Course Name:	Biology 2		
Credits:	1		
Prerequisites:	Biology 1 and PS or Chem 1		
Description:	This course is a continuation of Biology I. The Organization of Life and the six-kingdom classification system (Taxonomy) will be explored in depth starting with lower life forms and working up to animals. Labs will have an emphasis on identification and dissecting of several species. Lab work and group presentations will be included to develop critical thinking and organizational skills.		
Academic Standards:	Next Generation Science Standards		
Units:	**Length:**	**Unit Standards:**	**Unit Outcomes:**
Organizing Life's Diversity	2 weeks	HS-LS2-5: Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. HS-LS4-6: Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. HS-LS2-6: Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.	Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
Viruses and Bacteria	3 weeks	HS-LS2-3: Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. HS-LS1-4: Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Protists	2 weeks	HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. HS-LS1-5: Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
Fungi	3 weeks	HS-LS1-6: Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
Intro to Animals	2 weeks	HS-LS4-2: Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

Invertebrates	12 weeks	HS-LS2-8 Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. HS-LS1-7 Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. HS-LS1-2 Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. HS-LS3-2 Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. HS-LS4-1 Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. HS-LS4-3 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.	Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. 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.
Vertebrates	9 weeks	HS-LS3-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. HS-LS3-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. HS-LS4-5: Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species.	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
Mammals	3 weeks	HS-LS4-3: 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.	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. 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 Name: **Organizing Life's Diversity**	**Length:** 2 weeks
Standards: HS-LS2-5 HS-LS4-6 HS-LS2-6	**Outcomes:** Develop a model to illustrate the role of photosynthesis and cellular respiration in the cycling of carbon among the biosphere, atmosphere, hydrosphere, and geosphere. Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity. Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.
Essential Questions: What is the difference between classification methods? **Academic Vocabulary:** Part 1- Classification,Taxonomy, Binomial Nomenclature,Genus, Specific Epithet, Family, Order, Class, Phylum, Division, Kingdom Part 2 - Phylogeny, Cladistics, Cladogram, Eubacteria, Protist, Fungus	**Learning Targets:** Evaluate the history, purpose, and methods of taxonomy. Explain the meaning of a scientific name. Describe the organization of taxa in a biological classification system. Describe how evolutionary relationships are determined. Explain how cladistics reveals phylogenetic relationships. Interpret and apply terminology Compare the six kingdoms of organisms.
Topic 1: **Methodology in Classification**	**Length:** 1 week
Lesson Frame: Dichotomous Keys	We will learn to read a dichotomous key.
	I will build a dicot key for leaf samples.
Lesson Frame: Phylogenetic Fans	We will identify all the components phylogeny.
	I will be able to competently read a phylogenetic fan.
Lesson Frame: Cladistics	We will discuss and give examples of class.
	I will be able to associate cladograms to fossil records.
Lesson Frame: Specific Examples for Each Mythology	We will review the 5 influences on evolution.
	I will be able to give specific examples for all the facts of the 5 influences.
Performance Tasks: Using a Dichotomous Key in a Field Investigation Identifying Key Characteristics Base off of The 5 Influences on Evolution. Constructing a Cladogram	Notes:
Topic 2: **Classification System = Taxonomy**	**Length:** 1 week
Lesson Frame: The Six Kingdoms	We will introduce the 6 kingdoms and Phylogeny
	I will be able to identify characteristics and timelines for each Kingdom.
Lesson Frame: Taxonomical Hierarchy	We will define taxonomy.
	I will know the taxonomy of humans and one other organism.
Lesson Frame: Binomial Nomenclature	We will list contributions from scientists that devised BN.

	I will be able to write the genus and species name of several organisms.
Performance Tasks: Identifying Shark Species The History of Taxonomy Who was Carolus Linnaeus	Notes: Latin notes: prefix suffix and root word associations

