**Unit 1: Cells – Scientific Method/Organic Chemistry/Cellular Structure/Cellular Transport/Photosynthesis/Respiration**

**Key Words:**
- Macromolecules/biomolecule, amino acid, carbohydrates, enzyme, lipids, fat, homeostasis, nucleic acids, organic, protein, lock and key model, catalyst, qualitative, quantitative, scientific method, variables (types), experiment, ethics, pH, reactants, products, substrate, active site, activation energy.
- Independent (manipulated) variable, dependent (responding) variable, controlled variable/control, Active/passive (endocytosis, exocytosis, tonics), transport, autotroph/heterotrophic cells, cell/plasma membrane, selective permeability, semi-permeable, Cell Theory, cell wall, cellular respiration, chlorophyll, diffusion, facilitated diffusion, transport protein, aerobic/anaerobic (lactic acid/alcohol), fermentation, homeostasis, microorganism, nucleus, organelles, endosymbiosis, osmosis, photosynthesis, respiration, eukaryote, prokaryote, ATP, ADP, electron transport chain, reactants, products, Wet mount slide, positioning of specimen on stage, magnification

**Desired Outcomes**

**Georgia Performance Standards:**
- SB1: Students will analyze the nature of relationships between structures and functions in living cells.
  - a. Explain the role of cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining homeostasis and cell reproduction.
  - b. Explain how enzymes function as catalysts.
  - c. Identify the function of the four macromolecules.
  - d. Explain the impact of water on life processes.
- SB3: Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.
  - a. Explain the cycling of energy through the process of photosynthesis and respiration.

**Understandings:**
- Students will understand that...
  1. That there are a set of steps to solve problems.
  2. All living things “biotic factors” are composed of the four basic organic compounds
  3. These 4 organic compounds are necessary for life functions
  4. Enzymes influence many vital chemical reactions within living things
  5. All living things are composed of cells
    - Unicellular vs. multicellular
  6. All cells come from other cells
  7. Cells are the basic unit of life
  8. All life functions occur within the cell and are influenced by enzymes
  9. Organelles perform specific functions

**Essential Questions:**
- 1. How do you use the scientific method to solve problems?
- 2. What are the 4 macromolecules and how does their function(s) contribute to homeostasis in living things?
- 3. How are prokaryotes and eukaryotes different?
  - a. structures and functions
- 4. How are plant and animal cells different?
- 5. How are multicellular organisms organized?
- 6. How does the plasma membrane aide in homeostasis?
  - a. structure and function
  - b. methods of transport – active/passive, tonics
- 7. How do cells obtain and use energy?
  - a. Adp/atp cycle
  - b. Photosynthesis
  - c. Respiration

**Big Ideas:**
- Scientific Method, Organic Compounds, Enzymes, Prokaryote vs. Eukaryote, Organelles/Functions, Cell Transport, Homeostasis, Photosynthesis and Respiration

**Students will know/be able to do…**
- 1. That the scientific process is ongoing.
  - o Suggest reasonable hypotheses for identified problems.
  - o Develop procedures for solving scientific problems.
  - o Collect, organize (graph), record, analyze appropriate data.
  - o Write a lab report
  - o Develop reasonable conclusions based on data collected.
  - o Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.
  - o model/apply the scientific method given real world examples
- 2. Determine chemical elements that are essential constituents of organic molecules
- 3. the importance of the 4 macromolecules found living systems
  - o Compare the function of the four major macromolecules (i.e., carbohydrates, proteins, lipids, nucleic acids).
  - o Identify examples of the 4 major types of macromolecules
- 4. Determine the properties of basic biomolecules in living organisms
- 5. Explain how enzymes are a type of catalysts that affects the rate and outcome of chemical reactions.
  - o Explain how enzymes function as catalysts
- 6. Comprehend the lock and key action of enzymes in catalyzing biological reactions
- 7. All living things are composed of cells, and there are two main categories of cells
  - a. Compare/contrast prokaryotes and eukaryotes
  - b. Complexity from unicellular to multicellular
8. Cells have specialized structures/organelles to maintain homeostasis.
   a. Identify cell organelles for both prokaryotic and eukaryotic cells, including the cell membrane, in maintaining
      homeostasis and cell reproduction.
      i. Identify the parts of the cell involved in cell transport
      ii. Compare and contrast active & passive transport
   b. Understand the mechanisms (active/passive transport) required to maintain
      iii. Identify the type of active & or passive transport
      iv. Identify the type of tonic given a case study
9. The relationship that exists between photosynthesis and cellular respiration
   a. Determine how energy is stored and released from the ATP-ADP Cycle
   b. Compare/contrast the processes of photosynthesis and respiration
   c. Identify and compare/contrast the equations, reactants and products of photosynthesis and respiration
   d. Identify those organelles where photosynthesis and respiration occur within the cell

