Board Approved July 2014 Revised July 2016

Timeline			
Week	Marking Period 1	**Week**	Marking Period 3
1	Introduction to 7th Grade Life Science *Black Box of Science Challenge	21	Heredity: Inheritance and Variation of Traits
2	Scientific Practices *Hot Cuppa-Science (soundwave) lab	22	Heredity: Inheritance and Variation of Traits *Pedigree Investigator: A case of Addiction
3	Scientific Practices	23	Heredity: Inheritance and Variation of Traits
4	Scientific Practices (CHOICE PBL Project)	24	Heredity: Inheritance and Variation of Traits *Karyotyping Genetic Disorders Lab
5	Scientific Practices (CHOICE PBL Project)	25	Heredity: Inheritance and Variation of Traits
6	Life Science: Organization and Development *Needs and Characteristics of Life*	26	Heredity: Inheritance and Variation of Traits *Opinion Matters PSA Debate Project on Modern Advances in Genetics
7	Life Science: Organization and Development *Needs and Characteristics of Life*	27	Heredity: Inheritance and Variation of Traits *Opinion Matters PSA Debate Project on Modern Advances in Genetics
8	Life Science: Organization and Development *Needs and Characteristics of Life* *Response to Stimuli Lab	28	Biological Evolution: Unity and Diversity
9	Chemistry: Atomic Composition of Matter	29	Biological Evolution: Unity and Diversity
10	Chemistry: Atomic Composition of Matter	30	Biological Evolution: Unity and Diversity *Build a Beast Project
Week	Marking Period 2	**Week**	Marking Period 4
11	Life Science: From Molecules to Organisms *Structures and Processes* *InstaGerm Activity	31	Ecology: Interactions, Energy, and Dynamics
12	Life Science: From Molecules to Organisms *Structures and Processes* *Organelle Wars Campaign	32	Ecology: Interactions, Energy, and Dynamics
13	Life Science: From Molecules to Organisms *Structures and Processes* *Organelle Wars Campaign	33	Ecology: Interactions, Energy, and Dynamics
14	Life Science: From Molecules to Organisms *Structures and Processes* *It's a Frog Eat Frog World 3D Anatomy Project & Dissection	34	Ecology: The Penguin Predicament PBL STEM Project
15	Life Science: From Molecules to Organisms *Structures and Processes*	35	Ecology: The Penguin Predicament PBL STEM Project
16	Life Science: From Molecules to Organisms *Structures and Processes* *Osmosis-Diffusion Molarity Lab	36	Science Research Study: Human Influence on the Environment
17	Life Science: From Molecules to Organisms *Structures and Processes*	37	Science Research Study: Human Influence on the Environment
18	Life Science: From Molecules to Organisms *Structures and Processes*	38	Science Research Study: Human Influence on the Environment

	*Faces of Cancer PBL Research Project		
19	Life Science: From Molecules to Organisms *Structures and Processes* *Faces of Cancer PBL Research Project	39	STEM – Engineering Design Process *Environmental Engineering Oil Spill Management Challenge
20	Heredity: Inheritance and Variation of Traits *Protein Synthesis Lab	40	STEM – Engineering Design Process

*Indicates additional/replacement activities implemented in the 7th grade honors life science curriculum.

Time Frame	**5+ Weeks:** *Activities implemented where appropriate throughout the school year*

Topic

Science Practices / Engineering Design Process: Understanding Scientific Explanations; Generate Scientific Evidence through Active Investigations; Reflect on Scientific Knowledge; Participate Productively in Science

Essential Questions

- How do we build and refine models that describe and explain the natural and designed world?
- What constitutes useful scientific evidence?
- How is scientific knowledge constructed?
- How does scientific knowledge benefit, deepen, and broaden from scientists sharing and debating ideas and information with peers?
- How does a scientist/engineer satisfy the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions?

Enduring Understandings

- Measurement and observation tools are used to categorize, represent and interpret the natural world.
- Evidence is used for building, refining, and/or critiquing scientific explanations.
- Scientific knowledge builds upon itself over time.
- Being able to measure accurately is important at school and at home, at work and when pursuing hobbies.
- Quality workmanship and accurate measurements with precise instruments are necessary to successfully solve problems.