Unit Name: **Viruses and Bacteria**	**Length:** 2 weeks
Standards: HS-LS2- HS-LS1-4	**Outcomes:** Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions. Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.
Essential Questions: How will students identify the 4 main types of viruses? Will they be able to distinguish between the reproductive cycles of viruses? Why is it important to know how to use classification system specifically for bacteria? How many different ways can bacteria reproduce? Can students determine the usefulness of bacteria and viruses? **Academic Vocabulary:** Part 1 - Virus, Host Cell, Bacteriophage, Capsid, Lytic Cycle, Lysogenic Cycle, Provirus, Retrovirus, Reverse Transcriptase, Prion, Viroid Part 2 - Chemosynthesis, Binary Fission, Conjugation, Obligate Aerobe, Obligate Anaerobe, Endospore, Toxin, Nitrogen Fixation	**Learning Targets:** Identify the different kinds of viruses and their structures. Compare and contrast the replication cycles of viruses. Compare the types of prokaryotes. Explain the characteristics and adaptations of bacteria. Gain in depth understanding of concepts from reading chapter 18. Interpret and apply terminology Evaluate the economic importance of bacteria.
Topic 1: **Virus**	**Length:** 1 week
Lesson Frame: Classification of Viruses	We will determine taxonomy for viruses.
	I will be able to ID viruses by physical characteristics.
Lesson Frame: Reproductive Tactics of Viruses	We will compare and contrast reproductive habits of viruses.
	I will be able tell which is more harmful.
Lesson Frame: Measuring and determining whether viruses and good, bad or neither	We will use micrographs to determine specific viruses and their environments.
	I can tell the difference between good, and bad viruses.
Performance Tasks: Using a Model for Measure Virus Lab Practical	Notes:
Topic 2: **Bacteria**	**Length:** 1 week
Lesson Frame: Different Ways to ID Bacteria	We will determine taxonomy for bacteria.
	I will be able to ID bacteria by their shapes and arrangements.
Lesson Frame: Bacteria Evolution = Fast	We will monitor the growth and development of cultures.
	I will be able to determine the rate of growth.

Lesson Frame: Compare and Contrast reproductive tactics	We will compare and contrast the reproductive tactics of bacteria.
	I will be able to ID them by monitoring growth and species.
Performance Tasks: Bacteria Cartoon Pathology Identification Economic Benefits Making Cultures - Lab Lab Practical = Microscope usage and bacterial measure and shapes	Notes:

Unit Name: **Protists**	**Length:** 2 weeks
Standards: HS-LS1-3: HS-LS1-5	**Outcomes:** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. Use a model to illustrate how photosynthesis transforms light energy into stored chemical energy.
Essential Questions: How will students compare and contrast the 3 different Protists? Will students determine reproductive strategies of each Protist group? Why is it important to key on the diversity of Protists life cycles? **Academic Vocabulary:** Part 1 - Protozoan, Alga, Pseudopodia, Asexual Reproduction, Flagellate, Ciliate, Sporozoan, Spore Part 2 - Thallus, Colony, Fragmentation, Alternation of Generations, Gametophyte, Sporophyte Part 3 - Plasmodium, Malaria	**Learning Targets:** Identify the characteristics of Kingdom Protista. Compare and contrast the four groups of protozoans. Compare and contrast the variety of plant like protists. Explain the process of alternation of generations in algae. Contrast the cellular differences and life cycles of the two types of slime molds. Discuss the economic importance of the downy mildews and water molds. Gain in depth understanding of concepts from reading chapter 18. Interpret and apply terminology.
Topic 1: **Protozoan = Animal-Like**	**Length:** 1 week
Lesson Frame: Pseudopoda (amoeba)	We will determine the taxonomy for protozoans.
	I will be able to list the phyla for protozoans.
Lesson Frame: Ciliates and Flagellates	We will compare and contrast modes of locomotion.
	I will match locomotion to classes of protozoans.
Lesson Frame: Sporozoans (plasmodium and Malaria)	We will review the history of good and bad protozoans
	I will know precautions to limit infection from Protist.
Performance Tasks: Feeding Ciliates and Flagellates Pathology investigation of Protozoans Lab Practical - Picture ID	Notes:
Topic 2: **Algae = Plant-Like**	**Length:** 1 week
Lesson Frame: Chlorophyta Examples/Populations	We will determine the taxonomy for alga.
	I will be able to list the phyla for alga.
Lesson Frame: Diatoms	We will determine the habitats for alga.
	I will be able to match habitat to various algae.
Lesson Frame: Helpful and Harmful Algae	We will introduce the uses for algae.
	I will be able to identify algae usage through research.

