Biology is the study of the living and how organisms interact with their environment. The course offers a focus on Biological concepts through inquiry based investigations & weekly laboratory experiments reinforcing the content. This course is designed to provide the student with the basic biological concepts: experimental design, biochemistry, cell biology, genetics, evolution, microbiology, & ecology. Students will be taking a state mandated Keystone Exam at the end of the course and passing for graduation requirements as well as entrance into a four year college.

Course Sections:

Lab: A general education course featuring a weekly hands-on laboratory period.
Academic: An academically adapted class without a laboratory period

Course Information:

Frequency & Duration: Daily for 42 minutes; 6 periods per week (5 daily meetings for Academic)
Text: Biology: Miller & Levine; Foundation Edition; Copyright 2010

Module 1: Basic Biological Principals	**Duration:** Aug./Sept. 3 Weeks
Big Idea	Basic Biological Principles are needed as an essential part of Biology Organisms share common characteristics of Life
Essential Questions	How do we know if something is alive? How is structure related to function at the various levels of cellular organization?
Eligible Content	• Describe and explain the characteristics of life common to all organisms. • Compare and contrast the cellular structures and degrees of complexity • Relate life processes to sub-cellular and cellular structures to their functions. • Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation • Compare cellular structures and their functions in prokaryotic and eukaryotic cells • Identify the advantages of multi-cellularity in organisms. • Describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms). • Recognize that systems within cells and multicellular organisms interact to maintain homeostasis • Explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation). • Distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation
Instructional/ Engagement Activities	• Students will be able to describe and explain the common characteristics of life common to all organisms • Given prokaryotic and eukaryotic Organisms compact and contrast the cellular structures and complexity. • Students will be able to determine structures in Eukaryotic cells that developed from Prokaryotic cells • Students will be able to relate life processes to sub-cellular and cellular structures to their functions. • Students will be able to explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation • Students will be able to compare cellular structures and their functions in prokaryotic and eukaryotic cells. • Students will be able to identify the advantages of multi-cellularity in organisms. • Students will be able to describe and interpret relationships between structure and function at various levels of biological organization (i.e., organelles, cells, tissues, organs, organ systems, and multicellular organisms).

	• Students will be able to recognize that systems within cells and multicellular organisms interact to maintain homeostasis • Students will be able to explain how organisms maintain homeostasis (e.g., thermoregulation, water regulation, oxygen regulation • Students will be able to distinguish between the scientific terms: hypothesis, inference, law, theory, principle, fact, and observation	
Assessments	**Student Assignments** Module Workbooks Module Power points • Word meanings worksheet • Living/nonliving activity • Homeostasis worksheet • Scientific method simulations • Cell parts guided notes & drawing • Endosymbiotic Theory • Investigating organelle diseases **Lab:** • Lab Equipment Activity • Microscope lab • Experimental Design lab • Plant/animal Cell Lab • Cell Size Lab **Project** • Module Webquest • Science Theory and Laws Puzzle Activity • Characteristic of Life Mock Trial • Feedback Loop Body Project **WEEKLY QUIZES AND A COMMON ASSESSMENT**	
Accommodations	• Open book or notebook test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Basic Biology Webquest • Interactive video demonstration and comprehension worksheet	
Standards	1.10.A1 3.1.B.A1. 3.1.10.A5. BIO.A.4.2.1 BIO.A.1.2.1. 3.1.10.A6. BIO.A.1.2.2.	BIO.A.4.1.4 BIO.B.3.3.1 CC.3.6.9-10.B CC.3.6.9-10.C CC.3.6.9-10.D CC.3.6.9-10.I CC.3.6.9-10.A.
Vocabulary	Cell Eukaryotic Cells Homeostasis Homeostatic Mechanism Control Independent Variable (manipulative) Dependent Variable (responding) Scientific Method Law Prokaryotic Cells Theory Characteristics of Life Cell Wall Chloroplast	Endosymbiosis Golgi apparatus Lysosomes Mitochondrion Unicellular Multicellular Nucleus Nucleolus Tissue Organ Organ System Organelle Plasma membrane (Cell membrane) Plastids

	Extracellular Intracellular Endoplasmic Reticulum Smooth ER	Ribosome Vacuoles Stomates

Module 2: Biochemistry	**Duration:** Sept. / Oct. (5 Weeks)
Big Idea	• Life emerges due to the chemical organization of matter into cells. • Cells have organized structures and systems necessary to support chemical reactions needed to maintain the living condition. • Structure is related to function at all biological levels of organization.
Essential Questions	• How is life a product of the organization & interaction of matter? • How does life result from cellular structure and function? • How is structure related to function at all biological levels of organization?
Eligible Content	• Define element, atom, compound, and molecule • Construct a model of the structure of an atom • Explain what determines an atoms stability • Contrast ionic and covalent bonds • Explain the three states of matter • Describe how energy changes are involved in chemical reactions • Explain how enzymes affect chemical reactions in organisms • Explain what a redox reaction is • Define solution, solute, solvent, and concentration • Explain the dissociation of water • Contrast the properties of acids and bases • Describe the use of the pH scale • Explain the action of buffers
Instructional/ Engagement Activities	• Students will be able to define element, atom, compound, and molecule • Students will be able construct a model of the structure of an atom • Students will be able explain what determines an atoms stability • Students will be able contrast ionic and covalent bonds • Students will be able explain the three states of matter • Students will be able describe how energy changes are involved in chemical reactions • Students will be able explain how enzymes affect chemical reactions in organisms • Students will be able explain what a redox reaction is • Students will be able define solution, solute, solvent, and concentration • Students will be able explain the dissociation of water • Students will be able contrast the properties of acids and bases • Students will be able describe the use of the pH scale • Students will be able explain the action of buffers