Alignment to NGSS

- SCI.MS-ETS1
- SCI.MS-ETS1
- SCI.MS-ETS1
- SCI.MS-ETS1

Student Outcomes

- Students will apply results of observation and measurement to build conceptual based models, search for core explanations, generate new and productive questions, and revise predictions.
- Students will construct and defend arguments based on carefully constructed evidence.
- Students will use instruments of measurement to safely gather accurate information for making scientific comparisons of scientific objects and events.
- Students will define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions.
- Students will evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem.
- Students will analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success.
  Students will develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Learning Activities

- Student Safety Contract
- Gummy Bear Lab

- Conducting a Scientific Investigation PBL Project
- Scientific Cents
- Excavating Evidence Activity
- Simpson's Variables
- Pumpkin' Chuckin' Catapult Challenge
- Support Challenge
- Structure Challenge
- Brain Safety Helmet Challenge
- Candy Grabber (prosthetic device) Challenge
- Water Filtration Challenge
- Air-Racer (Skimmer) Reverse Engineering Project
- The Penguin Predicament PBL Project

In addition to the activities above, honors students will take part in the following: Black Box of Science Challenge; Hot Cuppa-Science (soundwave) inquiry lab; CHOICE Inquiry PBL Project, Environmental Engineering Oil Spill Management Challenge

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do now and Wrap-up" participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Performance assessments – "Using Scientific Methods", "Consumer Challenge"

21st Century Skills

x	Creativity	x	Critical Thinking	x	Communication	x	Collaboration
x	Skills	**x**	Information Literacy	x	Media Literacy		

Interdisciplinary Connections

- Social Studies: "A Lifetime of Discoveries" Activity
- Language Arts: Open-Ended Real World Application Questions, Writing Predictions Activity, Lab Report
- Mathematics: Methods of finding averages, metric conversions, graphing results, significant figures
- Fine Arts: Creating scale models

Technology Integration

- Scientific Inquiry PowerPoint
- Air-Racer Reverse Engineering PowerPoint
- Video-Streaming
- ELMO Demonstrations
- SciLinks Activities

Time Frame	**3 Weeks**

Topic

Life Science: Organization and Development

Essential Questions

- What are the needs and characteristics of all living things?
- What methods are used to classify living things into groups?
- Why does every species have a scientific name?
- How did microscopes change our ideas about living things?
- What are the types of microscopes and how do they compare?

Enduring Understandings

- All living things share certain characteristics (cellular organization, maintain internal conditions, reproduce, grow and develop, use energy, respond to surroundings) and needs of life (food, water, shelter).
- Systematics uses all evidence known about organisms to classify them.
- Scientific names allow people all over the world to identify an organism.
- The invention of microscopes allowed scientists to view cells which enabled them to further explore and classify life.

Alignment to NGSS

- MS-LS1-1
- MS-LS1-8

Student Outcomes

- Students will conduct an investigation to provide evidence that living things are made of cells, either one cell or many different numbers and types of cells.
- Students will compare and contrast the two main types of microscopes, light and electron.
- Students will use scientific classification tools, such as dichotomous keys and cladograms.
- Students will gather and synthesize information that sensory receptors respond to stimuli by sending messages to the brain for immediate behavior or storage as memories.

Learning Activities

- Lost at Sea Survival Activity
- Heart Rate (Homeostasis) Inquiry Lab
- Is it Alive? Station Lab
- Please pass the bread
- Comparing Plant and Animal Cells
- Creepy Critters Lab
- Phylum Comparison Challenge
- Letter "E" Lab

In addition to the activities above, honors students will take part in the following: How Fast Does your Brain Respond to Stimuli? Lab

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do Now and Wrap-Up" Participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Projects/Performance Assessment: "Classification Research Project"

21st Century Skills							
X	Creativity	**X**	Critical Thinking	**X**	Communication	**X**	Collaboration
X	Skills	**X**	Information Literacy	**X**	Media Literacy		

Interdisciplinary Connections

- Social Studies: Historical and Social Perspectives on Cell Theory and The Microscope
- Mathematics: "How Small is a Cell"
- Language Arts: Open ended Real World Application Questions
- Fine Arts: Sketches of Microscopic Organisms

Technology Integration

- Video-streaming
- Cells Alive Animations
- ELMO Demonstrations
- SciLinks Activities

Time Frame	**2 Weeks**

Topic

Chemistry: Matter and its Interactions

Essential Questions

- What are the characteristics of matter?

Enduring Understandings

- Anything that has mass and takes up space is considered matter.
- The smallest unit of matter is an atom.
- Atoms combine to make molecules, organelles, cells, tissues, organs, etc.