Performance Tasks: Microscopic Observations of anatomy, feeding, and reproduction Lab Practical - Picture ID	Notes:
Topic 3: **Slime Molds and Downy Mildews = Fungus-Like**	**Length:** 1 day
Lesson Frame: Phylogenetic Fan Review of Classes	We will review taxonomy and examples for slime molds.
	I will be able to ID each class of SM.
Lesson Frame: Growth Patterns and Strategies = Where do they live?	We will
	I will
Performance Tasks: Lab Practical - Picture ID	Notes:

Unit Name: **Fungi**	**Length: 2** weeks
Standards: HS-LS1-6:	**Outcomes:** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.
Essential Questions: **How will students ID Fungi Specimens?** **Can students determine reproductive and life cycles of fungi classifications?** **Do students know how to utilize microscopes to make measurements and ID anatomy of fungi?** **Are students creative enough to put together a menu consisting fungus dishes matching up with their restaurant theme?** **How will students compare and contrast good vs. bad fungi?** **Academic Vocabulary:** **Part 1 - Hypha, Mycelium, Chitin, Haustoria, Budding, Sporangium** **Part 2 - Stolon, Rhizoid, Zygospore, Gametangium, Ascus, Ascospore, Conidiophore, Conidium, Basidium, Basidiospore, Mycorrhiza, Lichen**	**Learning Targets:** **Identify the basic characteristics of the fungi kingdom.** **Explain the role of fungi as decomposers and how this role affects the flow of both energy and nutrients through food chains.** **Identify the four major phyla of fungi.** **Distinguish among the ways spores are produced in zygomycetes, ascomycetes, and basidiomycetes.** **Summarize the ecological roles of lichens and mycorrhizae.**
Topic 1: **Phylogeny of Fungi**	**Length:** 1 week
Lesson Frame: Saprophytes vs. Parasites vs. Mutualists = Feeding Relationships	We will determine the taxonomy for fungi.
	I will list all fungi feeding relationships with examples.
Lesson Frame: Reproduction and Life Cycles of Fungi	We will monitor the growth patterns of fungi.
	I will learn the best environment to grow fungi.
Lesson Frame: Parts of a Basidiomycete.	We will ID the parts and functions of a mushroom.
	I will label the parts of a mushroom.
Performance Tasks: Growing Mold Microscope Observation of Anatomy (Lichen, Deutero, Basidio, Asco, and Zygomycota) Lab Practical	Notes: Collect local fungi samples.
Topic 2: **Usefulness of Fungi**	**Length:** 2 weeks
Lesson Frame: Economic Impact of Fungi	We will review the historical significance of mushrooms.
	I will make a timeline of fungus facts.
Lesson Frame: Living With Fungi	We will compare and contrast different fungi.
	I will be able to ID which fungi are helpful and harmful

Lesson Frame:	We will create a menu with fungi influenced dishes
	I will make and share one of the dishes from our menu.
Performance Tasks Fungus Among Us = Restaurant Simulation Creating a Menu that includes various fungi	Notes: Fungus in the Food Industry Research

Unit Name: **Intro to Animals**	**Length:** 2 weeks
Standards: HS-LS4-2	**Outcomes:** Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.
Essential Questions: How will students ID stages of animal development? Can students determine reproductive and life cycles? How will students compare and contrast body plans vs. arrangements vs. symmetry? Do students have and opportunity see first hand conception to birth of Deuterostomes and Protostomes? **Academic Vocabulary:** Part 1 - Sessile:, Blastula, Gastrula, Ectoderm, Endoderm, Mesoderm, Protostome, Deuterostome Part 2 - Radial Symmetry, Bilateral Symmetry, Asymmetry, Anterior, Posterior, Dorsal, Ventral, Acoelomate, Pseudocoelomate, Coelom, Exoskeleton, Invertebrate, Endoskeleton, Vertebrate	**Learning Targets:** Identify the characteristics of Animals. Identify cell differentiation of the typical animal cell. Sequence the development of a typical animal cell. Compare and Contrast radial and bilateral symmetry. Trace the phylogeny of animal body plans. Distinguish among the body plans of acoelomate, pseudocoelomate, and coelomate animals.
Topic 1: **Observing Animal Characteristics**	**Length:** 1 week
Lesson Frame: Dermal Layers and Developmental Stages	We will observe the (2) developmental stages in animals.
	I will ID whether an animal embryo looks like parents or not.
Lesson Frame: Reproduction and Life Cycles Animals	We will locate the germ layers in animals.
	I will know what tissues and organs form from the germ layers.
Lesson Frame: View of Animals Inside Out	We will list the early stages of zygote development through characteristics.
	I will observe and sketch the stages from fertilization through zygote.
Performance Tasks: Observing Vinegar Eels Compare and Contrast Protostome and Deuterostome Building Kahoots	Notes:
Topic 2: **Cells to Tissue to Organs to Organ Systems**	**Length:** 1 week
Lesson Frame: Symmetry/Body Arrangement	We will list the possible body symmetries and arrangements.
	I will learn the difference between symmetry and arrangement.
Lesson Frame: Body Plans/Coelomate vs. Acoelomate vs.	We will introduce body plans in accordance to body cavities.