Lesson Hook:
Word Splash, KWL, Graphic Organizer, Scientific method activities related to “What if, why not, etc…?”
Preview Questions/ Hot Topics: Plant vs. animal cells, Muscle Soreness. Cell analogies

Assessment Plan
1. Pre-Test: multiple choice format and written response label scientific method, cells
2. Graded/Non-graded summary assessments
3. Lab/Group Activities
   a. Scientific Method: Lab Activities where students identify variables, controls, write a hypothesis, etc... "THIS
      SHOULD BE DONE IN CONJUNCTION WITH CONTENT STANDARDS. "Kill two birds with one stone!" --
      Ramp lab, drops on a penny, etc...demo's, sample write ups, sample data sets, etc...
   b. Microscope Lab/plant vs. animal
   c. Eggsperiments, potatoes, gummy bears
   d. Respiration rates
   e. Grab bag cell organelles
   f. Chromotography & Plant photosynthesis rate activity
4. Graphic Organizers (such as but not limited to)
   a. KWL for cell parts
   b. Venn: Prokaryote vs. Eukaryotes & Plant vs. Animals
   c. Cell and Organelles
   d. Active vs. passive transport, examples of each
   e. Compare Photosynthesis vs. respiration
5. Writing
   a. Cell Analogies: Project/Modeling, compare cell to a city
   b. Predict outcome of tonics
   c. Identify the products, reactants, functions of photosynthesis/respiration
6. Quizzes
   a. Cell types, organelles - structure and function, transport, photosynthesis, respiration
7. Tests:  
   a. *regular biology and inclusion biology may want to consider giving multiple tests over the period of this unit.
8. Technology
   a. Students can create a power point on cell history, cell types (pro vs. euk), (plants vs. animals) cell organelles

Additional Resources:
1. Multi media resources; CD ROM – cell, Laser disk – cell;video – cell (media center), mitosis, meiosis; peachstar video
   clips on the cell
2. microviewers – cell division, cell
3. prepared slides –
   a. prokaryotes
   b. eukaryotes
4. lab materials –
   a. compare plant/animal,
   b. egg, iodine/cornstarch, potato
5. activities – cell models & cell story books, etc.
6. powerpoint/computer – organelles
**Unit 2: Genetics – Cell Reproduction/DNA/Heredity**

Key Words: DNA, RNA, replication, transcription, translation, amino acid, sequence, protein synthesis, insertion, deletion, substitution, inversion, translocation, nondisjunction, crossing over, codon, genetic code, anticodon, triplet, mRNA, tRNA, rRNA, nucleolus, ribosomes, enzyme, meiosis, chromosomes, mutagenic factors, selective breeding, biogenetic engineering, x-ray, ultraviolet, radiation, DNA technology, complementary strands, double helix, point mutation, nucleotide, frame shift, cell reproduction, mitosis, meiosis, Asexual/sexual reproduction, bioethics, dominant traits, recessive traits, chromosome, cloning, genotype, phenotype, punnett square, inheritance, pedigrees, genes, gene splicing, genetic engineering, fertilization, mutation, chromosome, cloning, allele, nondisjunction, aneuploidy, mutations, codominance, incomplete dominance, sex-linked, hybrid, purebred, Mendel’s laws, natural selection, adaptation, genetic variation, gene pool, selective breeding, artificial selection, segregation, independent assortment, trisomy, monosomy.