Assessments	**Student Assignments:** Module Workbooks Module Power points **Lab:** • Bonding • Water lab • Temperature Effects on Enzymes • Which detergent Works Best? • The Need for Speed • Macromolecule Building • Who took Jerrell's IPod? • Candy Calories Lab • Toothpickase – Enzyme Simulation **Project** • Polarity Cartoon Project • Biochemistry Webquest **WEEKLY QUIZES AND A COMMON ASSESSMENT**	
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Biochemistry Webquest • Interactive video demonstration and comprehension worksheet • Molecules of life teacher demonstration using bananas, hydrogen peroxide, meat tenderizer, and petri plates.	
Standards	BIO. A.2.1. BIO. A.2.2. BIO A.2.3.	
Vocabulary	Adhesion Acid Alkaline Activation Energy Aqueous Solution Atom Atomic Number Base Bond Buffer Carbohydrate Catalyst Chemical Reaction Cohesion Compound Concentration Covalent Bond Dehydration Synthesis Dissociation Electron Element Endergonic Reaction Energy Energy Level Enzyme	Hydronium Ion Hydroxide Ion Ion Ionic Bond Lipids Macromolecules Mass Matter Molecule Monomer Neutron Nucleic Acid Nucleus Organic Molecule Oxidation Reaction pH Scale Product Proton Saturated Solution Specific Heat Reactant Redox Reaction Reduction Reaction Solute Solution

	Exergonic Reaction Free Energy Hydrophilic Hydrophobic Hydrolysis	Solvent Temperature

Module 3: Bioenergetics	**Duration:** Nov (4 Weeks)
Big Idea	Organisms obtain and use energy to carry out their life processes.
Essential Questions	How do different organisms obtain and use energy to survive in their environment?
Eligible Content	• Describe the structure of mitochondria & chloroplasts in eukaryotic cells. • Describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. • Compare the basic transformations of energy during photosynthesis and cellular respiration. • Describe the structure of ATP • Describe the role of ATP in biochemical reactions
Instructional/ Engagement Activities	• The student will describe the structure of mitochondria & chloroplasts in eukaryotic cells. • The student will describe the fundamental roles of plastids (e.g., chloroplasts) and mitochondria in energy transformations. • Student will compare the basic transformations of energy during photosynthesis and cellular respiration. • The student will describe the structure of ATP The student will describe the role of ATP in biochemical reactions
Assessments	**Student Assignments** Module Workbooks Module Power points **Lab:**

	• Running Man • Photosynthesis • Yeast Respiration Lab • Photosynthesis Paper Atom Modeling • **Project** • Bioenergetics Webquest **WEEKLY QUIZES AND A COMMON ASSESSMENT**	
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Bioenergetics Webquest • Interactive video demonstration and comprehension worksheet	
Standards	BIO.A.3.1.1 BIO.A.3.2.1 BIO.A.3.2.2 BIO.A.3.2.1	
Vocabulary	Calvin Cycle Adenosine Triphosphate (ATP) Cellular Respiration	Photosynthesis Bioenergetics

Module 4: Cell Transport	Duration: December (3 Weeks)
Big Idea	Through a variety of mechanisms organisms seek to maintain a biological balance between their internal and external environments.
Essential Questions	How do organisms maintain a biological balance between their internal and external environments?
Eligible Content	• Describe how the structure of the plasma membrane allows it to function as a regulatory structure and/or protective barrier for a cell. • Compare & contrast active vs. passive transport mechanisms • Describe how membrane-bound cellular organelles facilitate intracellular transport of materials. • Explain mechanisms organisms use to maintain homeostasis.
Instructional/ Engagement Activities	• Students will be about to explain the role of ATP in cell metabolism • Students will be able to explain how the cell membrane functions as a regulatory structure and protective barrier for the cell • Students will be able describe transport mechanisms across the plasma membrane • Students will be able to Compare the mechanisms that transport materials across the plasma membrane (i.e., passive transport—diffusion, osmosis, facilitated diffusion; and active transport—pumps, endocytosis, exocytosis).
Assessments	**Student Assignments** Module Workbooks Module Power points **Lab:** • Osmosis/Diffusion • Building the cell membrane • Egg activity • Passive Transport Starch Lab • Endocytosis Bag Simulation **Project**

	• Cell Transport Webquest • **WEEKLY QUIZES AND A COMMON ASSESSMENT**	
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Cell Transport Webquest • Interactive video demonstration and comprehension worksheet • Diffusion teacher demonstration using ziploc bags, iodine, starch, 2 beakers, and distilled water.	
Standards	BIO.A.4.1.1 BIO.A.4.1.2 BIO.A.4.1.3 BIO.A.4.2.1	
Vocabulary	Active Transport Diffusion Endocytosis Exocytosis Facilitated Diffusion Passive Transport Osmosis Carrier Proteins	Concentration Concentration Gradient Impermeable Pumps Equilibrium Hypotonic Solution Hypertonic solution Isotonic Solution

