

FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT



Honors Biology: The Living Earth

Board Approval Date: June 15, 2023	Course Length: 2 Semesters
Grading: A-F	Credits: 5 Credits per Semester
Proposed Grade Level(s): 9	Subject Area: Life Science Elective Area (if applicable):
Prerequisite(s): Suggested Grade of B or better in previous science course or teacher recommendation	Corequisite(s):
CTE Sector/Pathway: N/A	
Intent to Pursue 'A-G' College Prep Status: Yes	
A-G Course Identifier: (d) Laboratory Science	
Graduation Requirement: Yes	
Course Intent: District Course Program (if applicable):	
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COURSE DESCRIPTION:

This course is designed to prepare students for success in upper level advanced college level science courses. The course is based on the CA Next Generation Science Standards (NGSS) and includes the Disciplinary Core Ideas related to Life Science and integrates a selection of the Earth and Space Science concepts. This course also incorporates the eight Science and Engineering Practices and seven Crosscutting Concepts related to the NGSS. Students taking Honors Biology will explore amplified and enriched Biology concepts related, but not limited to the interactions within ecosystems, energy dynamics, photosynthesis and cellular respiration, history of the earth’s atmosphere, natural selection, inheritance of traits, structure and function of organisms, system stability and response to change. Lab skills are emphasized and elements of critical thinking are required of students throughout the course.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Science Skills & Engineering Practices	How do scientists and engineers differ in their approach to their work? What skills are necessary to be a scientist or an engineer? How do scientists communicate their work to others?	*Graph analyses *Observational lab *Measurements lab *Data collection lab	*Unit test *Formal lab report
2. Ecosystems Interactions and Energy	What factors affect the size of populations within an ecosystem? What are common threats to remaining natural ecosystems and biodiversity? How can these threats be reduced?	*Food web design *Energy and growth rate calculations *Survivorship and population growth curve analysis	*Unit test *Carrying capacity formal lab report
3. Photosynthesis, Respiration and the History of Earth’s Atmosphere	How does the structure of plants enhance their ability to produce food? How do living things acquire energy and matter for life? How do organisms store energy? How are photosynthesis and cellular respiration connected? How do organisms use the raw materials they ingest	*Elodea and Bromothymol Blue lab *Bromothymol Blue and Exercise lab *Microscope viewing of plant cells	*Unit test *Formal lab report

	<p>from the environment? How has the cycling of energy and matter changed over Earth's history?</p>		
<p>4. Structure, Function, and Growth from Cells to Organisms</p>	<p>What happens if a cell in our body dies? How does the structure of DNA affect how cells look and behave? How do systems work in a multi-celled organism and what happens if there is a change in the system? How do organisms survive even when there are changes in their environment?</p>	<p>*Cell structure and specialization modeling *Cell structure microscope activity *Protein synthesis practice *Mitosis modeling</p>	<p>*Unit test *Human Homeostasis formal lab report</p>
<p>5. Inheritance of Traits</p>	<p>How are characteristics of one generation passed to the next? What allows traits to be transmitted from parents to offspring? How does variation affect a population under selective pressures?</p>	<p>*Monohybrid and dihybrid Punnett square practice *Pedigree creation and analysis *Meiosis modeling activity</p>	<p>*Unit Test *Genetic Disorder Project</p>
<p>6. Evidence for Evolution</p>	<p>How do we know how the earth was formed and its early history? How do layers of rock form and how do they contain fossils? Across the world, why do we see similar fossils, but living organisms that are very different from each other? What evidence shows that different species are related?</p>	<p>*Evidence for Evolution exploratory lab stations *DNA comparisons *Hominid fossil comparisons *Earth Viewer Biogeography lab</p>	<p>*Unit Test *Natural Selection and Evolution formal lab report</p>
<p>7. Ecosystem Stability and Response to Climate Change</p>	<p>What affects changes in ecosystems that ultimately affect populations? What are the changes that are happening in the</p>	<p>*Climate change exploratory lab *Carbon footprint activity</p>	<p>*Unit test *Human Impact Project</p>

	climate and what effects are those having on life? How are human activities impacting Earth's systems and how does that affect life on Earth? What can humans do to mitigate their negative impact on the environment?		
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ESSENTIAL STANDARDS:

Next Generation Science Standards

HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

HS-LS1-4. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

HS-LS1-5. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.