**Desired Outcomes**

Georgia Performance Standards:
SB2: Students will analyze how biological traits are passed on to successive generations.
   a. Distinguish between DNA and RNA.
   b. Explain the role of DNA in storing and transmitting cellular information.
   c. Using Mendel’s Laws, explain the role of meiosis in reproductive variability.
   d. Describe the relationships between changes in DNA and potential appearance of new traits including — alterations during replication, insertions, deletions, substitutions, mutagenic factors, radiation, chemicals.
   e. Compare the advantages of sexual reproduction and asexual reproduction in different situations.
   f. Examine the use of DNA technology in forensics, medicine and agriculture.

**Big Ideas:**
DNA vs. RNA, Replication, Transcription, Translation, Heredity – Genetic Code, Mutations, Technology

**Replication, Transcription, Translation/Protein Synthesis**

**Understandings:**
Students will understand that...
1. There is a chemical basis for heredity
2. All living things contain DNA/RNA
3. The structure of DNA/RNA contains the genetic code for heredity
4. How biological traits are passed on to successive generations.
5. Mendel’s laws of genetics and how these laws affect variability within a species.
6. Genetic alterations can affect subsequent generations.
7. DNA technology affects and influences today’s society.
8. Traits are passed from parent to offspring
9. Asexual reproduction results in identical offspring while sexual reproduction results in a mixing of parental traits i.e. variability
10. Through statistics/probability the occurrence of traits can be predicted
11. The genetic code can be affected by factors such as genetic engineering, mutations, etc...

**Essential Questions:**
How do cells divide and why?
What is the structure of DNA/RNA?
What other forms do nucleic acids take?
What is the function of DNA/RNA?
How are proteins synthesized?
Where are proteins synthesized within the cell?
How are proteins put together?
How do mutations affect protein function?
How do mutations affect the form and function of DNA?
What are some social/ethical applications of DNA manipulation?
Who was Mendel and how did he discover simple inheritance of traits?
What are Mendel’s Laws of Heredity and terminology?
What are Punnet Squares and how to determine the probability of mono- and dihybrid crosses?
How can you determine inherited traits through planned breeding of organisms?
What are more complex functions of DNA that affect human heredity?
What are complex inheritance patterns?
What are sex-linked traits?
How do mutations affect the form and function of DNA?
   o What are some genetic disorders linked to DNA mutation?
What are some social/ethical applications of DNA manipulation?
Students will know/be able to do…
1. How and why cells reproduce
   a. Sexual reproduction results in genetic variation; asexual reproduction offspring identical to their parents
   b. Identify those factors that regulate/trigger cell reproduction/death
   c. Identify reasons for malfunctions in cell reproduction resulting in conditions such as cancer
   d. Compare and contrast mitosis and meiosis
   e. Identify those organelles and or structures that aid in cell reproduction
2. That biological traits are passed from parent to offspring
   a. Analyze how biological traits are passed on to successive generations.
   b. Using Mendel’s law, explain the role of meiosis in reproductive variability.
3. Compare the advantage of sexual reproduction and asexual reproduction in different situations.
4. All life has a basic universal genetic code found in nucleic acids
   a. Distinguish between DNA and RNA. - Compare/contrast their structure, chemical composition, location within the cell, and function
   b. Comprehending the role of DNA in cellular replication prior to mitosis
   c. Understanding the roles of DNA and RNA during meiosis
   d. Explain the role of DNA in storing and transmitting cellular information.
   e. Analyze how biological traits are passed on to successive generations.
   f. Comprehend Mendel’s laws of genetics and how these laws affect variability within a species.
   g. Analyzing the effects of the law of independent assortment on genetic crosses
   h. Applying the concepts within the law of segregation to genetic crosses
   i. Predicting the genotypic and phenotypic outcome of genetic crosses
   j. Evaluating the role of each of these laws throughout the process of meiosis
5. Heredity pull out info from number one on Mendel.
6. Changes in DNA/RNA may result in genetic variations and new phenotypes - Describe the relationships between changes in DNA and potential appearance of new traits including:
   a. Alterations during replication such as insertions, deletions, and substitutions
   b. Mutagenic factors that can alter DNA such as high energy radiation (x-rays and ultraviolet) and chemicals
   c. Describe mutagenic factors found in the environment
   d. Evaluating the role of genetic variation in successive generations
   e. Analyzing the possible alterations that can occur during meiosis.
7. That DNA technology is now used in forensic investigations, medical research, and agriculture research.
   a. Identify common uses of DNA Tech and engineering
   b. Evaluate the use of DNA technology in today’s society.
   c. Evaluating the results of DNA comparisons in forensic sciences
   d. Justifying the use of gene therapy in medicine
   e. Predicting the effect of recombinant DNA on agricultural sciences
8. Students will compare and contrast sexual and asexual reproductive outcomes.
   a. Sexual reproduction results in genetic variation; asexual reproduction results in offspring identical to their parents