Module 5: Cell Growth & Reproduction	**Duration:** January (4 Weeks)
Big Idea	New cells arise from the division of pre-existing cells.
Essential Questions	How do organisms grow and reproduce?
Eligible Content	• Compare and contrast the life cycles of different organisms. • Explain how all organisms begin their life cycles as a single cell and that in multicellular organisms, successive generations of embryonic cells form by cell division. • Describe the cell cycle and the process and significance of mitosis. • Summarize the stages of the cell cycle • Examine how interactions among the different molecules in the cell cause the distinct stages of the cell cycle which can also be influenced by other signaling molecules • Examine how interactions among the different molecules in the cell cause the distinct stages of the cell cycle which can also be influenced by other signaling molecules • Explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction. • Relate mitosis and meiosis at the molecular level • Explain how cells differentiate in multicellular organisms • Explain the process of meiosis resulting in the formation of gametes. • Describe how the process of meiosis results in the formation of haploid gametes and analyze the importance of meiosis in sexual reproduction. • Compare and contrast the function of mitosis and meiosis. • Illustrate that the sorting and recombining of genes in sexual reproduction results in a great variety of possible gene combinations in offspring.

	• Describe processes that can alter composition or number of chromosomes(i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion). • Compare the processes and outcomes of mitotic and meiotic nuclear divisions. • Describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis Compare and contrast a virus and a cell. Relate the stages of viral cycles to the cell cycle.
Instructional/ Engagement Activities	• Given different organisms compare and contrast the life cycles • Students will be able to explain how all organisms begin their life cycles as a single cell and that in multicellular organisms, successive generations of embryonic cells form by cell division. • Students will be able to describe the cell cycle and the process and significance of mitosis. • Students will be able to summarize the stages of the cell cycle • Students will be able to examine how interactions among the different molecules in the cell cause the distinct stages of the cell cycle which can also be influenced by other signaling molecules • Students will be able to explain the role of mitosis in the formation of new cells and its importance in maintaining chromosome number during asexual reproduction. • Students will be able to relate mitosis and meiosis at the molecular level • Students will be able to explain how cells differentiate in multicellular organisms • Students will be able to explain the process of meiosis resulting in the formation of gametes. • Students will be able to describe how the process of meiosis results in the formation of haploid gametes and analyze the importance of meiosis in sexual reproduction. • Students will be able to compare and contrast the function of **mitosis** and **meiosis**. • Students will be able to illustrate that the sorting and recombining of genes in sexual reproduction results in a great variety of possible gene combinations in offspring. • Students will be able to describe processes that can alter composition or number of chromosomes (i.e., crossing-over, nondisjunction, duplication, translocation, deletion, insertion, and inversion). • Students will be able to compare the processes and outcomes of mitotic and meiotic nuclear divisions. • Students will be able to describe the events that occur during the cell cycle: interphase, nuclear division (i.e., mitosis or meiosis), cytokinesis Given a virus and a cell, students will be able to compare and contrast a virus and a cell. Relate the stages of viral cycles to the cell cycle.
Assessments	**Student Assignments** Module Workbooks Module Power points **Lab:** • Mitosis Simulation lab • Mitosis stages under a microscope • Good Cells Gone Bad • Leksak Bird activity **Project** • Meiosis Crossing over Pipe Cleaner Demonstration • Cell Division Webquest **WEEKLY QUIZES AND A COMMON ASSESSMENT**
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Cell Division Webquest • Interactive video demonstration and comprehension worksheet • Cell Division Teacher Demonstration using onions, food coloring, and microscope slides.
Standards	BIO.B.1.1.1

	BIO.B.1.1.2 BIO.B.1.2.1 BIO.B.1.2.2	
Vocabulary	Asexual Reproduction Cell Cycle Cell Division Chromosome Cytokinesis Embryo Gametes Haploid	Interphase Lysogenic cycle Lytic cycle Meiosis Mitosis Sexual Reproduction Virus

Module 6: Genetics	**Duration:** Feb. (2.5 Weeks)
Big Idea	DNA segments contain information for the production of proteins necessary for growth and function of cells.
Essential Questions	• How does DNA control growth and function of cells? • How are traits inherited, expressed and passed from one generation to the next?
Eligible Content	<u>Part I</u> • Describe how genetic information is inherited and expressed • Explain that the information passed from parents to offspring is transmitted by means of genes which are coded in DNA molecules. • Explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance. • Describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles). • Compare and contrast Mendelian and non- Mendelian patterns of inheritance. • Describe how Mendel's laws of segregation and independent assortment can be observed through patterns of inheritance. • Distinguish among observed inheritance patterns caused by several types of genetic traits (dominant, recessive, co dominant, sex-linked, polygenic, incomplete dominance, multiple alleles) • Demonstrate how inherited characteristics can be observed at the molecular, cellular, and organism levels. • Describe how mutations in sex cells may be passed on to successive generations and that the resulting phenotype may help, harm, or have little or no effect on the offspring's success in its environment <u>Part II</u> • Explain the role of sex chromosomes in sex determination • Describe how sex linkage affects the inheritance of traits • Explain the effect of crossing over on the inheritance of genes in linkage groups • Summarize the procedure involved in constructing a chromosome map

