FOLSOM CORDOVA UNIFIED SCHOOL DISTRICT

Biology of the Living Earth

Board Approval Date: June 1, 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): **N/A**	**Corequisite(s):** **N/A**
CTE Sector/Pathway:	
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:

Biology is the first course in the California Next Generation Science Standards (CA NGSS) Three Course Model 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. In this course, students will explore concepts related 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. Students should learn an appreciation for all living things and the critical importance of maintaining the delicate balance required for all living things to interact and live successfully.

DETAILED UNITS OF INSTRUCTION:

Unit Number/Title	Unit Essential Questions	Examples of Formative Assessments	Examples of Summative Assessment
1. Ecosystems Interactions and Energy	What factors affect the size of populations within an ecosystem? What are common threats to remaining natural ecosystems and biodiversity?	*Carrying Capacity Graphing Activity *Food Web Model *Energy Pyramid Activity *Abiotic/Biotic on-campus field trip *Properties of Water	*Unit Test *Project *Lab or other means of assessment
2. Photosynthesis and Respiration and the History of Earth's Atmosphere	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 from the environment? How has the cycling of energy and matter changed over Earth's history?	*Modeling pathway of carbon atoms from photosynthesis through respiration *Whiteboarding Compare/Contrast Light Reaction and Dark Reaction *Formal Radish Lab (SEP practice) *Bromothymol Blue CO2 activity	*Unit Test *Project *Lab or other means of assessment
3. Evidence for Evolution	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?	*Modeling Fossil Layers *Whale Evolution data analysis activity *Rocket-Pocket mice case study *Amino acid sequence analysis *Alien DNA activity (DNA-	*Unit Test *Project *Lab or other means of assessment

	What evidence shows that different species are related?	RNA-Protein/Trait)	
4. Inheritance of Traits	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?	*Blue People Activity *HHMI Pedigree Analysis and Lactose Intolerance *Punnett Square Practice	*Unit Test *Project *Lab or other means of assessment
5. Structure, Function, and Growth from Cells to Organisms	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?	*Introduction to Microscopes, prepared slides of prokaryotes and eukaryotes, *Elodea Lab *Meiosis and Mitosis modeling *Cell specialization activity	*Unit Test *Project *Lab or other means of assessment
6. Ecosystem Stability and Response to Climate Change of Traits	What affects changes in ecosystems that ultimately affect populations? What are the changes that are happening in the 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?	*Invasive Species Project *Sea Ice Extent Data Analysis *Climate Change Lab	*Unit Test *Project *Lab or other means of assessment

ESSENTIAL STANDARDS:

HS-LS 2-5: 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 ESS 2-7: Construct an argument based on evidence about the simultaneous coevolution of Earth's systems and life on Earth. (ELA/Literacy CCSS: WHST.9.12.1)

HS LS 1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (ELA/Literacy CCSS: WHST.9-12.7, WHST.9-12.8)

HS LS 1-1: 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. (ELA/Literacy CCSS: RST.11-12.1, WHST.9-12.2, WHST.9-12.9)
HS -LS 4-1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. (ELA/Literacy CCSS: RST.11-12.1, WHST.9-12.2, WHST.9-12.9, SL.11-12.4 and Math CCSS: MP.2)

HS LS 4-2 : Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for 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. (ELA/Literacy CCSS: RST.11-12.1, WHST.9-12.2, WHST.9-12.9, SL.11-12.4 and Math CCSS: MP.2, MP.4)

HS-ESS 3-5: 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 systems. (ELA/Literacy CCSS: RST.11-12.1, RST.11-12.2, RST.11-12.7 and Math CCSS: MP.2, HSN-Q.A.1, HSN-Q.A.2, HSN-Q.A.3)

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://www.cde.ca.gov/be/st/ss/documents/finalelaccssstandards.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.
https://www.cde.ca.gov/ci/sc/cf/cascienceframework2016.asp

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?keys=&tid%5B%5D=107&tid_3%5B%5D=96&tid_3%5B%5D=94

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
Yes		*HMH Science Dimensions: The Living Earth*	S. Nowicki, Ph.D.	Houghton Mifflin Harcourt		*1/1/2020*

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

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