Lesson Hook:
- Where can you get DNA from?, Video Clips: CSI, Glow in the dark crops, organisms
- Designer Children: Should you pick the sex of your child?, Frogs as a natural barometer
- Examples of Mutations/Diseases within the animal/plant kingdom, Dolly, clone a pet, clone a human

Assessment
Performance Tasks, Projects, Quizzes, Tests, Academic Prompts, Other Evidence: (observations, samples, dialogues):
1. Onion Root Tip - Mitosis vs. Meiosis with microscopes/microslides
2. Role Play steps of mitosis/meiosis using students, string, ropes, pipe cleaners
3. Generate a model/graphic organizer that identifies the structures of DNA and RNA
4. Graphic Organizer:
   - Compare and contrast structure/functions of DNA and RNA
   - Codon Charts
6. Sequence DNA, RNA, and Proteins
7. Writing/Research
   - Identify the structure functions of DNA, Transcription/RNA, and Translation/Protein
   - Identify reasons for mutations (compare and contrast natural means of genetic variability vs. mutagens)
   - Research/identify types of DNA technology techniques and their application
8. Identify, compare and contrast types of mutations
9. Quizzes & Tests
   - DNA, RNA, replication, transcription, translation/protein synthesis
   - Mutations
   - Heredity
   - Technology

Learning Plan of Experiences and Instruction
Additional Resources:
## Unit 3: Classification/Evolution

### Key Words:
- **Classification**: virus, protein coat, capsid, lytic, lysogenic, DNA, RNA, bacteria, archaeabacteria, eubacteria, prokaryote, protist, contractile vacuole, algae, fungi, plant, bryophyte, vascular, nonvascular, tropism, hormone, phototropism, gravitropism, thigmotropism, animal, vertebrate, chordate, invertebrate, symmetry, radial, bilateral, endoskeleton, exoskeleton, ectotherm, endotherm, metamorphosis, fish, amphibians, reptiles, birds, mammals, behavior, innate, learned, cuticle, monera
- **Animal**: classification scheme, dichotomy, function, fungi, amino acid/nucleic acid evidence, hormonal modification, kingdom, organism, plant, protist, structure, taxonomy, virus
- **DNA, RNA, bacteria, archaebacteria, eubacteria, prokaryote, protist, contractile vacuole, algae, fungi, plant, bryophyte, vascular, nonvascular, tropism, hormone, phototropism, gravitropism, thigmotropism, animal, vertebrate, chordate, invertebrate, symmetry, radial, bilateral, endoskeleton, exoskeleton, ectotherm, endotherm, metamorphosis, fish, amphibians, reptiles, birds, mammals, behavior, innate, learned, cuticle, monera
- **Animal**: classification scheme, dichotomy, function, fungi, amino acid/nucleic acid evidence, hormonal modification, kingdom, organism, plant, protist, structure, taxonomy, virus
- **Domains**: Archaea, Bacteria, Eukarya
- **Kingdoms**: Archaebacteria, Eubacteria, Protista, Fungi, Plant, Animal, endosymbiosis