	• Distinguish between chromosome mutations and gene mutations • Show how pedigree analysis can be used to illustrate the inheritance of traits • Explain the inheritance of ABO blood groups • Give examples of traits or disorders transmitted by autosomal dominant, autosomal recessive, polygenic, and X-linked recessive inheritance • Compare sex-linked traits with sex influenced traits • Explain how nondisjunction can cause human genetic disorders
Instructional/ Engagement Activities	<u>Part 1</u> • Students will be able to describe how genetic information is inherited and expressed • Students will be able to explain that the information passed from parents to offspring is transmitted by means of genes which are coded in DNA molecules. • Students will be able to explain the functional relationships between DNA, genes, alleles, and chromosomes and their roles in inheritance. • Students will be able to describe and/or predict observed patterns of inheritance (i.e., dominant, recessive, co-dominance, incomplete dominance, sex-linked, polygenic, and multiple alleles • Students will be able to compare and contrast Mendelian and non- Mendelian patterns of inheritance. • Students will be able to describe how Mendel's laws of segregation and independent assortment can be observed through patterns of inheritance. • Students will be able to distinguish among observed inheritance patterns caused by several types of genetic traits • Students will be able to demonstrate how inherited characteristics can be observed at the molecular, cellular, and organism levels • Students will be able to describe how mutations in sex cells may be passed on to successive generations and that the resulting phenotype may help, harm, or have little or no effect on the offspring's success in its environment <u>Part II</u> • Students will be able to explain the role of sex chromosomes in sex determination • Students will be able to describe how sex linkage affects the inheritance of traits • Students will be able to explain the effect of crossing over on the inheritance of genes in linkage groups • Students will be able to summarize the procedure involved in constructing a chromosome map • Students will be able to distinguish between chromosome mutations and gene mutations • Students will be able to show how pedigree analysis can be used to illustrate the inheritance of traits • Students will be able to explain the inheritance of ABO blood groups • Students will be able to give examples of traits or disorders transmitted by autosomal dominant, autosomal recessive, polygenic, and X-linked recessive inheritance • Students will be able to compare sex-linked traits with sex influenced traits • Students will be able to explain how nondisjunction can cause human genetic disorders
Assessments	**Student Assignments** Module Workbooks Module Power points **Lab:**

	Project • • Genetics Webquest **WEEKLY QUIZES AND A COMMON ASSESSMENT**
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Genetics Webquest • Interactive video demonstration and comprehension worksheet • Probability teacher demonstration using 24 plain M&M's, paper towels, and plastic cups.
Standards	3.1.10.B1. 3.1.B.B5. BIO.B.1.2.2 BIO.B.2.1.1
Vocabulary	<u>Part I</u> Alleles Co-dominant Dominant Incomplete dominance Genotypic Variations Independent Assortment Law of Segregation Multiple alleles P Henotypic Variations Polygenetic Recessive Sex Linked <u>Part II</u> Amniocentesis Carrier Chromosome Map Colorblindness Deletion Frameshift Mutation Inversion Linkage Group Monosomy Nondisjunction Pedigree Point Mutation Polygenic Trait Sex Influenced Trait Sex Linkage Substitution Translocation Trisomy

Module 7: Evolution	**Duration:** April (2 Weeks)
Big Idea	Evolution is the result of many random processes selecting for the survival and reproduction of a population.
Essential Questions	• How do we scientifically explain the evidence and mechanisms for biological evolution?

	• What theories and evidence support the origin of life?
Eligible Content	• Define spontaneous generation, and list some of the observation that led people to think that life could arise from non living things • Summarize the results of experiments by Redi and by Spallanzani that tested the hypothesis of spontaneous generation • Describe how Pasteur's experiment disproved the hypothesis of spontaneous generation • Describe how Pasteur's experiment disproved the hypothesis of spontaneous generation • Explain the modern understanding of the formation of earth • Summarize the concept of half life • Describe the production of organic compounds in the Miller Urey experiment • Summarize the possible importance of cell like structures produced in the laboratory • Explain the importance of the chemistry of RNA in relation to the origin of life • Define endosymbiosis, and explain why it is important in the history of eukaryotes • Describe how the examination of fossils led to the development of evolutionary theories • Explain the law of superposition and its significance of life forms from the fossil record • Tell how biogeographic observations suggest decent with modification • Define evolution • Explain Lamarck's theory of evolution and describe how it was flawed • Explain Darwin's two major theories • Describe the difference between homologous, analogous, and vestigial structure Explain the difference between coevolution, and divergent and convergent evolution
Instructional/ Engagement Activities	• Students will be able to define spontaneous generation, and list some of the observation that led people to think that life could arise from non living things • Students will be able to summarize the results of experiments by Redi and by Spallanzani that tested the hypothesis of spontaneous generation • Students will be able to describe how Pasteur's experiment disproved the hypothesis of spontaneous generation • Students will be able to describe how Pasteur's experiment disproved the hypothesis of spontaneous generation • Students will be able to explain the modern understanding of the formation of earth • Students will be able to summarize the concept of half life • Students will be able to describe the production of organic compounds in the Miller Urey experiment • Students will be able to summarize the possible importance of cell like structures produced in the laboratory • Students will be able to explain the importance of the chemistry of RNA in relation to the origin of life • Students will be able to define endosymbiosis, and explain why it is important in the history of eukaryotes • Students will be able to describe how the examination of fossils led to the development of evolutionary theories • Students will be able to explain the law of superposition and its significance of life forms from the fossil record • Students will be able to tell how biogeographic observations suggest decent with modification • Students will be able to define evolution • Students will be able to explain Lamarck's theory of evolution and describe how it was flawed • Students will be able to explain Darwin's two major theories • Students will be able to describe the difference between homologous, analogous, and vestigial structure • Students will be able to explain the difference between coevolution, and divergent and convergent evolution
Assessments	**Student Assignments**

