

COURSE: 15-1 The Living Environment
GRADE LEVEL: 9

| MAIN/GENERAL TOPIC: | SUB-TOPIC: | ESSENTIAL QUESTIONS: | WHAT THE STUDENTS WILL KNOW OR BE ABLE TO DO: | SKILLS | WHEN STUDENT DOES IT: | ASSESSMENTS: |
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| WHAT IS SCIENCE? | | <ul style="list-style-type: none"> • What is science? • How are scientific observations made? • What are some of the instruments scientists use in their work? | <ul style="list-style-type: none"> • Make scientific observations • Become familiar with scientific lab equipment | <ul style="list-style-type: none"> • Recognize and know the uses of scientific lab equipment | September | <ul style="list-style-type: none"> • Scientific Equipment Observation Lab • Materials of Science Lab |
| SCIENTIFIC INQUIRY | | <ul style="list-style-type: none"> • What are the essential steps of a scientific investigation? • What is meant by a controlled experiment? | <ul style="list-style-type: none"> • Know the steps of a scientific investigation • Understand what is meant by a controlled experiment • Define the terms hypothesis, theory, and scientific law | <ul style="list-style-type: none"> • Understand and be able to design experiments | September | <ul style="list-style-type: none"> • Scientific Inquiry Lab • Scientific Inquiry • Quiz |
| EVOLUTION | | <ul style="list-style-type: none"> • How is the survival of a species through the generations linked to its ability to adapt to a changing environment? • What happens to species that do not adapt to a changing environment? • How are similarities in structure and biochemistry of species evidence of evolution? • What are the six main points of Darwin's Theory of Evolution? | <ul style="list-style-type: none"> • Understand Charles Darwin's Theory of Evolution • Be able to compare Darwin's theory to those of modern evolution | <ul style="list-style-type: none"> • Create evolutionary charts | September/ October | <ul style="list-style-type: none"> • Comparative Anatomy Lab • Evolution Packet • Peanut Variation Lab • Question Sheet • Evolution Quiz #1 • Bird Beak Adaptations • Compare Skulls Lab • Evolution Quiz #2 |

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| TAXONOMY | | <ul style="list-style-type: none"> Despite many differences, how can organisms be grouped according to common traits? | <ul style="list-style-type: none"> Explain the function of classification systems Explain how the theory of evolution has affected taxonomy | <ul style="list-style-type: none"> Use a dichotomous key | November | <ul style="list-style-type: none"> Salamander Classification Lab |
| ORGANIC CHEMISTRY | | <ul style="list-style-type: none"> How do chemicals in living things play essential roles in the processes of life? | <ul style="list-style-type: none"> Understand organic and inorganic compounds Identify the four major types of organic compounds found in living things Know how micro molecules make up macromolecules | <ul style="list-style-type: none"> Perform lab experiments to recognize organic chemicals | November | <ul style="list-style-type: none"> Molecular Models Lab The Food Lab |
| ENZYMES | | <ul style="list-style-type: none"> What are the functions of enzymes in living cells? | <ul style="list-style-type: none"> Describe the lock-and-key model of enzyme action Explain the effects of temperature, pH, and enzyme-substrate concentration | <ul style="list-style-type: none"> Create graphs and data tables | November | <ul style="list-style-type: none"> The Catalase Lab Enzyme Graphing Lab Lactase Lab |
| CELLS | Microscope | <ul style="list-style-type: none"> Why is the microscope so important to scientists? | <ul style="list-style-type: none"> Understand how compound and stereo microscopes work | <ul style="list-style-type: none"> Focus microscopes and measure specimens under both kinds of scopes | December | <ul style="list-style-type: none"> Microscope Lab |
| CELLS | | <ul style="list-style-type: none"> What are the basic features of a cell? What are the different levels of organization in organisms? | <ul style="list-style-type: none"> Understand that cells are the smallest unit of life Know that cells make up tissue Explain the levels of organization: cells-tissues-organs-organ systems-organism | <ul style="list-style-type: none"> Draw and label plant and animal cells Identify structures and understand functions | December | <ul style="list-style-type: none"> Cells and Scopes Packet |
| TRANSPORT | | <ul style="list-style-type: none"> How is the internal environment of a cell able to remain relatively constant at all times? | <ul style="list-style-type: none"> Understand how cells maintain homeostasis with the environment and other cells Distinguish the difference between active and passive transport | <ul style="list-style-type: none"> Define diffusion and osmosis Draw cells in distilled water and salt water | December | <ul style="list-style-type: none"> The Diffusion Lab Transport Packet Cells and Transport Quiz NYS Lab: Diffusion and Osmosis |