### Evolution
- **Macroevolution**: Speciation, Theory, Darwin, Lamarck, adaptation, ancestry, natural selection, artificial selection/selective breeding, convergent and divergent evolution, adaptive radiation, Linnaeus, traditional classification, evolutionary classification, cladogram, binomial nomenclature, vestigial organs, homologous structures, common ancestry.
- **Microevolution**: Speciation, adaptation, ancestry, natural selection, artificial selection/selective breeding, convergent and divergent evolution, adaptive radiation, Linnaeus, traditional classification, evolutionary classification, cladogram, binomial nomenclature, vestigial organs, homologous structures, common ancestry.
- **Desired Outcomes**

#### Georgia Performance Standards:
- **SB3**: Students will derive the relationship between single-celled and multi-celled organisms and the increasing complexity of systems.
  - a. Compare how structures and function vary between the six kingdoms.
  - b. Examine the evolutionary basis of modern classification systems.
  - c. Compare and contrast viruses with living organisms.
- **SB4**: Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.
  - a. Relate plant adaptations, including tropisms, to the ability to survive stressful environmental conditions.
  - b. Relate animal adaptations, including behaviors, to the ability to survive stressful conditions.
- **SB5**: Students will evaluate the role of natural selection in the development of the theory of evolution.
  - a. Trace the history of the theory.
  - b. Explain the history of life in terms of biodiversity, ancestry and rates of evolution.
  - c. Explain how fossil and biochemical evidence supports the theory.
  - d. Relate natural selection to changes in organisms.
  - e. Recognize the role of evolution to biological resistance.

### Big Ideas:
- History of classification, Classification/6 Kingdoms
- Viruses, Nomenclature/Dichotomy/Taxonomy/Cladograms
- Natural Selection, Theory of Evolution
- Factors that influence natural selection, Rates of Evolution
- Understanding:
  - All living things can be classified into groups based on traits (DNA, behavior, inheritance, phylogeny)
  - Living things change over time
  - Organisms adapt & species evolve: Analyze the effects of natural selection on species.
  - Students will evaluate the role of natural selection in the development of the theory of evolution
  - Understand how the theory of evolution pertains to the biological history of the Earth
  - There is scientific evidence for natural selection
  - Organisms are classified according to evolutionary history, physical characteristics, DNA, and increasing complexity of cellular processes.
  - Plants and animals adapt to survive in their environment.
  - Natural selection leads to changes in organisms and speciation.

### Essential Questions:
- How do we classify organisms in the Linnean System?
- How are dichotomous keys/cladograms used in classification?
- How do organisms adapt over time and species evolve?
- How do we use fossils and other sci. evidence to study/support the Theory of Evolution?
- How are viruses and living things similar/different? (evolution)
- How are the kingdoms grouped according to their developmental characteristics (physical, DNA/Genetic, behavioral)?
- Why are viruses not considered to be nonliving?
- What are the 2 kingdoms of bacteria and how are they similar/different?
- How are bacteria beneficial and harmful to the environment and our society?
- How do structures and function vary between the six kingdoms (archaebacteria, eubacteria, protists, fungi, plants, and animals)?
Students will know/be able to do…