	Module Workbooks Module Power points **Lab:** **Project** • Ecology Webquest • Biome Diorama • EPA Mock Trial **WEEKLY QUIZES AND A COMMON ASSESSMENT**	
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Evolution Webquest • Interactive video demonstration and comprehension worksheet	
Standards	3.1.10.A1 3.1.10.A8. 3.1.B.C2. 3.1.10.C3. 3.1.B.C3. BIO.B.3.2.1	
Vocabulary	Adaptive Radiation Analogous Anatomy Biogenesis Coacervates Coevolution Convergent Evolution Divergent Evolution Endosymbiosis Evolution Diversity Fossil Records Founder Effect Gene pool	Genetic Drift Half Life Homologous Law of Superposition Migration Natural Selection Physiology Population Radioactive Dating Species Spontaneous Generation Vestigial

Module 8: Ecology	Duration:
Big Idea	Organisms on Earth interact and depend in a variety of ways on the other living and nonliving things in their environments.
Essential Questions	How do organisms interact with and depend on each other in an ecosystem? How are organisms impacted by the nonliving components of an ecosystem?
Eligible Content	• Describe the levels of ecological organization (i.e. organisms, population, community, ecosystem, biome, and biosphere)

	• Describe characteristic biotic and abiotic components of aquatic and terrestrial ecosystems • Describe biotic interactions in an ecosystem (e.g. competition, predation, symbiosis) • Describe how matter recycles through an ecosystem (i.e. water cycle, carbon cycle, oxygen cycle, and nitrogen cycle) • Describe how ecosystems change in response to natural and human disturbances (e.g. climate change, introduction of nonnative species, pollution, fires) • Describe how energy flows through an ecosystem (e.g. food chains, food webs, energy pyramids)	
Assessments	**Student Assignments** Module Workbooks Module Power points **Lab:** **Project** • Module Webquest **WEEKLY QUIZES AND A COMMON ASSESSMENT**	
Accommodations	• Open book test (may also include reduced number of choices, word bank, questions read aloud, extended time) • Test based study guide questions • Teacher-guided workbook assignments • Evolution Webquest • Interactive video demonstration and comprehension worksheet (may include primary and secondary succession)	
Standards	3.1.B.A2 3.1.B.C1 4.1.10A 4.1.12.A 4.1.10.B 4.1.10.C 4.1.10.D 4.1.10.E 4.1.10.F 4.2.10.A 4.2.10.B	4.2.10.C 4.2.10.D 4.5.12.D Bio.B.4.1.1 Bio.B.4.1.2 Bio.B.4.2.1 Bio.B.4.2.2 Bio.B.4.2.3 Bio.B.4.2.4 Bio.B.4.2.5
Vocabulary	Abiotic Biosphere Biotic Carrying Capacity Commensalism Community Ecosystem Emigration Immigration	Limiting Factors Mutualism Population Population Dynamics Succession Topography Watershed Wetlands Vegetation

