Science Curriculum – Life Science

Kindergarten

Overall Essential Skill – Students will use their 5 senses to observe and describe characteristics and changes in non-living and living objects in the world around them

- Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. Students will observe and describe with their five senses
- Scientific Technology & Tools- magnifying glasses, simple scales, safety goggles and measuring tools
- Content Topics – Using the appropriate tools, technology, and techniques, students will observe the characteristics and changes in living and non-living objects in the world around them
- Science Safety- - Students will follow safety instructions, directions, and use appropriate safety equipment.

Content – Science at the Kindergarten level is at the free-exploration level. Students will use their 5 senses to observe and describe the characteristics and changes in living and non-living objects in the world around them

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Students will be exposed to:

- Living things, both plants and animals
- The physical environment, such as rocks, minerals, soil, day and night, puddles, daily weather, musical instruments and water play

Grade One – Life Cycles of Insects

Essential Skills

- Content Skills- Students will demonstrate an understanding that cycles are a repeating pattern in living and non-living objects. Students will demonstrate an understanding that properties distinguish one object from another.
- Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. – Students will use standard/non-standard measurement scales and units and to observe and describe, predict, sort, categorize and record
- Scientific Technology & Tools – Students will use appropriate tools, technology, and techniques to gather, analyze, interpret, and share data. (Thermometers, rulers (inch & cm), rain gauges (cm units), magnifying glasses, simple microscopes, balances, computers and safety goggles)
- Science Safety- Students will follow safety instructions, directions, and use appropriate safety equipment.

Content

- Students will explain in their own words, with or without visuals, the life cycle of an insect
- Students will draw and label, or build models and label the basic anatomy of an insect
- Students will explain in their own words, with or without visuals, the basic functions

of insects in the world

Grade Two – Life Cycles of Plants

Essential Skills

- Content Skills- Students will demonstrate an understanding that the Earth gets heat and light from the sun and has air, soil and water to sustain life. Students will understand that proper soil conditions are essential for plant growth and survival. Students will understand that plants have life cycles and plant growth is affected by many different variables. Students will expand their understanding of solids, liquids, and gases and how they change.
- Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. Students will use appropriate measurement units, observe, describe, predict, sort, record, categorize
- Scientific Technology & Tools - Students will use appropriate tools, models, technology, and techniques to gather, analyze, interpret, and share data. (Rulers, magnifying glasses, compare old and new technology, computers and safety goggles)
- Science Safety- - Students will follow safety instructions, directions, and use appropriate safety equipment.

Content

- Students will collect, sort, and classify a variety of seeds and explore various seed dispersal adaptations
- Students will identify and explain the major parts of plants and their functions
- Students will identify and describe the basic requirements for sustaining plant life
- Students will conduct experiments which illustrate how the environment affects the viability of plants
- Students will explain ways that plants are essential for human and animal survival

Grade Three –Vertebrate Study

Essential Skills

- Content Skills- Students will demonstrate an understanding of the characteristics of vertebrates and their adaptations for survival in various environments. Students will understand the basic characteristics of sound. Students will understand the different properties of rocks and minerals; and how those properties determine their use.
- Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. Students will use appropriate measurement units, observe, describe, read and create graphs/tables to construct explanations, predict, sort, categorize, record, develop scales, introduce and conduct an experiment isolating one variable
- Scientific Technology & Tools – Students will use appropriate tools, technology, and techniques to gather, analyze, interpret, and share data. (computers, rulers, magnifying glasses, microscopes, balance scales, prisms, and safety goggles)
- Science Safety- - Students will follow safety instructions, directions, and use appropriate safety equipment.

Content

• Students will list the requirements that all vertebrates have to sustain life (food, water, air and shelter)
• Students will explain the physical characteristics of vertebrates
• Students will be able to list and give examples of five families of vertebrates(fish, reptiles, amphibians, mammals, and birds)
• Students will explain in their own words with or without visuals the difference between vertebrates and invertebrates
• Identify various adaptations and how they affect animal survival

Grade Four – Habitats in NH Ecosystems

Essential Skills
• Content Skills - Students will demonstrate an understanding of the interactions and interdependence between plants and animals and their habitats in New Hampshire ecosystems. Students will demonstrate an understanding of the interactions between land and water on the planet Earth. Students will explore chemistry in the familiar context of food, and relate nutrients to human health.
• Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. Students will use appropriate measurement units, and will observe, describe, experiment isolate a variable, pose a question, make a prediction, read and create graphs and tables and create explanations
• Scientific Technology & Tools – Students will use appropriate tools, technology, and techniques to gather, analyze, interpret, and share data. (computers, rulers, magnifying glasses, microscopes, thermometers (F & C), compasses, litmus paper, models and safety goggles)
• Science Safety- - Students will follow safety instructions, directions, and use appropriate safety equipment.

