-type: none"> <li>Understand that an enzyme is a protein, and explain how this relates to its structure and function under varying conditions.</li> <li>Discuss the importance of ATP.</li> <li>Describe the function and importance of cell respiration and photosynthesis, including where the major stages occur.</li> </ul>	<ul style="list-style-type: none"> <li>Unit exam</li> <li>Quizzes</li> <li>Homework assignments</li> <li>Lab on temperature influences on enzymatic action</li> <li>Microscopic examination of leaves</li> <li>Lab on cycling of energy</li> <li>Video essay</li> </ul>	Inquiry LS1, 7 Domain LS 14-17 Sci-Tech and Human Affairs LS - N/A

Systems of the Human Body	30 Days	<ul style="list-style-type: none"> <li>• Circulatory System</li> <li>• Respiratory System</li> <li>• Digestive System</li> <li>• Excretory System</li> <li>• Nervous and Endocrine Systems</li> <li>• Reproductive System and Development</li> </ul>	<ul style="list-style-type: none"> <li>• Perform dissection.</li> <li>• Understand basic structure and function of human body systems and explain how these systems interact to maintain homeostasis .</li> </ul>	<ul style="list-style-type: none"> <li>• Unit exam</li> <li>• Quizzes</li> <li>• Homework assignments</li> <li>• Group presentations</li> <li>• Lab on circulatory system</li> <li>• Lab on earthworm dissection</li> <li>• Lab on fish dissection</li> <li>• Lab on frog dissection</li> <li>• Lab on energy content in foods</li> <li>• Lab on nutrition in paramecium</li> <li>• Lab on reproduction in plants</li> <li>• Self-analysis of diet based on the food pyramid</li> <li>• Video essays</li> </ul>	<p>Inquiry LS 1, 2, 3, 6, 7, 11 Domain LS 1, 2, 3, 4, 17 Sci-Tech and Human Affairs LS 1-5</p> <p>*Note: based on Science and Technology Curriculum Framework of 1997</p>
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