Appendix 1: Adopted Vocabulary Definitions

Module 1: Basic Biological Principals

Cell- The basic unit of structure & function in all living organisms;
Eukaryotic Cells- A cell with a nuclear membrane and organelles;
Homeostasis- Regulation of an organism's internal conditions to maintain life; Homeostatic Mechanism – A regulatory mechanism that contributes to maintaining a state of equilibrium;
Control – Part of an experiment that stays the same;
Independent Variable (manipulative) – The part of the experiment that we change;
Dependent Variable (responding) – The part of the experiment that we are measuring from what we manipulated;
Scientific Method – The process that scientists use to solve a problem; Hypothesis- An educated guess;
Law – A law that generalizes a body of observations, it explains but does not describe them.
Prokaryotic Cells- a cell lacking a true membrane-bound nucleus;
Theory- This has been proven by many experiments that have been performed over time.
Characteristics of Life – Characteristics common to most life forms;
Cell Wall – Supports & protects the cell & made from cellulose;
Chloroplast – Organelle found in plant cells or other eukaryotic photosynthetic organisms where photosynthesis occurs;
Extracellular – outside of cell
Intracellular – Inside of cell
Endoplasmic Reticulum – Organelle, containing folded membranes, responsible for production, processing & transportation of materials inside & outside an eukaryotic cell.
Rough ER that has surface ribosomes & participates in protein synthesis & Smooth ER that has no ribosomes & participates in the synthesis of proteins mostly for export by the cell as well as synthesis of lipids & steroids
Endosymbiosis – A theory that earlier eukaryotic cells were formed from simpler prokaryotes
Golgi Apparatus – An organelle found in eukaryotic cells responsible for the final stages of processing proteins for release by the cell
Lysosomes – Breaks down cellular components that are no longer needed as well as unwanted molecules that are ingested by the cell
Mitochondrion – The membrane bound organelle in eukaryotes that is the site of cellular respiration
Unicellular – Made up of one cell
Multicellular – Made from more than one cell
Nucleus – The Command center of the cell
Nucleolus – Found in the nucleus & produces ribosomes
Tissue – composed of cells
Organ – Composed of tissues
Organ system – composed of organs
Organelle – Little organs of the cell
Plasma membrane (Cell membrane) – A thin, phospholipid & protein molecule bilayer that covers the cell & controls movement of materials in & out of the cell; Plastids – A group of organelles found in photosynthetic organisms that is responsible for synthesis & storage of food
Ribosome – An organelle composed of RNA & proteins that is the site of protein synthesis
Vacuoles – An organelle mostly found in plant cells, but some animal & bacterial cells that stores food, water or waste
Stomates – Tiny opening or pore that is used for gas exchange on the underside of plant leaves.

Module 2: Biochemistry

Adhesion – Attraction between difference substances – water and another substance
Atom – smallest unit of an element
Acid- substance that increases the hydrogen ion concentration when added to water

Alkaline- basic
Activation Energy- amount of energy for a chemical reaction to start and to continue on its own
Aqueous Solution- solution in which water is the solvent
Atom- simplest particle of an element that retains all properties of that element
Atomic Number- number of protons in an atom
Base- substance that increases hydroxide ion when added to water
Bond- chemical attraction between atoms
Buffer- chemical reactions that neutralize small amounts of acids or bases added to a solution
Catalyst- chemical that reduces the amount of activation energy needed for a reaction
Carbohydrates – A macromolecule that contains the atoms of carbon, hydrogen & oxygen and serves as a major source of energy for organisms
Chemical Reaction- process of breaking chemical bonds forming new bonds or both
Compound- a pure substance that is made up of atoms or two or more elements
Concentration- measurement of the amount of solute dissolved in a fixed amount of solvent
Cohesion – The attraction between like molecules – water attracted to water
Covalent Bond- bond formed by the sharing of one or more pairs of electrons between atoms
Dehydration synthesis – A type of reaction, where a compound is formed at the cost of losing a water molecule
Dissociation- separating a molecule into simpler molecules, atoms, radicals or ions
Electron -negatively charged particle
Element- substance that ordinarily cannot be broken down chemically to form simpler kinds of matter
Endergonic Reaction- chemical reaction involves a net gain of free energy
Energy- ability to do work or cause change
Energy Level- area around the nucleus in which electrons move
Enzyme-a catalyst usually a protein
Exergonic Reaction- chemical reaction involves a net release of free energy
Free Energy- energy in a system available to do work
Hydrophobic – water fearing
Hydrophilic – water loving
Hydrolysis – A chemical process in which a molecule of water is added to a substance which splits the molecule
Hydronium Ion- $H3O^+$
Hydroxide Ion- OH^-
Ion- atom or compound with a net electrical charge
Ionic Bond- bond formed by electrical attraction between 2 opposing charged ions
Lipids – A macromolecule made from carbon, hydrogen & oxygen that stores energy
Mass- fundamental property of an object generally regarded as equivalent to the amount of matter in an
Matter- anything that occupies space and has mass
Macromolecule – A polymer made from individual monomers. Examples are lipids, carbohydrates, proteins & nucleic acids
Molecule – The smallest particle of a substance
Monomer – A molecules of any compound that can react with other molecules of the same or different compound to form a polymer
Neutron- neutrally charged particle in the nucleus of an atom
Nucleus- core of protons and neutrons in an atom
Organic molecule – Any molecule that has carbon in it
Oxidation Reaction- reaction in which the reactant loses one or more electrons becoming more
Nucleic Acid – A biological macromolecule composed of the elements C, H, N, O, & P and carries genetic information (DNA & RNA)
positive in charge
pH – Measure of acidity or alkalinity of an aqueous solution scaling from 1-14
pH Scale- numeric range that quantifies the relative concentration of hydronium ions and hydroxide ions in a solution
Product- compound formed by a chemical reaction
Protein – A macromolecule that contains the principal components of organisms
Proton-subatomic particle with a positive charge
Saturated solution- solution in which no more solute can dissolve
Reactant- compound or atom involved in a chemical reaction
Redox Reaction- reaction in which electrons are transferred between atoms
Reduction Reaction- reactions in which reactant gains one or more electrons and becomes more negative
Solute- substance dissolved in a solution
Solution- mixture in which one or more substances are uniformly dissolved in another substance
Solvent- the substance in which the solute is dissolved
Specific Heat – The measure of heat energy required to increase the temperature of a unity quantity of a substance by a certain temperature interval

Temperature – A measure of the average kinetic energy of particles in a sample of matter.

