**Seneca R 7 School District** **Course: Biology** **Grade Level: 10**

| Unit | Topic | MLS | | Activities | Primary Resources |
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| 1 | **Experimental Design (16 Days)** | ETS.1.A.1 | Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions for solutions that account for societal needs and wants | • Metacognition Handout<br>• Frayer Model of Life<br>• Lab Safety<br>• CER Method and Practice<br>• Graphing<br>• Metric Measurement Review<br>• Microscope Lab<br>• Scientific ProcessesDiscussion<br>• Cooperating Like a Scientist<br>• Communicating Like a Scientist<br>• Exercise 2: Experimental Design<br>• Milk Lab<br>• Scientific Processes Review<br>• Unit 1 RTI | Modern Biology (Holt, Rinehart and Winston, 2006) |
| | | ETS.1.A.2 | Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. | | |
| | | **Objectives** | • Outline the process of scientific inquiry<br>• Compare and contrast observations, inferences, and predictions<br>• Construct a graph to illustrate data collection<br>• Analyze and utilize graphs for evidence<br>• Design and conduct a scientific investigation<br>• Summarize a major global challenge or problem<br>• Summarize societal needs and wants related to the challenge or problem<br>• Describe the smaller parts into which a complex problem might be broken | | |
| | | **Key Terms** | constraint, criteria, engineering, global challenge, measureable, need, qualitative, quantifiable, requirement, risk mitigation, societal, solution, criteria decision, engineering, manageable, priority, problem, solution, solve, systematic, tradeoff | | |
| | | **Common Assessments** | Quiz: Safety<br>Unit 1 Test: Experimental Design | | |

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| 2 | **Classification and the** | 9-12.LS1.A.2 | Develop and use a model to illustrate the hierarchical organization of interacting systems (cell, tissue, organ, | • What is Living<br>• Ex 1: Characteristics of Life | Modern Biology (Holt, Rinehart |

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| | **Characteristics of Life (10 Days)** | | organ system) that provide specific functions within multicellular organisms. | • Characteristics of Life Discussion<br>• How Can We Organize Things<br>• Model Development: Classification<br>• Exercise 2: Classification Compare and Contrast<br>• Classification Section Reviews<br>• Classification of Life Discussion<br>• What is a Species?<br>• Using a Dichotomous Key<br>• Classification of Snacks Lab<br>• Unit 2 Review<br>• Unit 2 RTI | and Winston, 2006) |
| | | **Objectives** | • Identify the levels of Biology from smallest to largest with terminology, images, and definitions<br>• Summarize the characteristics of living things<br>• Classify organisms according to their evolutionary relationships<br>• Compare prokaryotic and eukaryotic cells | | |
| | | **Key Terms** | atom, elements, cell, molecule, tissue, organ, organ system, organism, population, community, ecosystem, biosphere, unicellular, multicellular, adaptation, homeostasis, metabolism, cell division, development, reproduction, gene, domain, kingdom, animalia, bacteria, eubacteria, archaebacteria, protista, fungi, plantae | | |
| | | **Common Assessments** | Pretest: Unit 2<br>Test: Unit 2 | | |

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| **3** | **Evolution (16 Days)** | 9-12.LS4.C.1 | Students will construct an explanation based on evidence for how natural selection leads to adaptation of populations. | • Change Over Time<br>• Rainfall and Bird Beaks<br>• Battle of the Beaks<br>• Natural Selection Reading<br>• Natural Selection Discussion<br>• Evolution STEM | Modern Biology (Holt, Rinehart and Winston, 2006) |

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| | | 9-12.LS4.C.2 | Students will evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) variation of species over time, and (3) the extinction of other species | Case<br>• How does life diversify?<br>• Evolution, Mutation, and Selection<br>• Exercise 2: Speciation<br>• Natural Selection and Genetic Drift<br>• Natural Selection and Genetic Drift<br>• Behavioral Adaptations<br>• Section 15.2 & 15.3 Review<br>• Unit 3 Study Guide<br>• Unit 3 RTI | |
| | | **Objectives** | • Describe the relationship between natural selection and adaptation of populations (microevolution).<br>• Describe how differences in ecosystems can contribute to natural selection over time.<br>• Recognize that natural selection does not result in the gain of new information leading to the evolution of new types of organisms.<br>• Describe how environmental conditions can change over time.<br>• Describe the relationship between environmental conditions and the distribution or disappearance of traits in a population. | | |
| | | **Key Terms** | evolution, natural selection, adaptation, fitness, fossil, biogeography, homologous structure, analogous structure, vestigial structure, phylogeny, convergent evolution, divergent evolution, adaptive radiation, artificial selection, coevolution, microevolution, gene pool, allele frequency, imigration, emigration, gene flow, genetic drift, speciation, morphology, geographic isolation, allopatric speciation, reproductive isolation, gradualism, punctuated equilibrium | | |
| | | **Common Assessments** | Pretest: Unit 3 Natural Selection<br>Quiz: Natural Selection | | |