1. Use the present day system of classification to categorize organisms into their appropriate Kingdom based on their characteristics.
2. Design/use a dichotomous key/cladogram that classifies organisms
3. Students can explain/justify the development of both physical and behavioral characteristics over time
4. Students will evaluate the role of natural selection in the development of the theory of evolution.
5. Students will investigate the theory of evolution and how it pertains to the biological history of Earth.
6. Students will recognize the scientific evidence for natural selection.
7. how scientific theories are developed
8. comparing the geologic history of a species
   - biodiversity
   - ancestry
   - rate of evolution
9. evaluating the scientific evidence that supports the theory of evolution
   - fossil record
   - biochemistry
   - embryologic development
   - homologous structures
10. analyzing the effect of natural selection on species
11. Classify organisms based on the 6 kingdom and 7 level system.
12. Identify behaviors of plants or animals when given an example.
13. Draw conclusions based on descriptions of an unidentified organism.
14. Identify common links/relationships between given organisms or cladograms

Lesson Hook
- Do organisms evolve?
- What things change/evolve/adapt
- Survival of the Fittest
- Reading Scenario
- Vestigial Organs/Structures
- Why do organisms go extinct?
- Activity: Toothpick Prey/Pipe cleaners, string
- Peppered Moth Example
- Do snakes have backbones?
- Do all birds fly?
- Do mammals lay eggs?
- Invert intro lab
- Are viruses living? Can you cure a cold with an antibiotic?
- Word Splash, KWL,
- Graphic Organizers – invert and vertebrate comparisons/characteristics

Assessment
Performance Tasks, Projects, Quizzes, Tests, Academic Prompts, Other Evidence: (observations, work samples, dialogues):
1. Writing/Reading
   - Write up of hooks/activities
   - Research/read articles and discuss findings/write up findings
2. Design an imaginary organism, how would you classify it, how would it change over time.
3. Create/Use Dicotomous key
4. Graphic Organizers – cladograms, characteristics of kingdoms chart, analyze & compare data
5. Quiz
6. Test
7. Performance Tasks, Projects, Quizzes, Tests, Academic Prompts, Other Evidence: (observations, work samples, dialogues):
8. memory match game – invert phyla/vert classes
   ⇒ Graphic Organizers: ABC chart
   ⇒ Models – virus, bacteria, organisms
   ⇒ Writing prompts: describe difference between viruses and bacteria, body response, and treatment of both
   ⇒ Summary activities: Ticket out the door, most impt.
9. Test

Learning Plan of Experiences and Instruction

Additional Resources:
Jeff Corwin Galapagos video clip
Internet evolution activities
## Unit 4: Ecology

### Key Words:
- Abiotic, biotic, community, competition, consumers, decomposers, diversity, ecosystem, energy pyramid, environmental variation, evidence, food chain, food web, inference, limiting factor, population, predator, prey, producers, qualitative, quantitative, symbiosis, trophic levels, primary, secondary, tertiary consumers, biome, climate, weather, biomass, nutrient recycling, energy flow, carbon cycle, nitrogen cycle, nitrogen fixation, water cycle, ecology

- Pollution, global warming, greenhouse effect, acid rain (sulfur dioxides), renewable, nonrenewable, biological controls, biological resistance, pesticide, insecticide, succession, primary, secondary succession, pioneer species, carrying capacity, limiting factor, sustainable use, logistic growth, exponential growth, tolerance, density dependent/independent

### Desired Outcomes

**Georgia Performance Standards:**
- SB4: Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.
  - a. Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.
  - b. Explain the flow of matter and energy through ecosystems by:
    - arranging components of a food chain according to energy flow.
    - comparing the quantity of energy in the steps of an energy pyramid.
    - explaining the need for cycling of major nutrients.
  - c. Relate environmental conditions to successful changes in ecosystems.
  - d. Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use and water/power consumption.

