Science Standard
Catalina Foothills School District
High School – Biology: Environmental

Environmental Biology is an inquiry-based laboratory course that incorporates aspects of inquiry, cooperative learning, and independent research while focusing on essential real-world concepts and environmental issues. A diverse range of topics will be covered including cellular biology, genetics, evolution, and ecology, all through an environmental perspective. Students will be engaged in activities that promote analytical thinking, scientific inquiry, and development of higher-level cognitive skills. The course will make use of sophisticated laboratory equipment, technological resources, and media equipment to enhance the inquiry process and heighten students' awareness of community and global issues. This course fulfills the CFHS Biology graduation requirement.

1A. SCIENTIFIC INQUIRY: GENERATING SCIENTIFIC QUESTIONS	
BIO-E.1a.1	Frames testable questions showing evidence of observations and connections to prior knowledge.
BIO-E.1a.2	Develops a testable question appropriate to the scientific domain being investigated.
1B. SCIENTIFIC INQUIRY: FORMULATING HYPOTHESES	
BIO-E.1b.1	Develops a testable hypothesis based upon evidence of scientific principles, probability and/or modeling.
BIO-E.1b.2	Clearly distinguishes relationships between the dependent and independent variables *(required: cause and effect or correlation) within a testable hypothesis)*.
1C. SCIENTIFIC INQUIRY: DESIGNING INVESTIGATIONS	
BIO-E.1c.1	Specifies the parameters of measurement for a natural resource topic.
BIO-E.1c.2	Describes suitable controls for the investigation of a natural resource topic.
BIO-E.1c.3	Designs procedures that appropriately address the hypothesis for a natural resource topic.
1D. SCIENTIFIC INQUIRY: DATA COLLECTION	
BIO-E.1d.1	Creates and demonstrates safe and ethical procedures.
BIO-E.1d.2	Uses units of measurement with appropriate degree of accuracy.
BIO-E.1d.3	Creates procedures that appropriately and adequately address the hypothesis *(for example: adequate sample size, multiple trials)*.
BIO-E 1d.4	Creates a suitable method of recording data.
1E. SCIENTIFIC INQUIRY: ANALYSIS	
BIO-E.1e.1	Interprets data to describe relationships between variables *(for example: positive, negative, no relationship)* in a natural resource topic.
BIO-E.1e.2	Incorporates mathematical analysis, where appropriate.
BIO-E.1e.3	Critiques the investigation for possible sources of error and suggests corrections.
1F. CONCLUSIONS AND EXTENSIONS	
BIO-E.1f.1	Makes evidence-based predictions *(for example: extrapolations and interpolations)*.
BIO-E.1f.2	Evaluates whether the data support the hypothesis for a natural resource topic.
1G. COMMUNICATION	
BIO-E.1g.1	Uses suitable media to inform an audience about an investigation of a natural resource topic.
BIO-E.1g.2	Applies appropriate ethics *(for example: language, style, citations)*.
2. INTERACTION OF SCIENCE AND SOCIETY	
BIO-E.2.1	Describes the interaction of science, human curiosity and societal needs *(for example: investigating the cell cycle to discover how radiation can bond to cells and reduce in concentration over time)*.
BIO-E.2.2	Critically analyzes the science concepts behind societal issues *(for example: analyzing the ecological effects of land use)*.
BIO-E.2.3	Describes natural resource enhancement techniques *(required: stream, forest stand, wildlife habitat, range, recreation area, cropland enhancement techniques)*.
3A. SYSTEMS THINKING: CHANGE OVER TIME	
BIO-E.3a.1	Explains how a system's components change over time *(for example: evolution of a species)*.

3B. SYSTEMS THINKING: INTERDEPENDENCIES	
BIO-E.3b.1	Explains the causal relationships in a system as being either positive or negative feedback relationships *(for example: population fluctuation in predator and prey systems; protein feedback on gene transcription).*
3C. SYSTEMS THINKING: SYSTEM-AS-CAUSE	
BIO-E.3c.1	Explains reasons why specific behaviors result from the organization of a system *(for example: how stream classification systems help to define watershed boundaries).*
4. STRUCTURE AND FUNCTIONS OF CELLS	
BIO-E.4.1	Describes the interaction of cell organelles in prokaryotes and eukaryotes.
BIO-E.4.2	Analyzes the relationship between surface area-to-volume ratio and cell size.
BIO-E.4.3	Compares and contrasts methods of cellular transport *(required: diffusion, osmosis, active transport, passive transport).*
BIO-E.4.4	Compares the structure, properties, function and size of proteins, lipids, nucleic acids, carbohydrates, water, atoms, molecules, and macromolecules.
5. METABOLISM IN CELLS	
BIO-E.5.1	Explains the system of ATP production *(required: cellular respiration as a system).*
E-BIO.5.2	Examines the purpose and process of protein synthesis *(required: as a system).*
6. CELL CYCLES	
BIO-E.6.1	Explains the system of DNA replication.
BIO-E.6.2	Explains cell cycle, meiosis and fertilization and how they lead to genetic variation.
7. GENETICS	
BIO-E.7.1	Outlines the relationships among nucleic acids, genes, chromosomes and karyotype in viruses, prokaryotes, and eukaryotes.
BIO-E.7.2	Applies the laws of Mendelian genetics *(required: calculate the probability of phenotype and genotype from a monohybrid cross using a Punnett square).*
BIO-E.7.3.	Explains the causes of genetic variation, cancer, and genetic disorders *(required: observable diseases impacting plants and animals).*
8. EVOLUTION I	
BIO-E.8.1	Provides evidence to support biogenesis.
BIO-E.8.2	Explains the effects of major events in the evolution of Earth and life.
BIO-E.8.3	Provides evidence to support evolutionary theory.
9. EVOLUTION II	
BIO-E.9.1	Analyzes the degree of relatedness among various species using cladistics, phylogeny, morphology, and DNA analysis.
BIO-E.9.2	Explains the relationship of reproduction, recombination, mutation, adaptation, and environmental change with succession, natural selection, speciation, and biodiversity.
BIO-E.9.3	Describes characteristics and harvesting techniques of common plants (including grasses, trees, and other woody vegetation), and wildlife (including fish).
BIO-E.9.4	Describes characteristics of insect damage and how to report observance of insect infestation.
10. ECOLOGY	
BIO-E.10.1	Analyzes the ecosystem relationships and population dynamics among levels of organization (required: organism to biosphere) within the biosphere.
BIO-E.10.2	Relates biogeochemical cycles and energy flow (required: nitrogen, carbon, phosphorous, hydrologic, food webs, stream classification systems).
BIO-E.10.3	Evaluates human effects on the environment and the available resources (required: population dynamics, potential pollution sources, influence of weather/climatic factors).
BIO-E.10.4	Creates a habitat management plan using information and data collected for a specific area.