HS-LS1-6. Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon based molecules.

HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.

HS-LS2-1. Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.

HS-LS2-2. Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.

HS-LS2-3. Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

HS-LS2-4. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

HS-LS2-5. Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere.

HS-LS2-6. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

HS-LS2-7. Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.

HS-LS2-8. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce.

HS-LS3-1. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

HS-LS3-2. Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

HS-LS3-3. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.

HS-LS4-1. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence.

HS-LS4-2. Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

HS-LS4-3. Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable traits tend to increase in proportion to organisms lacking this trait.

HS-LS4-4. Construct an explanation based on evidence for how natural selection leads to adaptation of populations.

HS-LS4-5. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.

HS-LS4-6. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity.

Earth and Space Science

HS-ESS2-6. Develop a quantitative model to describe the cycling of carbon among the hydrosphere, atmosphere, geosphere, and biosphere.

HS-ESS2-7. Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth.

HS-ESS3-1. Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-4. Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.

HS-ESS3-5. Analyze geoscience data and the results from global climate models to make an evidence based forecast of the current rate of global or regional climate change and associated future impacts to Earth's systems.

HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

RELEVANT STANDARDS AND FRAMEWORKS, CONTENT/PROGRAM SPECIFIC STANDARDS:

Link to Common Core Standards (if applicable):

Educational standards describe what students should know and be able to do in each subject in each grade. In California, the State Board of Education decides on the standards for all students, from kindergarten through high school.

https://learning.ccsso.org/wp-content/uploads/2022/11/ELA_Standards1.pdf

Link to Framework (if applicable):

Curriculum frameworks provide guidance for implementing the content standards adopted by the State Board of Education (SBE). Frameworks are developed by the Instructional Quality Commission, formerly known as the Curriculum Development and Supplemental Materials Commission, which also reviews and recommends textbooks and other instructional materials to be adopted by the SBE.

Link to Subject Area Content Standards (if applicable):

Content standards were designed to encourage the highest achievement of every student, by defining the knowledge, concepts, and skills that students should acquire at each grade level.

<https://www.nextgenscience.org/search-standards>

Link to Program Content Area Standards (if applicable):

Program Content Area Standards apply to programs such as International Baccalaureate, Advanced Placement, Career and Technical Education, etc.

TEXTBOOKS AND RESOURCE MATERIALS:

Textbooks

Board Approved	Pilot Completion Date (If applicable)	Textbook Title	Author(s)	Publisher	Edition	Date
<i>Yes</i>		<i>HMH Science Dimensions: The Living Earth</i>	S. Nowicki, Ph.D.	Houghton Mifflin Harcourt (HMH)		<i>11/1/2019</i>

Other Resource Materials

HHMI, PBS Learning, NOVA videos, Amoeba Sisters, Crash Course, Bozeman Science, National Center for Case Studies in Science Teaching, Pear Deck, EdPuzzle, Learn Genetics Utah, PhET, The Wonder of Science, Stanford NGSS Assessment Project, CASE, NIH, Moana Loa Observatory, Scripps Institute, SIRC, SASP, CA Environmental Literacy Initiative, Exploratorium, California Academy of Science, Science Learning Hub (science learn.org), MBER, Concord Consortium, Khan Academy, Verner Scientific, Pogil, Pasco

Supplemental Materials

Board approved supplemental materials (Including but not limited to: Film Clips, Digital Resources, Supplemental texts, DVDs, Programs (Pebble Creek, DBQ, etc.):

Gizmos