Module 3: Bioenergetics

Calvin Cycle- A biochemical pathway of photosynthesis in which CO2 is converted into carbohydrates; **Adenosine Triphosphate (ATP)** = A molecule of particles from an area of low concentration to an area of high concentration that uses energy provided by ATP or a difference in electrical charges across a cell membrane.
Cellular Respiration = A complex set of chemical reactions involving an energy transformation where potential chemical energy in the bonds of "food" molecules is released & partially captured in the bonds of adenosine triphosphate (ATP) molecules.
Photosynthesis = A process in which solar radiation is chemically captured by chlorophyll molecules & through a set of controlled chemical reactions resulting in the potential chemical energy in the bonds of carbohydrate molecules.
Bioenergetics = The study of energy flow (energy transformations) into & within living systems.

Module 4: Cell Transport

Active Transport the movement of ions or molecules across a cellular membrane from a lower to a higher concentration, requiring the consumption of energy
Diffusion the movement of molecules from an area of higher concentration to lower concentration;
Endocytosis A process in which a cell engulfs extracellular material through an inward folding of its plasma membrane. Two types are phagocytosis & pinocytosis
Exocytosis the transport of material out of a cell by means of a sac or vesicle that first engulfs the material and then is extruded through an opening in the cell membrane
Facilitated Diffusion- process by which substances are transported across cell membranes by means of protein carrier molecules
Passive Transport- is the cellular process of moving molecules and other substances across membranes; does not require energy
Osmosis-the Movement of water molecules from an area of higher or lower concentration.
Carrier Proteins – Proteins embedded in the plasma membrane involved in the movement of ions, small molecules, & macromolecules into & out of cells; also known as transport proteins;
Concentration – The measure of the amount of proportion of a given substance when combined with another substance
Concentration Gradient – The graduated difference in concentration of a solute per unit distance through a solution
Impermeable – Not permitting passage of a substance
Pumps – Any of several molecular mechanisms in which ions or molecules are transported across a cellular membrane requiring the use of an energy source
Equilibrium – Concentration of molecules is the same in & out of the cell
Hypotonic Solution – Concentration of dissolved substances is lower in the solution outside the cell than inside the cell
Hypertonic solution – Concentration of dissolved substances outside the cell is higher than inside the cell
Isotonic Solution – Concentration of dissolved substances in the solution is the same as the concentration of dissolved substances inside the cell.

Module 5: Cell Division

Asexual Reproduction -reproduction, as budding, fission, or spore formation, not involving the union of gametes;
Cell Cycle- the events of cell division including interphase, mitosis, and cytokinesis;
Cell Division- the division of a cell in reproduction or growth;
Chromosome- any of several threadlike bodies, consisting of chromatin, that carry the genes in a linear order: the human species has 23 pairs, designated 1 to 22 in order of decreasing size and X and Y for the female and male sex chromosomes respectively;
Cytokinesis- the division of the cell cytoplasm that usually follows mitotic or meiotic division of the nucleus;
Embryo- the young of a viviparous animal, especially of a mammal, in the early stages of development within the womb, in humans up to the end of the second month;
Gametes- a mature sexual reproductive cell, as a sperm or egg, that unites with another cell to form a new organism;
Haploid- an organism or cell having only one complete set of chromosomes, ordinarily half the normal diploid number;
Interphase- the period of the cell cycle during which the nucleus is not undergoing division, typically occurring between mitotic or meiotic divisions;
Lysogenic cycle- the replication of viruses without causing immediate destruction of the host cell
Lytic cycle- the replication process of viruses that results in the destruction of the host cell
Meiosis - part of the process of gamete formation, consisting of chromosome conjugation and two cell divisions, in the course of which the diploid chromosome number becomes reduced to the haploid

Mitosis- the usual method of cell division, characterized typically by the resolving of the chromatin of the nucleus into a threadlike form, which condenses into chromosomes, each of which separates longitudinally into two parts, one part of each chromosome being retained in each of two new cells resulting from the original cell;
Sexual reproduction- reproduction involving the union of gametes
Virus- a nonliving particle composed of a nucleic acid and protein coat

Module 6: Genetics

Part I.

Alleles- any of several forms of a gene, usually arising through mutation, that are responsible for hereditary variation
Codominant- of or relating to two different alleles that are fully expressed in a heterozygous individual
Dominant- the trait or character determined by such an allele
Incomplete dominance- the appearance in a heterozygote of a trait that is intermediate between either of the trait's homozygous phenotypes
Genotypic Variations- the genetic makeup of an organism or group of organisms with reference to a single trait, set of traits, or an entire complex of traits
Independent Assortment the principle, originated by Gregor Mendel, stating that when two or more characteristics are inherited, individual hereditary factors assort independently during gamete production, giving different traits an equal opportunity of occurring together
Law of Segregation the principle, originated by Gregor Mendel, stating that during the production of gametes the two copies of each hereditary factor segregate so that offspring acquire one factor from each parent
Multiple alleles- a series of three or more alternative or allelic forms of a gene, only two of which can exist in any normal, diploid individual
Phenotypic Variations- the observable constitution of an organism
Polygenetic- one of a group of nonallelic genes that together control a quantitative characteristic in an organism
Recessive- that one of a pair of alternative alleles whose effect is masked by the activity of the second when both are present in the same cell or organism
Sex Linked- determined by a gene located in a sex chromosome

Part II.

