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

UNIT	LENGTH	CONTENT	SKILLS	METHODS OF ASSESSMENT	FRAMEWORK STRAND(S) & STANDARD(S)*
Introduction	15 Days	• Definition of life and characteristics of living things • Intro to 5 kingdoms • Scientific method • Intro to Darwinian theory • Microscopy • Measurement and unit analysis	Students will: • Formulate a definition of life and describe characteristics of living organisms. • Compare and contrast the 5 kingdoms. • Describe the Darwinian theory. • Use and care for the microscope. • Convert metric and English units. • Explain and apply the principles of the scientific method.	• Unit exam • Lab: Microscope • Homework • Quizzes • Worksheets	Inquiry LS 1-11 Domain LS – N/A Sci-Tech and Human Affairs LS 1,2
The Cell	15 Days	• Cell theory • Relative size • Cell organelles • Surface area to volume ratio • Prokaryotic vs. eukaryotic • Plant vs. animal cells • Membrane systems • Transport • Cell connections	Students will: • Explain the cell theory. • Compare size in the micro and macro world. • Perform organelle identification and description of function. • Demonstrate correct microscope technique—slide prep and staining. • Use microscope in determining size of cells. • Measure and calculate surface area and volume. • Describe various types of cell connections in plant and animal cells. • Formulate hypothesis, observe, gather data and interpret results.	• Unit exam • Lab on the cell • Lab on diffusion • Lab on surface area to volume ratio • Lab on osmosis • Homework • Quizzes	Inquiry LS 1-8, 10,11 Domain LS 1-3, 8 Sci-Tech and Human Affairs LS 1,2

Chemistry of Life	15 Days	• Review basic chemistry terminology and concepts necessary for unit • Most abundant elements in body • Molecular formulas and equations • Organic vs. inorganic molecules • Acids, bases, pH scale and biological buffers • Dehydration synthesis and hydrolysis • Organic molecules of life-carbohydrates, lipids, proteins	Students will: • Explain basic structure of the atom. • Define atom, element, compound, molecule. • Determine ion formation. • Interpret chemical equations and chemical formulas. • Identify and distinguish between inorganic and organic molecules. • Explain the relationship between acid, bases and the pH scale and the importance of buffers in living systems. • Identify types of reactions (dehydration synthesis vs. hydrolysis). • Identify and describe the principle organic compounds as to elements, building blocks, and functions in living systems. • Demonstrate use of scientific method—research, experimentation, formulating hypothesis, interpretation of data collected.	• Unit exam • Quizzes • Homework • Lab on organic molecule building • Lab on homeostasis and buffers • Worksheets • Lab on biologically important molecules • Video essay on fats and cholesterol	Inquiry LS 1,2 4-11 Domain LS 4 Sci-Tech LS-N/A
Genetics I	15 days	• Prokaryotic vs. Eukaryotic cell cycles • Terminology: chromosomes, chromatid diploid, haploid etc. • Stages of mitosis and purpose • DNA structure & function • DNA replication • One gene, one protein hypothesis • RNA vs. DNA • Protein synthesis • Mutations; causes ,types and effects • Gene regulation • Asexual vs. sexual reproduction • Stages of meiosis and purpose • Mitosis vs. meiosis	Students will: • Compare and contrast cell cycles of prokaryotes and eukaryotes. • Define basic terminology involved. • Explain the function of mitosis, stages of mitosis and demonstrate ability to recognize and/or diagram. • Explain the structure of DNA and how it replicates. • Compare and contrast RNA and DNA in terms of structure and function. • Explain the steps of protein	• Unit exam • Quizzes • Homework assignments • Lab on DNA structure • Lab on DNA replication • Lab on protein synthesis—worksheet style • Lab on protein synthesis and essay • Video essay	Inquiry LS 8 Domain LS 3, 8–13 Sci-Tech and Human Affairs 1-5