Pseudocoelomate	I will be able to distinguish between, acoelomate, pseudocoelomate and coelomate.
Lesson Frame: Body Locations/Directional Terms	We will learn the correlations for corresponding body locations.
	I will be able to locate and label all body location and direction terms on an organism.
Performance Tasks Levels of Organization Investigation Internal Protection vs. External Protection Bio Lab Lab Practical	Notes:

Unit Name: **Animal Invertebrates**	**Length:** 12 weeks
Standards: HS-LS2-8 HS-LS1-7 HS-LS1-2 HS-LS3-2 HS-LS4-1 HS-LS4-3	**Outcomes:** Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. Evaluate the evidence for the role of group behavior on individual and species' chances to survive and reproduce. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. Communicate scientific information that common ancestry and biological evolution are supported by multiple lines of empirical evidence. Develop a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. 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.

Essential Questions: Can students determine reproductive and life cycles? How will students compare and contrast body plans vs. arrangements vs. symmetry? How will students understand how digestive systems work? Do roundworms have an impact on world health? Do annelids have an economic/environmental/medical impacts? Do mollusks have an economic impact on the restaurant and jewelry industry? How will students compare and contrast the 3 main characteristics of arthropods? Can students determine reproductive and life cycles? How will students understand how the exoskeleton works? Do insects have an economic impact on society both positive and negative? How will students compare and contrast the classes of echinoderms? What kind of heterotrophs would we classify echinoderms as? How will students understand how the water vascular system works? **Academic Vocabulary:** Filter Feeding, Hermaphrodite, External Fertilization, Internal Fertilization, Regeneration, Pharynx, Scolex, Proglottid, Acoelomate, Trichinosis, Pseudocoelomate, Setae, Crop, Gizzard, Nephridia, Pharynx, Closed Circulatory System, Coelom, Mantle, Radula, Siphon, Open Circulatory System, Pericardium, Umbo, Gonad, Appendage, Molting, Cephalothorax, Tracheal Tube, Spiracle, Book Lung, Pheromone, Simple Eye, Compound Eye, Mandible, Malpighian Tubule, Parthenogenesis, Chelicerae, Pedipalp, Spinneret, Metamorphosis, Larva, Pupa, Nymph, Ray, Pedicellaria, Water Vascular System, Madreporite, Tube Foot, Ampulla, Asteroidea, Ophiuroidea, Echinoidea, Crinoidea, Holothuroidea, Concentricycloidea	**Learning Targets:** Identify the characteristics of sponges. Relate the sessile life of sponges to their food gathering adaptations. Describe reproductive adaptations in sponges. Understand phylogeny of Porifera. Analyze the relationships among the classes of cnidarians. Sequence the stages in the life cycle of a Cnidarian. Evaluate the adaptations of cnidarians for obtaining food. Distinguish between the structural adaptations of parasitic flatworms and free living planarians. Explain how parasitic flatworms are adapted to their way of life. Understand phylogeny of Platyhelminthes. Compare and Contrast the structural adaptations of roundworms and flatworms. Distinguish between the structural adaptations of parasitic roundworms. Identify the characteristics of four roundworm parasites. Identify the characteristics of segmented worms. Compare the Adaptations of the different classes of Annelida. Describe reproductive adaptations in Segmented Worms. Describe the characteristics of segmented worms and their importance to the survival of these organisms. Evaluate the adaptations of for obtaining food. Compare and Contrast the Classes of segmented worms. Become Familiar with ALL Taxonomic Classes for Annelida. Relate the structural and behavioral adaptations of arthropods to their ability to live in different habitats. Analyze the adaptations that make arthropods a successful evolutionary phylum. Compare and contrast the similarities and differences among the major Classes and Orders of arthropods. Explain the adaptations of insects that contribute to their success. Evaluate the adaptations of for obtaining food. Compare and contrast the similarities and differences among the major classes of Echinoderms. Interpret data suggesting that echinoderms are close relatives of chordates. Gain an in depth understanding of Anatomy and Physiology for a Starfish. Know all taxonomy for Echinodermata. Evaluate the adaptations of for obtaining food.
Topic 1: **Sponges**	**Length:** 1 week
Lesson Frame: Features of Sponges	We will determine the taxonomy for porifera.
	I will know the classifications for sponges.
Lesson Frame: Types of Sponges (body typeID)	We will observe the various body types of sponges.
	I will know all of the functional parts, inside and out..micro and macro, of porifera.
Lesson Frame: Filter Feeding vs. Reproduction	We will compare the filter feeding process to reproduction.
	I will label the life cycle of a sponge and list the important anatomy involved.
Performance Tasks: Porifera Specimens Lab Observing Spicules - Microscope Lab	Notes:

Topic 2: **Cnidarians**	**Length:** 1 week
Lesson Frame: Classes of Cnidarians (Hydrozoa, Scyphozoa, Anthozoa, Cubozoa)	We will determine taxonomy for cnidarians.
	I will be able to ID the classes of cnidarians from physical traits.
Lesson Frame: What features makes each class unique?	We will observe the structures and functions that make cnidarians unique.
	I will be to locate and label body parts of a Hydra.
Lesson Frame: Feeding Strategies	We will observe feeding habits of various cnidarians.
	I will be able to explain special anatomy and function of a nematocyst.
Performance Tasks: Microscopic observations of nematocysts Lullaby Parody and Mobile of a Cnidarian	Notes:
Topic 3: **Flatworms**	**Length:** 1 week
Lesson Frame: What is a planarian?	We will identify characteristics of NP flatworms.
	I will be able to name species and habitats.
Lesson Frame: Feeding and Habitat	We will investigate correlations to environment and taxonomy.
	I will be able to name species and habitats.
Lesson Frame: Tapeworms feeding, reproduction and habitat	We will identify characteristics of parasitic flatworms.
	I will be able to name species by physical characteristics.
Lesson Frame: Flukes feeding, reproduction and habitat	We will investigate correlations to environment and taxonomy.
	I will be able to name species and habitats.
Performance Tasks: Labeling Diagrams Life Cycle of Turbellarians Lab Practical Extreme Conditions ID Anatomy/Physiology of Tapeworms Lab PRactical	Notes: Parasitic Worm Treatments Acoelomate Body Plan Review
Topic 4: **Nematoda Phylogeny**	**Length:** 1 week
Lesson Frame: ID species of roundworms	We will investigate various species of roundworms.
	I will be able to identify 4 examples of roundworms.
Lesson Frame: Matching habitat, reproductive strategies and feeding to Nematodes	We will determine survival tactics of roundworms with habitat.
	I will match roundworm to habitat and/or survival tactic.
Lesson Frame: Erratication of parasites	We will study the timeline of the Guinea Worm.
	I will know who was responsible for the erratication of the Guinea Worm took place.
Performance Tasks: Diagram Labeling Ascaris Dissection Lab Practical	Notes: What is the CDC?

Topic 5: Oligochaeta - Earthworm	**Length:** 2 weeks
Lesson Frame: Habitat - Reproduction - Feeding	We will learn the rules and procedure for lab dissections.
	I will perform the dissection on an earthworm.
Lesson Frame: Anatomy and Physiology - Body Systems and Function	We will emphasize anatomy and function for body systems.
	I will differentiate the parts of digestion, reproduction, circulatory systems.
Lesson Frame: ID other classes of Annelids and usefulness (Hirudinea/Polychaeta)	We will determine the taxonomy for annelids.
	I know examples and habitats for hirudinea and polychaeta.
Performance Tasks: Earthworm Dissection Lab Practical	Notes: Economic Impact Medicinal Uses
Topic 6: **Mollusks**	**Length:** 1 week
Lesson Frame: ID anatomy and physiology of squid - locomotion/protection/feeding	We will determine the taxonomy of mollusca.
	I will be able to ID each class of mollusk and give examples.
Lesson Frame: Helpful/Harmful Gastropods and Bivalvia	We will follow the protocols for dissections
	I will correctly and safely dissect a bivalve.
Lesson Frame: ID anatomy and physiology of bivalvia - feeding/reproduction	We will ID all Internal and external characteristics of bivalves.
	I will be able to match anatomical features with their respective functions.
Performance Tasks: Labeling Diagrams Clam Dissection Snail Dissection	Notes: Gastropod ID via video
Topic 7: Characteristics of Arthropods	**Length:** 2 weeks
Lesson Frame: Anatomy for Locomotion and Breathing	We will determine the breakdown for Arthropod classifications.
	I will be able to read the phylogenetic fan for arthropoda.
Lesson Frame: Anatomy for Feeding	We will ID the internal and external features of crustaceans
	I will correctly and safely dissect and match features to function of crayfish.
Lesson Frame: Anatomy for Reproduction	We will compare and contrast habitat for classes of Arthropods.
	I will know the methodology and timeline for matching Arthro to Enviro.
Performance Tasks: Crustacean External Anatomy - Lab Crayfish Dissection Grasshopper Dissection Lab Practical	Notes:
Topic 8: **Diversity of Arthropods**	**Length:** 2 weeks
Lesson Frame: Arthropod Classes	We will locate reproductive organs and strategies for arthropods.
	I will ID the various reproductive organs and tactics for Arthropods.

Lesson Frame: Life Cycles = Metamorphosis	We will determine the classification orders for insects.
	I will match the 11 insect orders to examples within.
Lesson Frame: Insect Orders	We will ID the internal and external structures of orthoptera (grasshopper).
	I will correctly and safely dissect and match features to function in the grasshopper.
Performance Tasks: Phylogeny of Arthropoda Arthropod Poetry Life in the Undergrowth - BBC Series	Notes: Life in the Undergrowth (BBC Documentary)
Topic 1: Taxonomy of Echinoderms	**Length:** 1 week
Lesson Frame: Unique Characteristic for each Class of Echinoderm	We will determine the taxonomy of echinoderms.
	I will match classes to examples via external characteristics.
Lesson Frame: Feeding and Reproduction Strategies	We will ID feeding strategies for classes of echinoderms.
	I will list and match feeding and reproduction tactics to classes.
Lesson Frame: Pedicellariae and Locomotion	We will ID external and internal features for echinoderms.
	I will correctly and safely dissect the sea star labeling and functioning anatomy for locomotion, feeding, reproduction and support/structure.
Performance Tasks: Observing Pedicellariae - mini-Lab Sea Star Dissection Lab Practical - Picture ID and Anatomy/Physiology	Notes:
Topic 1: **Chordates**	**Length:** 2 days
Lesson Frame: The Lancet	We will determine the taxonomy for IC.
	I will be able to ID classifications of IC.
Lesson Frame: The Tunicate	We will observe various organs related to chordates.
	I will be able to ID anatomy and physiology of tunicates and lancelets.
Lesson Frame: Features of the Invert Chordate	We will compare and contrast habitat for Urochordata and Invert. Chordates.
	I will make a smooth transition from invertebrates to vertebrate after this chapter.
Performance Tasks: Observing Lancelets - Lab Lab Practical	Notes: Transition Organisms research

Unit Name: Vertebrate Animals	**Length**: 9 weeks
Standards: HS-LS3-1 HS-LS3-3 HS-LS4-5	**Outcomes:** Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species. Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
Essential Questions: What are the 4 main classifications of fish? Will they be able to distinguish parts of the reproductive cycles? Why is it important to know how to use classification system specifically for fish? How many different ways can fish reproduce? What are the positive and negatives for various fish populations? What is our transition organism between fish and amphibians? How will students identify the classifications of amphibians? Will they be able to distinguish between stages of metamorphosis? Why is it important to know how to use classification system specifically for amphibians? How many different ways can amphibians communicate? What is the most important positive outcome for studying amphibian populations? What is our transition organism between amphibian and reptile? Why is it important to know how to use classification system specifically for reptiles? How many different environments can we find reptiles? What is the most important positive outcome for studying reptilian migration and hibernation? What is our transition organism between reptile and birds? What are the parts of the developing chick? Why is it important to know how to use classification and orders for birds? How many continents can we find birds? What are the outcomes for studying migration? What is our transition organism between birds and mammals? **Academic Vocabulary:** Spawning , Fins, Lateral Line, Swim Bladder, Cloaca, Ectotherm, Vocal Cord, Vomerine Teeth, Tympanic Membrane, Nictitating Membrane, Glottis, Metamorphosis, Phenology, Amniotic Egg, Shell, Plasma Membrane, Albumen, Chorion, Amnion, Yolk Sac, Embryo, Allantois, Hibernation, Migration, Ectotherm, Jacob's Organ, Feather, Sternum, Air Sacs, Preening, Endotherm, Incubate	**Learning Targets:** Compare and Contrast similarities and differences between classes of fish. Relate structural Adaptations of fish to their environments. Interpret the phylogeny of fish. Know and understand all body systems and the accompanying organs for fish. Relate the demands of terrestrial life to the adaptations of amphibians. Relate the evolution of the 3 chambered heart to amphibian lifestyle. Compare and contrast the characteristics of the different groups of amphibians. Relate the structural adaptations of the amniotic egg to various environments on land. Explain how Reptile adaptations make them suited for life on land. Identify all anatomical structures and physiological adaptations Reptile possess. Relate reptile adaptations to their ability to live in most environments. Interpret the phylogeny and taxonomy of reptiles. Relate the structural adaptations of the amniotic egg to various environments on land. Explain how bird adaptations make them suited for life on land. Identify all anatomical structures and physiological adaptations birds possess. Relate bird adaptations to their ability to fly. Interpret the phylogeny and taxonomy of birds.
Topic 1: **Characteristics of Fish**	**Length:** 1 week

