Content: Life Science	**Grade or Course:** Lab Biology	**Date Developed:** 7/30/2018

Overview:

Lab Biology is a year-long course worth 1 credit, and is open to students who have successfully completed Global Science. The class meets every other day for a full year. The intent of Lab Biology is to provide students who may or may not be contemplating post secondary studies with experiences that allow students to meet graduation standards for both science practices and life science content.

Lab biology is taught with a molecular approach, where students strive to understand the interconnections of biological concepts. These concepts are divided into seven units of study: Nature of Science, Fundamental properties of Energy and Matter, Cell respiration and Photosynthesis, Cell Transport, Cell cycle regulation, Genetic Variability, Molecular genetics, and Evolution.

Each unit of study provides the student with lab experiences that are linked to the concepts being taught.

Instruction and assessment will include class discussion, lab/field experiments, interpreting and analyzing data, modeling biological phenomena, reading basic texts and communicating science in written and oral formats. Successful participation at this level will require that students be active members of the classroom community who can work independently as well as collaboratively to achieve the learning goals.

Essential Questions:

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?

How is science distinguished from other ways of knowing?
How are the atoms, molecules and biological components of living things organized at different levels to allow the functions of life?
How do cells acquire and manipulate energy and matter?
How and why do cells replicate to maintain complex organisms?
What are the consequences of failing to regulate the cell life cycle?
How do our bodies guard against disease?
How is biological information recorded, communicated, and transferred?
How can genetic knowledge be used to manipulate, control, and/or improve organisms?
How can variations in genetic code affect individuals and populations?
How can evolution account for the development and modification of all species?
How is biology relevant to everyday life?

EO's addressed to proficiency level:

Students will understand, demonstrate, and be evaluated on the following Scientific Practices:

- 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:

- Systems and system models
- Energy and matter
- Stability and change
- Structure and Function

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	Nature of Science- Logical thought and Experimental Design
Unit 2	Fundamental properties of Energy and Matter
Unit 3	Cell respiration and Photosynthesis
Unit 4	Cell cycle regulation- Cancer and Immune system
Unit 5	Genetic Variability- Meiosis and Heritability
Unit 6	Molecular genetics- Structure of DNA and Central Dogma
Unit 7	Evolution- Natural Selection and Speciation

EO Assessments:

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