			synthesis and the one gene, one protein hypothesis. • Explain what mutations are, what causes them, the types and the effects on the organism. • Compare and contrast asexual vs. sexual reproduction. • Explain the importance of meiosis and describe the stages. • Compare and contrast mitosis and meiosis.		
Genetics II	10 Days	• Gregor Mendel's classical work laying the foundations of inheritance • Punnett square analysis of inheritance patterns • Fundamental influences on patterns of inheritance • Introduction to probability theory • Biotechnology concepts • Human genetic diseases • Medical ethics	Students will: • Examine Mendel's experiments on heredity and explain how they led to Mendel's principles of dominance, segregation, and independent assortment. • Use Punnett squares to illustrate monohybrid and dihybrid crosses. • Examine incomplete dominance, codominance, multiple alleles, polygenic inheritance, gene interactions, and environmental influence. • Explain how to use a test cross. • Solve genetics problems using probabilities. • Discuss the importance of genetic diversity. • Examine basic concepts of Biotechnology, including various cloning techniques. • Interpret simple pedigrees. • Examine some genetic diseases. • Discuss ethical issues in medical genetics.	• Unit exam • Quizzes • Homework assignments • Worksheets • Lab on the Human Face • Forensics exercise on DNA fingerprinting • Pedigree charts • Activity on frequency of human genetic traits • Video on the Human Genome Project and discussion • Video essay (DNA and cloning concepts)	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

Evolution	10 Days	• History of evolutionary thought • Evidence for evolution • Mutations and significance of variability • Hardy-Weinberg theory • Gradualism and Punctuated Equilibrium • History of life on earth • Origins of life • Origins of the eukaryotic cell	• Define basic terminology involved. • Discuss contributions to theories of evolution. • Examine four areas of evidence for evolution. • Explain how mutations contribute to variability in a species. • Explain the significance of changes in gene frequencies. • Examine differences in theories of gradualism and punctuated equilibrium. • Discuss the history of life on earth, including origins of various life forms.	• Unit exam • Quizzes • Homework assignments • Group presentations • Time line • Video essays • Lab on change over time	Inquiry LS 1,2,7,9,10,11 Domain LS 5-7 Sci-Tech and Human Affairs LS 1,2
Taxonomy	5 Days	• Taxonomic hierarchy • Contributions of Aristotle and Linnaeus • Detailed look at five kingdoms of life, and consideration of a six kingdom scheme	Students will: • Define basic terminology involved. • Solve and construct dichotomous taxonomic keys. • Outline the basic characteristics of each of the five kingdoms. • Compare and contrast the five kingdom vs. six kingdom scheme.	• Unit exam • Quizzes • Homework assignments • Worksheets • Lab on how to use a dichotomous key • Group research and presentations	Inquiry LS 1 Domain LS – N/A Sci-Tech and Human Affairs LS 1
Photosynthesis and Cell Respiration	5 Days	• Enzymes and selected factors that influence their activities • Structure and function of ATP • Major stages and purpose of cell respiration • Major stages and purpose of photosynthesis	Students will: • Understand that an enzyme is a protein, and explain how this relates to its structure and function under varying conditions. • Discuss the importance of ATP. • Describe the function and importance of cell respiration and photosynthesis, including where the major stages occur.	• Unit exam • Quizzes • Homework assignments • Lab on temperature influences on enzymatic action • Microscopic examination of leaves • Lab on cycling of energy • Video essay	Inquiry LS1, 7 Domain LS 14-17 Sci-Tech and Human Affairs LS - N/A

Systems of the Human Body	30 Days	• Circulatory System • Respiratory System • Digestive System • Excretory System • Nervous and Endocrine Systems • Reproductive System and Development	• Perform dissection. • Understand basic structure and function of human body systems and explain how these systems interact to maintain homeostasis .	• Unit exam • Quizzes • Homework assignments • Group presentations • Lab on circulatory system • Lab on earthworm dissection • Lab on fish dissection • Lab on frog dissection • Lab on energy content in foods • Lab on nutrition in paramecium • Lab on reproduction in plants • Self-analysis of diet based on the food pyramid • Video essays	Inquiry LS 1, 2, 3, 6, 7, 11 Domain LS 1, 2, 3, 4, 17 Sci-Tech and Human Affairs LS 1-5 *Note: based on Science and Technology Curriculum Framework of 1997