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| **4** | **Energy (22 Days)** | 9-12.LS1.C.1 | • Use a model to demonstrate how photosynthesis transforms light energy into stored chemical energy. | • Photosynthesis Lab PPT<br>• Photosynthesis Lab<br>• Photosynthesis PPT<br>• Photosynthesis PPT Notes<br>• U4- Exercise #3 | • Photosynthesis Overview Image<br>• Chloroplast Electron Micrograph<br>• Chloroplast Image |

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| | | | | • Photosynthesis Modeling Ball/Stick PPT | • Light Dependent Reaction Image<br>• Light Independent Reaction Image<br>• Light Dependent, Electron Transport Chain: McGraw Hill Animation<br>• Light Independent, Calvin Cycle: McGraw Hill Animation |
| | | 9-12.LS1.C.2 | • Use a model to demonstrate that cellular respiration is a chemical process whereby the bonds of molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. | • Yeast Lab Student<br>• Yeast Lab W/O Student<br>• Yeast Lab Teacher<br>• Cellular Respiration PPT<br>• Cellular Respiration Notes<br>• Modeling Cell Ball/Stick | • Cellular Respiration Overview Image<br>• Glycolysis Sequence Image<br>• Glycolysis Overall Image<br>• Link Reaction Sequence Image<br>• Krebs Cycle Sequence Image<br>• Krebs Cycle Sequence Image 2<br>• Electron Transport Chain Sequence Image<br>• Mitochondria Electron Micrograph<br>• Mitochondria Image<br>• How Glycolysis Works: McGraw Hill Animation |

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| | | | | | • How Krebs Cycle Works: McGraw Hill Animation<br>• How Electron Transport Chain Works: McGraw Hill Animation |
| | | 9-12.LS1.C.3 | • Construct and revise an explanation based on evidence that organic macromolecules are primarily composed of six elements, where carbon, hydrogen, and oxygen atoms may combine with nitrogen, sulfur, and phosphorus to form large carbon-based molecules. | • What is Food?<br>• What is Food Research?<br>• Macromolecules PPT<br>• Macromolecules Notes<br>• Macromolecule Study Guide | • CrashCourse Macros<br>• Animation Carbohydrates<br>• Animation Lipids<br>• Animation Proteins |
| | | 9-12.LS2.A.1 | • Explain how various biotic and abiotic factors affect the carrying capacity and biodiversity of an ecosystem using mathematical and/or computational representations. | • Energy Stations PPT<br>• Energy Stations Notes<br>• Intro. to Ecology PPT<br>• Intro To Eco PPT Notes<br>• Energy Macro View<br>• Ecosystem Energy Flow PPT<br>• Ecosystem Energy Flow Notes | • Crash Course Biology: Ecology<br>• Crash Course Links in the Chain<br>• McGraw-Hill: Energy Flow Animation<br>• Carbon Cycle Animation |
| | | 9-12.LS2.B.1 | • Construct and revise an explanation based on evidence that the processes of photosynthesis, chemosynthesis, and aerobic and anaerobic respiration are responsible for the cycling of matter and flow of energy through ecosystems and that environmental conditions restrict which reactions can occur. | • Photosynthesis PPT<br>• Photosynthesis PPT Notes<br>• Photosynthesis Modeling Ball/Stick PPT<br>• Cellular Respiration PPT | |