Amniocentesis- physician removes a small amount of amniotic fluid from the amnion, the sac that surrounds the fetus
Carrier- Individuals who have one copy of a recessive autosomal allele
Chromosome Map- a diagram that shows linear sequence of genes on a chromosome**; Colorblindness**- recessive X-linked disorder in which an individual cannot distinguish between certain colors
Deletion- is the loss od a piece of chromosome due to chromosomal breakage
Frameshift Mutation- addition or deletion of a single nucleotide causes the remaining codons to be incorrectly grouped
Inversion- is a chromosome mutation in which a chromosomal segment breaks off and then reattaches in reverse orientation to the same chromosome
Linkage Group- the group of genes located on the same chromosome, that are usually inherited together
Monosomy- zygote with 45 chromosomes has only one copy of a particular chromosome; **Nondisjunction-** the failure of a chromosome to separate from its homologue during meiosis
Pedigree- a family record that's shows how a trait is inherited over several generations**; Point Mutation-** the substitution, addition, or removal of a single nucleotide
Polygenic Trait- a trait that is controlled by two or more genes;
Sex Influenced Trait- the presence of male or female sex hormones influences the expression of certain human traits
Sex Linkage-the presence of a gene on a sex chromosome
Substitution- one nucleotide in a codon is replaced with a different nucleotide, resulting in a new codon
Translocation- a chromosome piece breaks off and reattaches to another, non-homologous chromosome
Trisomy- zygote with 47 chromosomes has three copies or a particular chromosome

Module 7: Evolution

Adaptive Radiation-many related species evolve from a single ancestral species;
Analogous- same function different structure;
Anatomy- the structure of an animal or plant, or of any of its parts;
Biogenesis-states that all living things come from other living things;
Coacervates-collection of droplets that are composed of amino acids and sugars;
Coevolution-the change of two or more species in close association with each other**;**
Convergent Evolution-occurs when the environment selects similar phenotypes, even though the ancestral types were quite different from one another;
Divergent Evolution-two or more related populations or species become more and more dissimiliar;
Endosymbiosis- a mutually beneficial relationship between one organisms and another that lives within it: chloroplasts and mitochondria evolved from endosymbiotic bacteria;

Evolution- change in the gene pool of a population from generation to generation by such processes as mutation, natural selection, and genetic drift;
Diversity- the state or fact of being diverse; difference; unlikeness;
Fossil records- a term used by paleontologists to refer to the total number of fossils that have been discovered, as well as to the information derived from them;
Founder effect-the accumulation of random genetic changes in an isolated population as a result of its proliferation from only a few parent colonizers;
Gene pool- the total genetic information in the gametes of all the individuals in a population; **Genetic drift**- random changes in the frequency of alleles in a gene pool, usually of small populations;
Half Life-the length of time it takes for one half of any size sample of an isotope to decay; **Homologous-** same structure but different function;
Law of Superposition-states that successive layers of rock or soil were deposited on top of one another by wind or water;
Migration- a number or body of persons or animals migrating together;
Natural Selection- the process by which forms of life having traits that better enable them to adapt to specific environmental pressures, as predators, changes in climate, or competition for food or mates, will tend to survive and reproduce in greater numbers than others of their kind, thus ensuring the perpetuation of those favorable traits in succeeding generations;
Physiology- the organic processes or functions in an organism or in any of its parts;
Population- the assemblage of a specific type of organism living in a given area; all the individuals of one species in a given area;
Radioactive Dating-a method used to establish the age of materials;
Species- the major subdivision of a genus or subgenus, regarded as the basic category of biological classification, composed of related individuals that resemble one another, are able to breed among themselves, but are not able to breed with members of another species;
Spontaneous Generation-the thought that living things arise from nonliving things;
Vestigial-features that were useful to an ancestor, but they are not useful to the modern organism

Module 8: Ecology
Abiotic- nonliving factors;
Biosphere- the thin volume of Earth and its atmosphere that supports life;
Biotic- Living components of the environment;
Carrying Capacity- the number of individuals the environment can support over a long period of time;
Commensalism- an interaction in which one species benefits and the other is not affected;
Community- all the interacting organisms living in the area;
Ecosystem- includes all of the organisms and the nonliving environment found in a particular place;
Emigration- the movement of individuals out of a population;
Immigration- the movement of individuals into a population;
Limiting Factors- an environmental factor that tends to limit population size;
Mutualism- a cooperative relationship in which both species derive some benefit;
Population- includes all the members of a species that live in one place at one time;
Population Dynamics- populations change in size and composition over time;
Succession- the gradual sequential regrowth of species in an area;
Topography- the detailed mapping or charting of the features of a relatively small area, district, or locality;
Watershed- the region or area drained by a river, stream, etc.; drainage area;
Wetlands- land that has a wet and spongy soil, as a marsh, swamp, or bog;
Vegetation- all the plants or plant life of a place, taken as a whole