Lesson Frame: Fin Location and Function	We will observe movement in fish.
	I will be able to match movement direction to fins.
Lesson Frame: External Organs and Function	We will determine the taxonomy for fish.
	I will be able to match classes to major features.
Lesson Frame: Internal Organs and Function	We will dissect a perch (osteichthyes)
	I will know what the external organs and internal organs jobs are.
Performance Tasks: Perch Dissection Gill Dissection - Microscope Scale Diversity	Notes:
Topic 2: **Diversity of Fish**	**Length:** 1 week
Lesson Frame: Fish Family Tree	We will ID what physical features for survival that determine classification in fish.
	I will compare and contrast survival evolution in fish classes.
Lesson Frame: Agnatha vs. Gnathostomata vs. Myxini vs. Cephalaspidomorphi	We will observe a timeline for historical facts about each class of fish.
	I will list important dates (time) for turning points in the evolution of fish.
Lesson Frame: Unique Strategies in Reproduction	We will dissect the shark.
	I will be able to ID and match specialized organs in chondrichthyes.
Performance Tasks: Shark Dissection Lab Practical/Specialized Organs	Notes: Research Tonic Immobility Sketch findings in Shark Dissection.
Topic 3: **Diversity in Amphibians**	**Length:** 1 week
Lesson Frame: Amphibian Phylogeny	We will determine the taxonomy for amphibians.
	I will list and match examples to taxonomy.
Lesson Frame: Habitat and Feeding	We will ID survival strategies for amphibians.
	I will know the specific organs that have allowed amphibians to evolve.
Lesson Frame: Mapping Chordates	We will review the phylogenetic fan for chordates.
	I will know which amphibians are related due in part to their environment.
Performance Tasks: Wisconsin Amphibian Survey Frog Phenology	Notes: Procedures and protocols for nationwide amphibian species to population survey.
Topic 4: **Amphibian Features**	**Length:** 1 week
Lesson Frame: External Characteristics	We will dissect the frog.
	I will correctly and safely ID both external and internal characteristics.
Lesson Frame: Internal Organs and Function	We will function the specialized organs for frogs.

	I will locate the tympanic and nictitating membranes, vocal chords, heart and lungs
Performance Tasks: Frog Dissection Lab Practical	Notes: Research metamorphosis of amphibs.
Topic 5: **Reptile Characteristics**	**Length:** 1 week
Lesson Frame: External Anatomy and Function	We will determine the taxonomy for reptiles.
	I will list and match the sub-orders/orders and families of reptiles.
Lesson Frame: Internal Anatomy and Function	We will dissect a turtle.
	I will correctly and safely locate the external and internal organs of a turtle.
Lesson Frame: Specialized Organs Among the Classes of Reptiles	We will identify specialized organs that make each order of reptile unique.
	I will list, locate and match specialized organs to snakes, lizards and turtles.
Performance Tasks: Turtle Dissection Virtual Dissections (snake, alligator, leatherback)	Notes:
Topic 6: **Taxonomy of Reptiles**	**Length:** 1 week
Lesson Frame: Reptile Orders, Sub-Orders and Families Review	We will research the classification of reptiles.
	I will create a visual project (Prezi) based on the reptile taxonomy, habitat, feeding habits, specialized organs and reproductive strategies.
Performance Tasks: Reptile PRezi Presentation Lab Practical	**Notes:**
Topic 7: **Characteristics of Birds**	**Length:** 2 weeks
Lesson Frame: Anatomy of a Feather	We will observe the anatomy of a feather.
	I will know the microanatomy of the different types of feathers.
Lesson Frame: Adaptations for Flight	We will analyze the principles of flight.
	I will list all of the adaptation birds possess for flight.
Lesson Frame: Rituals: Feeding, reproduction and survival strategies	We will observe special circumstances that make bird reproduction, feeding and survival strategies unique.
	I will choose a unique ritual of birds and create a cartoon.
Performance Tasks: Feather ID - Lab Feather Micro-Anatomy Lab Chicken Wing Dissection Pigeon Dissection Duck Breast Dissection	Notes: Fly tying demo from Dave Ehrenberg, President of Trouts Unlimited Tomorrow River Chpt