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| | | 9-12.LS2.B.2 | • Communicate the pattern of the cycling of matter and the flow of energy among trophic levels in an ecosystem. | • Energy Stations PPT<br>• Energy Stations Notes<br>• Introduction to Ecology PPT<br>• Intro To Eco PPT Notes<br>• Energy Macro View<br>• Ecosystem Energy Flow PPT<br>• Ecosystem Energy Flow Notes<br>• U4- Exercise 1 | • Crash Course Biology: Ecology<br>• Crash Course Links in the Chain<br>• McGraw-Hill: Energy Flow Animation<br>• Carbon Cycle Animation |
| | | 9-12.LS2.B.3 | • Use a model that illustrates the roles of photosynthesis, cellular respiration, decomposition, and combustion to explain the cycling of carbon in its various forms among the biosphere, atmosphere, hydrosphere, and geosphere. | • Energy Stations PPT<br>• Energy Stations Notes<br>• Introduction to Ecology PPT<br>• Intro To Eco PPT Notes<br>• Energy Macro View<br>• Ecosystem Energy Flow PPT<br>• Ecosystem Energy Flow Notes<br>• Photosynthesis PPT<br>• Photosynthesis PPT Notes<br>• Cellular Respiration PPT | |
| | | **Objectives** | • Analyze the flow of energy and the cycling of matter in an ecosystem<br>• Analyze overall reactions including reactants and products for photosynthesis and cellular respiration and factors that affect their rates<br>• Compare the structure and function of organic molecules in organisms. | | |
| | | **Key Terms** | chemical energy, convert, energy, input, light energy, matter, organism, output, photosynthesis, photosynthesizing, plant, stored energy, transform, transformation, bond, cellular respiration, chemical | | |

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| | | | process, compound, energy , food, form, input, molecule, output, oxygen, amino acid, amino acid sequence, biological molecule, carbon, carbon based molecule, combine, element, hydrogen, molecule, oxygen, sugar, abiotic, biotic, boundary, carrying capacity, climate, competition, data set ,ecosystem, facto, graph, histogram, interdependent, population, quantitative analysis, relationship resource, scale, simulation, aerobic, anaerobic, cycle, energy, environment, flow, matter, respiration, role, atom, biomass, carbon, conserve, cycle, ecosystem, energy, flow, hydrogen, matter, molecule, nitrogen, organism, oxygen, store, transfer, trophic level, atmosphere, biosphere, carbon cycle, cellular respiration, geosphere, hydrosphere, photosynthesis |
| | | **Common Assessments** | Pretest: Energy<br>Quiz: Ecology<br>Quiz: Macromolecule<br>Test: Cellular Respiration<br>Quiz: Photosynthesis |

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| **5** | **Homeostasis (16 Days)** | 9-12.LS1.A.2 | Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. | • Can You Stand the Heat<br>• How do Materials Move?How do Materials Move?<br>• Osmosis/Diffusion Notes<br>• Membranes and Molecular Movement Reading<br>• Passive Transport Handout.<br>• Human Homeostasis<br>• An Eggs-Periment BSCS<br>• Egg lab Write up<br>• Osmosis Gizmo<br>• Osmosis and Diffusion Practice<br>•<br>• Cell Membrane Discussion<br>• Cell Membrane | Modern Biology (Holt, Rinehart and Winston, 2006) |
| | | 9-12.LS1.A.3 | Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. | | |
| | | **Objectives** | • Construct an explanation of how cell structures and organelles (including nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, Golgi, endoplasmic reticulum, vacuoles, ribosomes, and mitochondria) interact as a system to maintain homeostasis<br>• Compare and contrast active and passive transport<br>• Plan and carry out investigations to determine the role of cellular transport (e.g., active, passive, and osmosis) in maintaining homeostasis | | |

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| | | | | Handout<br>• Stepping Up the Pace Lab<br>• Homoeostasis Review<br>• Homeostasis Unit Remediation | |
| | | **Key Terms** | homeostasis, isotonic, hypertonic, hypotonic, concentration gradient, ATP, facilitated, diffusion, selective permeability, osmosis, active transport, passive transport, diffusion, endocytosis, exocytosis, pinocytosis, phagocytosis, exocytosis, phospholipid, bilayer, carrier protein, transport protein, turgor pressure, sodium potassium pump, equilibrium, plasmolysis | | |
| | | **Common Assessments** | Pre-Test: Homeostasis<br>Quiz: Cell Movement<br>Test: Homeostasis | | |