### Big Ideas:
- Organization of ecosystems
- Biomes
- Mov’t of energy/matter, Cycling of energy/matter
- Behaviors - Predator-prey, symbiotic, competition, mimicry, camouflage, migration
- Population Changes, Succession, Human Impacts
- Animal & Plant adaptations
- Natural Selection, Biological Resistance, Plant Tropisms

### Understandings:
- Students will understand that...
  1. Matter and Energy can not be created or destroyed but may be rearranged.
  2. The Earth is composed of both living and non living factors
  3. Changes within an ecosystem may upset the homeostasis of the ecosystem.
  4. Ecosystems change over time
  5. The Earth is a dynamic system composed of the changes and interactions that occur between living and nonliving things.
  6. Ecosystems can be described/classified based on the abiotic and biotic factors within them.
  7. Behaviors exist between organisms within ecosystems
  8. understanding chemical resistance as a modern example of biological evolution
  9. Human interactions can have both positive and negative impacts on their ecosystems

### Essential Questions:
- What are the characteristics of life?
  - abiotic/biotic factors
- What is an ecosystem?
- How is an ecosystem organized?
  - levels of organization
  - niche, habitat
  - symbiotic relationships
  - biomes
- How does energy/matter move in an ecosystem?
  - organisms – autotrophs, heterotrophs, decomposers
  - food chains/web/pyramid
  - law of conservation of energy/matter
- How do ecosystems change over time?
  - succession (primary/secondary)
  - human impact
- How do plants and animals adapt to their environment?
  - behavioral and physical adaptations
- What enables living things to thrive, not just staying alive?
Students will know & do
1. How an ecosystem is organized and the factors that compose an ecosystem
   a. Design/create/draw a model/hierarchy that illustrates the makeup of the ecosystem
   b. Investigate the relationships among organisms, populations, communities, ecosystems, and biomes.
2. How energy moves through an ecosystem
   a. Arranging components of a food chain according to energy flow.
   b. Comparing the quantity of energy in the steps of an energy pyramid.
   c. Explaining the need for cycling of major nutrients (C, O, H, N, P).
3. How ecosystems change over time
   a. Relate environmental conditions to successional changes in ecosystems.
      i. Compare and contrast primary and secondary succession
   b. Identify how populations change over time
      i. Interpret graphs of population changes
      ii. Identify specific factors both natural and artificial that may affect populations
4. How the direct/indirect actions of humans can impact an ecosystem
   a. Examine one of these issues in regards to the pro’s/con’s associated with its impact on society and the ecosystem.
      • pollution
      • proposed global warming
      • explosive population
      • pesticide and herbicide usage
      • resource consumption, renewable and non-renewable
5. How plants and animals are adapted to survive in their habitats
   a. Relate plant/animal adaptations, including tropisms, to the ability to survive stressful env. conditions
6. How natural/artificial selection drive the evolution/adaptation of organisms/species
   a. Relate natural selection to changes in organisms
   b. Recognize the role of evolution to biological resistance (pesticide and antibiotic resistance).

Lesson Hook:
1. Abiotic vs. Biotic
2. What’s the best way to dispose of trash?/Where does your trash go?
3. Environmental dilemmas
4. Activities:
   • How many Bears live in the forest, Wooly Boogers, Sustainable ecosystems

Assessment
Performance Tasks, Projects, Quizzes, Tests, Academic Prompts, Other Evidence: (observations, work samples, dialogues):
1. Create and interpret food chains, food webs, food pyramids
2. Writing:
   • Symbiotic Activity & Human Impact
   • Scenarios of human impact related to local, state, national, global issues
      a. Hot Topics: subdivision, sea turtles, box turtles, septic fields, extinctions (ivory billed woodpecker, spotted oil), is hunting an acceptable/responsible control of deer population
      b. What’s the best way to kill bugs
      c. Debate the Pro’s and Con’s of Hunting/Fishing
3. Graphic Organizer
   • Compare and contrast types of succession
4. Name that Biome: use characteristics related to physical factors and organisms within that biome

Learning Plan of Experiences and Instruction

Additional Resources: