

Content: Life Science	Grade or Course: Foundations of Biology	Date Developed: 7/30/2018
Overview: <p>Foundations of Biology is a year-long course worth 1.0 credits, and is open to students who have completed at least Global Science. The class meets every other day for of 80 minutes. The intent of Foundations of Biology is to provide students with a basic introduction to key biological concepts.</p> <p>Foundations level biology is taught by focusing on you and your living environment where a basic understanding of biological principles will assist you in many future life decisions. In this class, students will be required to conduct many scientific investigations, interpret the value of data/information, and apply new knowledge to real current world issues.</p> <p>Students are expected to play an active and participatory role in all activities and class discussions. Students will be expected to make basic connections between data analysis and biological concepts. Foundations of Biology is intended to engage students in a broad survey of mandatory life science content goals and general science practices.</p>		
Essential Questions: <p>CC: How are the structures of biological components related to their functions? CC: How and why do living systems maintain stability or respond to change? CC: How can we use cause and effect relationships to explain biological phenomena? CC: How does energy flow and matter cycle among and within biological systems?</p> <p>How do cells acquire and manipulate energy and matter? How and why do cells replicate to maintain complex organisms? How is biological information recorded, communicated, and transferred? How can evolution account for the development and modification of all species? How is biology relevant to everyday life?</p>		
EO's addressed to proficiency level: <p>Students will understand, demonstrate, and be evaluated on the following Scientific Practices:</p> <ul style="list-style-type: none"> ● P1: Asking Questions and Defining Problems ● P4: Analyzing and Interpreting Data ● P5: Using Math and Computational Thinking ● P6: Constructing Explanations ● P8: Obtaining, Evaluating, and Communicating Information 		

Standards:

Students will understand and use the following additional Scientific Practices:

- P2: Developing and Using Models
- P3: Planning and Carrying out Investigations
- P7: Engaging in Argument over Evidence

Students will understand and use the following Cross-Cutting Concepts:

- Structure and Function
- Stability and change
- Cause and Effect
- Energy and matter

Students will understand, use, and be evaluated on the following Disciplinary Core Ideas:

1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins that carry out the essential functions of life through systems of specialized cells. HS-LS1-1
2. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. HS-LS1-4
3. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy. HS-LS1-5
4. 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-LS1-7
5. Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem. HS-LS2-4
6. 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-LS2-5
7. 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-LS3-1
8. 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-LS3-2
9. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. HS-LS3-3
10. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-1
11. 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-LS4-2

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

Units:

Unit 1	Metabolism: Matter and Energy
Unit 2	Cellular Regulation: Cell Cycle and Cell Division
Unit 3	Genetics: Heritability, Prediction and Variability
Unit 4	Evolution: Natural Selection and Speciation

EO Assessments:

- Cell Respiration Exercise CER
- Cell Size Efficiency CER
- Fast Plant Mendelian Genetics CER
- Natural Selection CER