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| **6** | **Growth and Reproduction (20 Days)** | 9-12.LS1.A.1 | Construct a model of how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells | • DNA Paper Models<br>• DNA Structure, Replication and Mutation Reading<br>• Building DNA Gizmo<br>• DNA Structure and Replication Discussion<br>• DNA Structure and Replication Review<br>• Onion Root Tip Observations<br>• Cell Cycle and Mitosis Discussion<br>• Pg. 159 #'s 1-6<br>• Cell Division Gizmo<br>• Cell Cycle and Mitosis Review<br>• Chromosomes and Cell Division | Modern Biology (Holt, Rinehart and Winston, 2006) |
| | | 9-12.LS1.B.1 | Develop and use models to communicate the role of mitosis, cellular division, and differentiation in producing and maintaining complex organisms | | |
| | | **Objectives** | • Compare and contrast DNA and RNA and Apply DNA and RNA base pairing rules involving Adenine, Cytosine, Guanine, Thymine, and Uracil<br>• Identify the stages of cell division.<br>• Illustrate the importance of mitosis and meiosis.<br>• Put the stages of mitosis and meiosis in order.<br>• Identify how cell differentiate into mature cells<br>• Construct a model of how meiosis will create variation from one generation to the next generation.<br>• Predict what will happen if an error or mistake occurs in either mitosis or meiosis. | | |

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| | | | • Support prediction with evidence of why the results may occur if there is an error in mitosis or meiosis.<br>• Construct an explanation of how the structures of DNA and RNA lead to the expression of information within the cell via the processes of replication | Handout<br>• Mitosis Foldable<br>• Meiosis Discussion<br>• Meiosis Handout<br>• Meiosis Gizmo<br>• Cancer Reading<br>• The Eukaryotic Cell and Cancer<br>• Processes That Generate Complexity<br>• Unit 6 Review | |
| | | **Key Terms** | Mitosis, Meiosis, Variation, Chromosomes, Cancer, Differentiation, Genetics ,Diploid, Haploid, Homologous Chromosomes, Binary Fission, Gamete, Interphase, Prophase, Metaphase, Anaphase, Telophase, Cytokinesis, Genetic Recombination, Independent Assortment, Crossing-Over, Asexual Reproduction, Spermatogenesis, Oogenesis, DNA, RNA, Complementary Base Pairs | | |
| | | **Common Assessments** | Pretest: Unit 6<br>Quiz: DNA Mitosis<br>Quiz: Mitosis<br>Quiz: Meiosis<br>Test: Unit 6 | | |

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| **7** | **Inheritance (24 Days)** | 9-12.LS4.B.2 | 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. | • Unit 7 Terms & Proficiency Scale<br>• Gifts From Your Parents<br>• Mr. Potato Head Genetics<br>• Genetics Discussion<br>• Exercise 2 Oompa Loompa Genetics<br>• Reading: Monk Finds Gene<br>• Heredity Exercise 3<br>• Deadly Cry Reading | Modern Biology (Holt, Rinehart and Winston, 2006) |
| | | **Objectives** | • Determine the outcome of stated monohybrid crosses and pedigrees<br>• State examples of traits demonstrating codominance, incomplete dominance, multiple alleles, polygenic traits.<br>• Calculate the probability of genotypic and phenotypic outcomes of monohybrid crosses in percentages, ratios, and fractions. | | |

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| | | | • Explain how mutations may or may not result in a phenotypic change<br>• Determine the outcome of a stated dihybrid crosses<br>• Hypothesize the outcome of monohybrid crosses and pedigrees with partial information<br>• Use Mendel's law of segregation and independent assortment to analyze patterns of inheritance<br>• Explain how the process of transcription and translation and their role in gene expression. | • Genetic Disorder Jigsaw<br>• X Rated Genes<br>• Exercise 5<br>• Hemophilia Reading<br>• Exercise 6<br>• Exercise 7<br>• Exercise 8<br>• Exercise 9<br>• Blood Typing WebQuest<br>• Disere's Baby<br>• Skin Color Reading<br>• Heredity Review<br>• What is a Protein Research<br>• About Proteins<br>• Protein Synthesis WebQuest<br>• Protein Synthesis Discussion<br>• Transcription Handout<br>• Protein Synthesis and Codon Practice<br>• Protein Synthesis with Words<br>• RNA Protein Synthesis Gizmo<br>• Exercise 3 Translation/Transcription<br>• Protein Synthesis STEM Gizmo | |
| | | **Key Terms** | Genetics, Heredity, Trait, Dominant, Recessive, Law of Segregation, Law of Independent Assortment, Allele, Nitrogenous bases, rRNA, Transcription, Translation, Protein Synthesis, mRNA, tRNA, codon, anticodon, Sex-linked Trait, Pedigree, Carrier, Genetic Disorder, Polygenic, Multiple Allele, Codominance, Incomplete Dominance | | |
| | | **Common Assessments** | Pretest: Unit 7<br>Test: Genetics | | |

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