Alignment to NGSS

- MS-PS1-1
- MS-PS1-5
- MS-PS1-6

Student Outcomes

- Students will develop models to describe the atomic composition of simple molecules and extended structures.
- Students will and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.
- Students will undertake a design project to construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.

Learning Activities

- What are the Characteristics of Matter? Station Lab
- The Atom Anecdote
- How Small is an Atom? Demo
- The Atoms Family
- Photosynthesis VS. Respiration Balancing Equations Activity
- The Penguin Predicament STEM Challenge

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do Now and Wrap-Up" Participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Projects/Performance Assessment: "Classification Research Project"

21st Century Skills

X	Creativity	**X**	Critical Thinking	**X**	Communication	**X**	Collaboration
X	Skills	**X**	Information Literacy	**X**	Media Literacy		

Interdisciplinary Connections

- Social Studies: Historical and Social Perspectives on the Discovery of the Atom
- Mathematics: "How Small is an Atom?"
- Language Arts: Open-Ended Real World Application Questions
- Fine Arts: Model's of Atoms of Various Elements

Technology Integration

- Video-streaming
- Atom Animations
- ELMO Demonstrations
- SciLinks Activities

Time Frame	**8 Weeks**

Topic

Life Science: From Molecules to Organisms - Structures and Processes

Essential Questions

- What basic substances make up a cell?
- What do the structures within a cell do?
- How do materials enter and leave the cell?
- How do cells obtain energy?
- How do cells go through cell division and what occurs if this process is disrupted?

Enduring Understandings

- All living things are composed of cells that are composed similar chemical components.
- Materials are transported through the cell membrane via passive and active transport.
- Cells obtain energy via photosynthesis, respiration, and fermentation.

Alignment to NGSS

- MS-LS1-1
- MS-LS1-2
- MS-LS1-3

Student Outcomes

- Students will develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function via cell transport, creation of usable energy, and replication of DNA.
- Students will explain the process and importance of DNA replication as well as the negative impact(s) that result if an error occurs during replication.
- Students will use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.

Learning Activities

- CSI Murder Mystery (Macromolecule) Lab
- Plant and Animal Cell Models
- Prokaryote Wanted Flyer
- Cell-Tastic Adventure Brochure Project
- How Much Does Your Nose Know? - Balloon Diffusion Station Lab
- Move It! Potato Lab
- Egg-Speriment Lab
- Diffusion/Osmosis Labs and Demonstrations
- Can you Feel the Burn? Lactic Acid Fermentation Lab
- Yeast on the Rise: Cellular Metabolism Lab
- Wild about Wiki!
- Right Brain Vs. Left Brain Activity
- DNA's Secret Code: Show Me What You're Made Of!
- My Fruit is Alive…? DNA Extraction Activity
- DNA Crime Scene Activity (building DNA strands to identify a guilty suspect)
- Cell Cycle and Cancer Virtual Lab

In addition to the activities above, honors students will take part in the following: InstaGerm Activity; Organelle Wars Campaign; It's a Frog Eat Frog World 3D Anatomy Project; Frog Dissection; Osmosis-Diffusion Molarity Lab; Faces of Cancer PBL Research Project: Part 1 – Analyzing real-life case studies to identify risk factors, Part 2 – Creating a PSA to spread awareness of a chosen cancer

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do Now and Wrap-Up" Participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Projects/Performance Assessment: "Cell City"

21st Century Skills

X	Creativity	**X**	Critical Thinking	**X**	Communication	**X**	Collaboration
X	Skills	**X**	Information Literacy	**X**	Media Literacy		

Interdisciplinary Connections

- Social Studies: Historical and Social Perspectives on Cell Theory and The Microscope
- Mathematics: "How Small is a Cell"
- Language Arts: Open ended Real World Application Questions
- Fine Arts: Creating a Plant and Animals Cell Model out of Recycled Material

Technology Integration

- Cell PowerPoint
- Video-streaming
- Cells Alive Animations
- ELMO Demonstrations
- SciLinks Activities

Time Frame	9 Weeks

Topic

Life Science: Heredity – Inheritance and Variation of Traits

Essential Questions

- How do organisms change as they go through their life cycle?

Enduring Understandings

- Organisms reproduce, develop, have predictable life cycles, and pass on some traits to their offspring.
- Organisms contain genetic information that influences their traits, and they pass this on to their offspring during reproduction.

Alignment to NGSS

- MS-LS1-4
- MS-LS1-5
- MS-LS3-1
- MS-LS3-2
- MS-LS4-5

Student Outcomes

- Students will use argument based on empirical evidence and scientific reasoning to support an explanation for how characteristic animal behaviors and specialized plant structures affect the probability of successful reproduction of animals and plants respectively.
- Students will construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.
- Students will investigate advances that allow scientists to test, screen, diagnose and treat thousands of possible genetic disorders in humans.
- Students will gather and synthesize information about the technologies that have changed the way humans influence the inheritance of desired traits in organisms and consider multiple viewpoints on modern genetic engineering.

Learning Activities

- Probability and Heredity Experiment
- Bikini Bottom Genetics
- Genetics with a Smile
- Young Rat Love Activity
- Doohickey-Bug Activity
- Genetically Superior-Hero Project
- Genetics of Taste Lab
- The Mystery of the Baby Blunder Activity
- X-linked Genes
- Pedigree Investigator
- How are Genes on Sex Chromosomes Inherited Experiment
- Pick Me! Pick Me! Hybrid Flipper Activity
- Let's Mix it Up: A Venture into Hybridization Project

In addition to the activities above, honors students will take part in the following: Tastization Hybrid Advertisement; Protein Synthesis Lab, Track the Trait: Pedigree Practice, Pedigree Investigator: A case of Addiction, Karyotyping Genetic Disorders Lab; Genetic Disorders Research Project – Creating a Counseling Brochure; Opinion Matters PSA Debate Project on Modern Advances in Genetics

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do Now and Wrap-Up" participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Performance assessments: "Genetics with a Smile", "Tracing Traits" and Modern Genetics Classroom Debate / Genetic Disorders Problem Based Learning Project

21st Century Skills

x	Creativity	**x**	Critical Thinking	**x**	Communication	**x**	Collaboration
x	Skills	**x**	Information Literacy	**x**	Media Literacy		

Interdisciplinary Connections

- Social Studies – historical perspectives of genetics, genetics debate
- Language Arts – Open ended real world application questions, Genetics creative short story
- Mathematics – probability and statistics of inheritance patterns
- Fine Arts – genetics rap, genetics with a smile activity

Technology Integration

- Genetics PowerPoint presentations
- Video-streaming
- Mendel's peas animation
- ELMO Demonstrations
- "SciLinks" Activities

Time Frame	3 Weeks

Topic

Biological Evolution: Unity and Diversity

Essential Questions

- How have living things changed over time?
- What scientific evidence exists to support the theory of natural selection?
- In what ways are organisms of the same kind different from each other? How does this help them survive and reproduce?

Enduring Understandings

- Beneficial variations between organisms of the same species give advantages in obtaining food, avoiding predators and reproducing in different environments.
- Organisms who are more likely to survive are able to pass on traits to their offspring.
- These naturally selected variations may lead to dramatic changes in characteristics of organisms in populations of extremely long periods of time.

Alignment to NGSS

- MS-LS4-1
- MS-LS4-2
- MS-LS4-3
- MS-LS4-4
- MS-LS4-6

Student Outcomes

- Students will analyze and interpret data for patterns in the fossil record that document the existence, diversity, extinction, and change of life forms throughout the history of life on Earth under the assumption that natural laws operate today as in the past.
- Students will apply scientific ideas to construct an explanation for the anatomical similarities and differences among modern organisms and between modern and fossil organisms to infer evolutionary relationships.
- Students will analyze displays of pictorial data to compare patterns of similarities in the embryological development across multiple species to identify relationships not evident in the fully formed anatomy.
- Students will construct an explanation based on evidence that describes how genetic variations of traits in a population increase some individuals' probability of surviving and reproducing in a specific environment.
- Students will use mathematical representations to support explanations of how natural selection may lead to increases and decreases of specific traits in populations over time.

Learning Activities

- Evolution of Technology Activity
- Peppered Moth Historical Data Analysis
- Worms Under Attack Pickworm Lab
- Evol-Ocean Island Lab
- May the Best Beak Win: Bird Adaptations Lab
- The Great Fossil Find Inquiry Lab
- Chimera Activity
- Thumbs up for Thumbs! Lab
- Funky Monkey Lab
- Becoming Human Webquest
- Your Inner Fish series

In addition to the activities above, honors students will take part in the following: Build a Beast Project

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do Now and Wrap-Up" participation.
- Observational Assessment/ Lab Participation
- Writing Tasks/Lab Reports
- Performance Assessment: Examine an "Evolutionary Tree" and Draw Conclusions about how Function and Ancestry Influence the Order and Structure of the Forelimbs of Animals.