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| ENERGY | | <ul style="list-style-type: none"> • How do all living things – animals, plants, and single cells obtain the energy they need to live? | <ul style="list-style-type: none"> • Understand how energy for life is created from the chemical energy in food • Describe the role of ATP in energy transfer | <ul style="list-style-type: none"> • Diagram photosynthesis and cellular respiration | January | <ul style="list-style-type: none"> • Energy Transfer • ATP Construction Lab |
| DISEASE | | <ul style="list-style-type: none"> • What are the lines of defense in the human body against disease causing organisms? | <ul style="list-style-type: none"> • Explain how diseases disrupt homeostasis • Understand how the immune system fights viruses, microorganisms, and pathogens | <ul style="list-style-type: none"> • Distinguish characteristics among the various pathogens | February | <ul style="list-style-type: none"> • Immune Response Lab |
| DNA | | <ul style="list-style-type: none"> • How does the DNA genetic code determine the traits of all living things? • How does DNA control the mechanism for passing on traits to new generations? • What roles do DNA and RNA play in making proteins? | <ul style="list-style-type: none"> • Understand why DNA is referred to as a “blueprint” or “code of life” • Know that genes are located on chromosomes • Know that humans have 46 chromosomes, 23 from each parent • Understand dominant/recessive genes | <ul style="list-style-type: none"> • Match DNA bases together • Match DNA with RNA | February/ March | <ul style="list-style-type: none"> • DNA Structure Lab • DNA Electrophoresis Lab • DNA Fingerprint • DNA Packet • Protein Synthesis Introduction |
| GENETICS | | <ul style="list-style-type: none"> • Why do family members often look alike? • How are traits passed from parents to offspring? | <ul style="list-style-type: none"> • Differentiate between gene presence and gene expression | <ul style="list-style-type: none"> • Determine the results of genetic crosses | March | <ul style="list-style-type: none"> • Dragon Lab • Design a Face Lab • Bug Karyotype lab • Genetics Quiz |
| GENETIC ENGINEERING | | <ul style="list-style-type: none"> • How can scientists alter the DNA of some organisms, controlling the way they function? • How can plant and animal breeders improve their crops and animals? • What are some ways genetic engineering can be used to benefit people? | <ul style="list-style-type: none"> • Understand that humans and nature can manipulate genes • Describe selective breeding • Explain different ways that humans are using genetic engineering in treating disorders | <ul style="list-style-type: none"> • Genetically engineer live <i>E. coli</i> bacteria | March | <ul style="list-style-type: none"> • Genetic Engineering Packet • Bacteria Glow Lab |

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| REPRODUCTION | | <ul style="list-style-type: none"> • What are the different kinds of reproduction? • How do cells reproduce in preparation for reproduction? • What are the body systems and processes involved in human reproduction? | <ul style="list-style-type: none"> • Compare and contrast asexual and sexual reproduction • Compare and contrast mitosis and meiosis • Understand human reproduction and development | <ul style="list-style-type: none"> • Calculate chromosome number in cells • Label and know reproduction diagrams | March | <ul style="list-style-type: none"> • Mitosis Onion Root Tip Lab • Cellular Division Packet • Starfish Development Lab • Cellular Division • Fetal Growth Lab • Cleavage of Zygote • Cellular Division Packet • Sparky Reproduction Story |
| HUMAN BODY | | <ul style="list-style-type: none"> • What are the systems of the human body? • How do the systems of the human body work together to keep the body alive? | <ul style="list-style-type: none"> • Know all the human body systems and how they interact | <ul style="list-style-type: none"> • Label human body systems • Measure pulse • Measure muscle fatigue • Prepare a report on a body system | March/April | <ul style="list-style-type: none"> • Human Body Review • Lung Capacity Lab • Reproduction Quiz • Pig Dissection • NYS Lab: Making Connections |
| ECOLOGY | Interactions among organisms | <ul style="list-style-type: none"> • What are the jobs that need to be filled in an ecosystem? • What factors make an ecosystem stable? • What are the types of symbiotic relationships? | <ul style="list-style-type: none"> • Description of ecosystems • Trophic organization of ecosystems • Biotic roles in ecosystems • Stability of ecosystems | <ul style="list-style-type: none"> • Be able to recognize the various niches organisms belong to • Discuss the characteristics of each biome • Understand the pathways of the oxygen/carbon, water and nitrogen cycles | April | <ul style="list-style-type: none"> • "Hoo Eats Who?" lab • Pt Go Home • Biome Real Estate advertisement |

