



Science Department Curriculum Guide

Biology – AP

Course Description	
AP Biology is equivalent to a 1st year college introductory biology course. The course will cover a range of topics from ecology to molecular genetics. A typical college course might cover a 6-8 week period but AP biology at the HS level runs for the entire school year. This allows us to more completely explore the topics at hand and often place them in a context that is useful for students. In AP biology students will cultivate their understanding of biology through inquiry-based investigations as they explore the following topics: evolution, cellular processes, energy and communication, genetics, information transfer, ecology, and interactions. The course consists of inquiry based laboratory investigations that make up at least 25% of the course content. In these investigations students will be expected to design new and innovative experiments that further increase their understanding of the key concepts. The AP biology course looks to strike a balance between traditional content understanding and enduring conceptual understandings focused around the big ideas of biology; evolution, energy, information storage and transfer, and systems interactions. In addition to the inquiry based labs students will participate in class discussions, lecture, and process oriented guided inquiry learning (POGIL) systems to cover the course content in a variety of methods which utilize multiple learning styles. The AP biology curriculum also integrates several mathematical concepts and models. This generally does not go beyond algebra, geometry, and graphing skills. The inquiry based labs will introduce students to some fundamentals in the use of mathematical analysis and the evaluation of data to assess for effect size and statistical significance.	
Course Content	Science Practices
The AP Environmental Science course is organized into nine units arranged in a logical sequence. Students will spend about 25% of instructional time engaged in hands-on, inquiry-based investigations. ■ Unit 1: Chemistry of Life ■ Unit 2: Cell Structure and Function ■ Unit 3: Cellular Energetics ■ Unit 4: Cell Communication and Cell Cycle ■ Unit 5: Heredity ■ Unit 6: Gene Expression and Regulation ■ Unit 7: Natural Selection ■ Unit 8: Ecology	■ Concept Explanation: Explain biological concepts, processes, and models presented in written format. ■ Visual Representations: Analyze visual representations of biological concepts and processes. ■ Questions and Methods: Determine scientific questions and methods. ■ Representing and Describing Data: Represent and describe scientific data. ■ Statistical Analysis and Data Analysis: Perform statistical tests and mathematical calculations to analyze and interpret data. ■ Argumentation: Develop and justify scientific arguments using evidence.
Course Description	
<i>Campbell Biology in Focus</i>, by Urry, Cain, Wasserman, Minorsly, and Reece; published by Pearson, 2015	



Subject: AP Biology

Units	Topics	Activities May Include
Chemistry of Life Term 1 3-4 weeks	- Structure of water and hydrogen bonding - Elements of life - Introduction of biological macromolecules - Properties of biological macromolecules - Structure and function of biological molecules - Nucleic acids	Enzyme Structure and Function
Cell Structure and Function Term 1 4-6 weeks	- Cell structure: subcellular components - Cell structure and function - Cell size - Plasma membranes - Membrane permeability - Membrane transport - Facilitated diffusion - Tonicity and osmoregulation - Mechanisms of transport - Cell compartmentalization - Origins of cell compartmentalization	Diffusion and Osmosis
Cellular Energetics Term 2 4-6 weeks	- Enzyme structure - Enzyme catalysis - Environmental impacts on enzyme function - Cellular energy - Photosynthesis - Cellular respiration - Fitness	- Cellular respiration - Photosynthesis
Cell Communication and the Cell Cycle Term 2 2-4 weeks	- Cell communication - Introduction to signal transduction - Changes to signal transduction pathways - Cell cycle - Regulation of cell cycle	Cell pathway project



Units	Topics	Activities May Include
Heredity Term 2 2-4 weeks	- Meiosis - Meiosis and genetic diversity - Mendelian genetics - Non-Mendelian genetics - Environmental effects of phenotype - Chromosomal inheritance	- Mitosis and Meiosis - Stop-go animation
Gene Expression and Regulation Term 3 4-6 weeks	- DNA and RNA structure - Replication - Transcription and RNA processing - Translation - Regulation of gene expression - Gene expression and cell specialization - Mutations - Biotechnology	- Bacterial transformation - Genetic fingerprinting
Evolution Term 3 4-6 weeks	- Introduction to evolution - Natural selection - Artificial selection - Population genetics - Hardy-Weinberg equilibrium - Evidence of evolution - Common ancestry - Continuing evolution - Phylogeny - Speciation - Extinction - Variation of populations - Origins of life on Earth	- Artificial Selection - BLAST lab
Ecology Term 4 4 weeks	- Responses to the environment - Energy flow through ecosystems - Population ecology - Effects of density on populations - Community ecology - Biodiversity - Disruptions to ecosystems	Energy Dynamics