Topic 8: **Bird Taxonomy - Aves**	**Length:** 1 week
Lesson Frame: Orders of Aves	We will determine the taxonomy for aves.
	I will know all of the bird orders.
Lesson Frame: Darwin's Finches	We will review the study and timeline for Charles Darwin's finches.
	I will list the benchmark dates for evolutionary influences on finches.
Lesson Frame: Divergent Evolution	We will observe specific species of birds and whether they follow the two types of e
	I will be able to compare and contrast divergent vs. convergent evolution.
Performance Tasks: Create Kahoots or Pear Deck Study Guide for Aves Orders Egg Incubation - 28 days to full term "Chick in a Cup" - Lab Lab Practical	Notes:

Unit Name: **Mammals**	**Length**: 3 weeks
Standards: HS-LS4-3 HS-LS3-3	**Outcomes:** Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. 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.
Essential Questions: How will students identify mammal taxonomy? What is the difference between herbivore and carnivore chewing anatomy? Why is it important to know how to use classification and orders for mammals? How many continents can we find mammals? What are the outcomes for studying migration and hibernation? **Academic Vocabulary:** Part 1 - Exocrine Gland, Endocrine Gland, Mammary Gland, Diaphragm Part 2 - Uterus, Placenta, Gestation	**Learning Targets:** Distinguish Mammalian Characteristics Explain how the characteristics of mammals enable them to adapt to most habitats. Distinguish among the 3 main Sub Classes of mammals. (Monotreme, Marsupial, and Placental) Relate the structural adaptations of mammals to their environments. Compare and Contrast reproduction in marsupial, placental, and monotreme. Identify all anatomical structures and physiological adaptations mammals possess. Interpret the phylogeny and taxonomy of mammals.
Topic 1: **Characteristics of Mammals**	**Length:** 2 weeks
Lesson Frame: Digestive Traits	We will ID the traits that make mammals...mammals.
	I will list the traits of all mammals.
Lesson Frame: Cardiovascular Traits	We will dissect a mammal.
	I will correctly and safely locate fand "landmark" the traits for mammals
Lesson Frame: Uro-Genital Traits	We will explore the vital organs of the fetal pig or rat.
	I will ID the organs with functions for all the body systems.
Performance Tasks: Pig or Rat Dissection 4 Chambered Heart Dissection- route of blood flow Chewing Mechanics Anatomy of a Tooth	Notes:
Topic 2: **Mammal Taxonomy**	**Length:** 1 week
Lesson Frame: Phylogenetic Fan for Mammals	We will determine the taxonomy for mammals.
	I will match examples and orders of mammals.
Lesson Frame: Compare and Contrast Mammal Locomotion	We will correlate the classification of mammals to their means of locomotion.
	I will compare and contrast the various ways mammals move around.
Lesson Frame: Reproductive Strategies in Mammals (3)	We will study the unique ways by which mammals reproduce and rear their young.

	I will list and match specific mammals to their reproductive strategies.
Performance Tasks: Lab Practical including picture ID for Orders Unique mammal behaviors - research project	Notes: Planet Earth Series

September	October	November	December	January	February	March	April	May	June	
Unit 1	Unit 3	Unit 5	Unit 6c	Unit 6e	Unit 6g	Unit 7	Unit 8c	Unit 8e		
Unit 2	Unit 4	Unit 6a	Unit 6d	Unit 6f	Unit 6h	Unit 8a	Unit 8d	Children's Book Project - Collaborate with 5K		
		Unit 6b				Unit 8b				