Content: Life Science	Grade or Course: 7th Grade	Date Developed: March 7, 2018

Overview:

The 7th grade science class at CRMS focusses on having students do the work of scientists through a series of experiments, labs, observations, written work, and projects. The course has a strong focus on human anatomy and physiology in the context of a broader focus on all of life. Students study the molecules of life, cells, organs, and organisms. They study interactions between organisms of different species, and between organisms and the non-living environment. Students demonstrate their knowledge in projects, writing, performance assessments, and by teaching others. To more deeply understand how human body systems function when they work properly, students will study genetic disorders, brain injuries, and cardiac emergencies.

Essential Questions:

How is life interconnected and interdependent? (Ecology1.0)
How does the energy that runs me cycle through the environment? (Energy & the Environment)
What am I made of? (Cells + Microscopy)
What makes me who I am as a person? (Brain Development)
What separates us from the machines? (Hour of Code)
What are the basic molecules of life? (Chemistry of Life)
What (literally) makes me tick? (Cardiac A & P)
What makes me who I am as a person? (Genetics and Evolution)
What makes a healthy community? (Ecology 2.0)

EO's addressed to proficiency level:

Practice Standards

PRACTICE 1: ASKING QUESTIONS AND DEFINING PROBLEMS: Students will design and refine empirically testable questions in order to describe and explain the natural world or to clarify criteria and constraints for solving problems about the designed world as demonstrated through the integration of cross- cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 2: DEVELOPING AND USING MODELS: Students will use and construct different types of models as tools for representing ideas and explanations, as demonstrated through the integration of cross-cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 3: PLANNING & CARRYING OUT INVESTIGATIONS: Plan and carry out safe, ethical, systematic field and laboratory investigations, as demonstrated through the integration of cross-cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 4: ANALYZING AND INTERPRETING DATA: Students will use a range of tools to identify the significant features and patterns in data, and calculate the degree of certainty in the results, as demonstrated through the integration of cross-cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 5: USING MATHEMATICS AND COMPUTATIONAL THINKING: Students will use mathematics and computation to represent physical variables and their relationships, to predict the behavior of systems, and to test the validity of such predictions, as demonstrated through the integration of cross- cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 6: CONSTRUCTING EXPLANATIONS AND DESIGNING SOLUTIONS: Students will construct explanations for scientific investigations that describe phenomena in the natural world and design solutions for engineering problems that are based on scientific knowledge, as demonstrated through the integration of cross-cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 7: ENGAGING IN ARGUMENT FROM EVIDENCE: Students will develop the ability to engage in argumentation based on evidence and reasoning and leads to evidence-based conclusions and solutions as demonstrated through the integration of the other science & engineering practices and cross-cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics.

PRACTICE 8: OBTAINING, EVALUATING, AND COMMUNICATING INFORMATION: Students will use oral and written skills to communicate, evaluate and critique ideas and methods generated via research and experimentation, as demonstrated through the integration of cross-cutting concepts within the disciplines of earth/space science, biology, chemistry, and physics. (NGSS Practice 8)

Content Standards

LS1.A STRUCTURE AND FUNCTION: All living things are made up of cells. In organisms, cells work together to form tissues and organs that are specialized for particular body functions.

LS1.B GROWTH AND DEVELOPMENT OF ORGANISMS: Animals engage in behaviors that increase the odds of reproduction. An organism's growth is affected by both genetic and environmental factors

LS1.C ORGANIZATION FOR MATTER AND ENERGY FLOW IN ORGANISMS: Plants use the energy from light to make sugars through photosynthesis. Within individual organisms, food is broken down through a series of chemical reactions that rearrange molecules and release energy.

LS1.D INFORMATION PROCESSING: Each sense receptor responds to different inputs, transmitting them as signals that travel along nerve cells to the brain; The signals are then processed in the brain, resulting in immediate behavior or memories.

LS2.A INTERDEPENDENT RELATIONSHIPS IN ORGANISMS: Organisms and populations are dependent on their environmental interactions both with other living things and with nonliving factors, any of which can limit their growth. Competitive, predatory, and mutually beneficial interactions vary across ecosystems but the patterns are shared.

LS2.B CYCLES OF MATTER AND ENERGY TRANSFER IN ORGANISMS: The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. Food webs model how matter and energy are transferred among producers, consumers, and decomposers as the three groups interact within an ecosystem.

LS2.C ECOSYSTEM DYNAMICS, FUNCTIONING, AND RESILIENCE: Ecosystem characteristics vary over time. Disruptions to any part of an ecosystem can lead to shifts in all of its populations. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health.

LS3.A INHERITANCE OF TRAITS: Genes chiefly regulate a specific protein, which affect an individual's traits.

LS3.B Variation of traits: In sexual reproduction, each parent contributes half of the genes acquired by the offspring resulting in variation between parent and offspring. Genetic information can be altered because of mutations, which may result in beneficial, negative, or no change to proteins in or traits of an organism

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LS4.A Evidence of common ancestry and diversity: The fossil record documents the existence, diversity, extinction, and change of many life forms and their environments through Earth's history. The fossil record and comparisons of anatomical similarities between organisms enables the inference of lines of evolutionary descent.

LS4.B Natural selection: Both natural and artificial selection result from certain traits giving some individuals an advantage in surviving and reproducing, leading to predominance of certain traits in a population.

LS4.C Adaptation: Species can change over time in response to changes in environmental conditions through adaptation by natural selection acting over generations. Traits that support successful survival and reproduction in the new environment become more common.

LS4.D Biodiversity and humans: Changes in biodiversity can influence humans' resources and ecosystem services they rely on.

Units:

1. Energy & the Environment: Calorimetry
2. Ecology 1.0: “Learning How To See” Symbiosis
3. Microscopy
4. Cells
5. Artificial Intelligence
6. Brain Anatomy and Physiology
7. Chemistry of Life
8. DNA/Genetics
9. CPR/Circulatory and Respiratory Systems
10. Ecology 2.0

Assessments:

1. Energy: Writing a Research Paper
2. Ecology: Claim, Evidence, Reasoning Writing (with Language Arts)
3. Microscopy: Lab Notebook: Teacher-Documented Student Observations
4. Cells: Student-Chosen Cell Model with Appropriate Organelles
5. Artificial Intelligence: Hour of Code Accelerated 20-Hour Course
6. Brain Anatomy and Physiology: Brain A & P Interactive
7. Chemistry of Life: Test
8. DNA/Genetics: Genetic Disorders Project
9. CPR/Circulatory and Respiratory Systems: Hands-Only CPR Training, Test, CPR Infographic
10. Ecology 2.0: Ecosystem Health Assessment Based on Benthic Macroinvertebrates, Submitted to Vital Signs Program at GOMRI