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| ECOLOGY | Limiting Factors | <ul style="list-style-type: none"> • Why are there more individuals of plants than predators? • How come deer do not over populate where they live? | <ul style="list-style-type: none"> • Energy flows through an ecosystem • Atoms and molecules cycle among the living and nonliving factors of an ecosystem • Energy passes through food webs as demonstrated by food pyramids • Carrying capacity is limited by the amount of resources and the amount of nutrient recycling • Organisms compete for resources • Growth and survival depend on physical conditions • Competition limits population size • Relationships between organisms can be competitive or beneficial | <ul style="list-style-type: none"> • Recognize a limiting factor in an ecosystem • Be able to interpret an energy pyramid • Prepare a report on a habitat | May | <ul style="list-style-type: none"> • Owl Pellet Lab • Eagle Lab • Energy through an ecosystem quiz • Kaibab Lab |
| | Succession | <ul style="list-style-type: none"> • What will happen to the front yard of the school if they stopped mowing the lawn? | <ul style="list-style-type: none"> • The interrelationships of organisms affect ecosystem stability • Organisms may alter the environment • Altered ecosystems may reach stability over time • Secondary succession restores ecosystems | <ul style="list-style-type: none"> • Predict which community will replace the current community and why this occurs | May | <ul style="list-style-type: none"> • Succession Quiz |
| | Species Preservation | <ul style="list-style-type: none"> • What is biodiversity? • Why is biodiversity important to an ecosystem? | <ul style="list-style-type: none"> • Biodiversity results from evolution and increases the stability of ecosystems • Biodiversity provides for future agricultural and medical discoveries • Biodiversity ensure survival of life in changing environments | <ul style="list-style-type: none"> • Use the internet to learn about endangered species | May | <ul style="list-style-type: none"> • Endangered species report |
| ENVIRONMENTAL ISSUES | Human Impact | <ul style="list-style-type: none"> • How has Humans impacted the environment? | <ul style="list-style-type: none"> • Humans are stressing the earth's finite resources • Ecosystems provide an array of basic processes that affect | <ul style="list-style-type: none"> • Debate the pros and cons of various environmental | June | <ul style="list-style-type: none"> • NYS Required lab: Relationships and Diversity of |

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| | | | <p>humans</p> <ul style="list-style-type: none"> Human activities can alter the equilibrium in ecosystems | issues | | living organisms |
| | Technological Development | <ul style="list-style-type: none"> What is extinction? How does extinction change an ecosystem? | <ul style="list-style-type: none"> Human degradation of ecosystems results in a loss of diversity Serious consequences may result from altered ecosystems Demand for additional energy may impact ecosystems negatively Many factors influence environmental quality | <ul style="list-style-type: none"> Recognize how energy flow pyramid is disrupted in the presence of Humans | June | <ul style="list-style-type: none"> Unit test |
| | Moral and Ethics | <ul style="list-style-type: none"> Do we have a responsibility to fix any environmental problems we created? | <ul style="list-style-type: none"> By applying ecological principles we may preserve the planet Individuals must assess environmental impact of new technologies | <ul style="list-style-type: none"> | June | <ul style="list-style-type: none"> Propose and present a method society may adopt to fix an environmental problem |