21st Century Skills

X	Creativity	**X**	Critical Thinking	**X**	Communication	**X**	Collaboration
X	Skills	**X**	Information Literacy	**X**	Media Literacy		

Interdisciplinary Connections

- Social Studies: Evolution Viewpoints Debate, Historical and Social Perspectives on Evolutionary Change
- Mathematics: Calculating the rates of decay using radioactive dating
- Language Arts: Open ended Real World Application Questions
- Fine Arts: Creating a Branching Tree to Model Evolutionary Relationships and Evolution Songs

Technology Integration

- Evolution PowerPoint
- Video-streaming
- Fossil Animation
- ELMO Demonstrations
- SciLinks Activities

Time Frame	8 Weeks

Topic

Ecosystems: Interactions, Energy, and Dynamics

Essential Questions

- How do living and non-living things interact within the environment?
- How does matter and energy move in ecosystems?
- What are current threats to components of ecosystems and how can these threats be minimized and/or eliminated?

Enduring Understandings

- Living things rely on both biotic and abiotic factors in their environment for survival.
- Organisms interact via symbiosis where both benefit (mutualism), one organism benefits and the other is unaffected (commensalism), or one organism benefits and the other is harmed (parasitism).
- Matter moves or cycles through ecosystems.
- Energy flows through ecosystems from producers to consumers.
- The transfer of energy in an ecosystem is modeled with food chains, food webs, and energy pyramids.

Alignment to NGSS

- MS-LS1-6
- MS-LS1-7
- MS-LS2-1
- MS-LS2-2
- MS-LS2-3
- MS-LS2-4
- MS-LS2-5

Student Outcomes

- Students will analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.
- Students will construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems (food chains, food webs, etc.).
- Students will develop a model to describe the cycling of matter (water cycle, carbon cycle, nitrogen cycle) and flow of energy (energy pyramids) among living and nonliving parts of an ecosystem.
- Students will construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.
- Students will develop a model to describe how food is rearranged through chemical reactions forming new molecules that support growth and/or release energy as this matter moves through an organism.
- Students will construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.
- Students will evaluate competing design solutions for maintaining biodiversity and ecosystem services.

Learning Activities

- Backyard Ecology Activity
- How does soil type effect plant growth? Lab
- A-Typical Animal Ecology Research Project
- Endangered Species Action Plan
- Studying Populations in an Ecosystem: Snowshoe Hare vs. Lynx

- Virtual Lab (Glencoe): Population Biology
- Oh Deer! (Carrying Capacity and Limiting Factors)
- Barnacle Competition – Virtual Ecology Lab
- Biodiversity Game: Monsters in the Forest
- The Penguin Predicament Global Warming/Endangered Species PBL STEM Project
    - Research, Data Collection, Engineer Design Proposal, Cold Stuff Lab (Testing Part 1), Build A Shelter, Simulated Africa Environment (Testing Part 2), Reflection / Action Plan

In addition to the activities above, honors students will take part in the following: Research Study: Human Influence on the Environment, Environmental Engineering Oil Spill Management Project

Assessments

- Topic Worksheets
- Section Quizzes and Tests
- Journal Entries: "Do now and Wrap up" participation.
- Observational Assessment/ Lab participation
- Writing Tasks/Lab Reports
- Projects/Performance Assessment: Ecosystem PBL project

21st Century Skills

X	Creativity	**X**	Critical Thinking	**X**	Communication	**X**	Collaboration
X	Skills	**X**	Information Literacy	**X**	Media Literacy		

Interdisciplinary Connections

- Social Studies: Historical and Social Perspectives on Environmental Concerns
- Mathematics: Graphing Population Trends; Use of Percentages in Calculation of Energy Lost Through the Energy Pyramid
- Language Arts: Open-Ended Real World Application Questions
- Fine Arts: Photosynthesis and Respiration Illustrations

Technology Integration

- Food Webs, Food Chains, and Energy Pyramids PowerPoint
- Video-Streaming
- ELMO Demonstrations
- SciLinks Activities