Content
• Students will create examples of food chains and webs to demonstrate an understanding of the interdependence of plants and animals in a New Hampshire ecosystems i.e. Alpine and Sub-alpine, Spruce-Fir-Northern Hardwood, Transitional Forest, Central Hardwood Forest, Coastal Plain.
• Students will relate different plants and animals to their habitats based on their physical characteristics
• Students will observe how seasonal changes affect plants and animals and how they adapt to survive in New Hampshire

Grade Five –Ecosystems & Photosynthesis - STC

Essential Skills
• Content Skills- Students will develop an understanding of the differences between scientific law and theory through the study of ecology, astronomy and motion and energy
• Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. Students will use appropriate measurement units, observe, describe, experiment, isolate a variable, pose a question, make a prediction, read and create graphs and tables, create explanations, compare and estimate very large and small numbers, work in small teams and form own conclusion, make hypothesis, and design experiments to test and seek information for comparing

past and present science ideas and theories
• Scientific Technology & Tools – Students will use appropriate tools, technology, and techniques to gather, analyze, interpret, and share data. (computers, rulers, magnifying glasses, microscopes, thermometers (F & C), stop watches, compasses, telescopes, microscopes, graduated cylinders, pH paper, and safety goggles)
• Science Safety- - Students will follow safety instructions, directions, and use appropriate safety equipment.

Content
• Using visuals, such as models, diagramming, posters, and/or charts, students will demonstrate that an ecosystem is a community of organisms and its interaction with its environment
• Students will describe and give examples of the various types of interactions that occur among organisms to demonstrate how organisms compete or cooperate with each other to gain food, resources or space (i.e. predator/prey, symbiotic, producer-consumer-decomposer, host/parasite)
• Students will explore through models, experiments and observations how matter and energy interact in any ecosystem
• Students will define pollutant and describe how it can affect the stability of an ecosystem; students will describe solutions that will minimize or alleviate the effects of pollutants
• Students will create a visual and use it to explain the process of photosynthesis and its importance for all life forms
• Students will label a diagram of the basic structures of a plant cell

Grade Six – Human Body - STC

Essential Skills
• Content Skills- Students will develop an understanding of the human body. Students will develop an understanding of how tools, observation, and technology are used to forecast weather.
• Process Skills/Scientific Method –Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum. Students will work in small teams and form own conclusion, make hypothesis, design experiments to test, seek information for comparing past and present science ideas and theories, determine the relationship between evidence and explanation, comprehend alternative explanations and procedures, and communicate procedures and explanations
• Scientific Technology & Tools – Students will use appropriate tools, technology, and techniques to gather, analyze, interpret, and share data. (microscopes, computers, thermometers, barometers, rulers, magnifying glasses, rain gauges (cm units), graduated cylinders, compile data on a computer, use technology to share data, and safety goggles)
• Science Safety-Students will follow safety instructions, directions, and use appropriate safety equipment.

Content
• Students will identify parts and functions of a basic animal cell
• Using models or diagrams, students will identify and describe the major functions and basic structures of the following systems:

Digestive
Respiratory System

Circulatory
Musculoskeletal

- Students will identify and describe the function of the major organs in the human body (i.e., lungs, heart, brain, and stomach)
- Students will demonstrate that the systems of the human body are interconnected and work together as one system using models, diagramming, or other visuals

Grade Seven – Cellular Biology

Essential Skills
Content Skills - Students will demonstrate an understanding of cellular structures and functions. Students will demonstrate an understanding of the laws governing transfer of energy and change in matter.
- Process Skills/Scientific Method - Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum
- Scientific Technology & Tools - Students will use appropriate tools, technology, and techniques to gather, analyze, interpret and share data. (Thermometers, graduated cylinders, rulers (inch & cm), , magnifying glasses, simple microscopes, balances, computers and probes, and safety goggles)
- Science Safety - Students will follow safety instructions, directions, and use appropriate safety equipment

Content
- Students will identify and diagram cellular structure in a variety of living organisms
- Students will present orally or in written form all functions of cell parts
- Students will observe, identify and describe, microscopic life forms
- Students will relate photosynthesis to energy production and storage in plants

Note: Greater emphasis on laboratory reporting, research, and lab activities in both seventh and eighth grade science content areas

Grade Eight – Interdependence of Life Systems

Essential Skills
Content Skills - Students will demonstrate an understanding of the interdependence of all life. Students will demonstrate an understanding that all matter has atomic structure that can be transformed.
- Process Skills/Scientific Method - Children will use the scientific method in our inquiry-based activities in all grade levels and content areas in the science curriculum
- Scientific Technology & Tools - Students will use appropriate tools, technology, and techniques to gather, analyze, interpret and share data. (Thermometers, rulers (inch & CM), magnifying glasses, simple microscopes, balances, computers and safety goggles)
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Content

- Students will create a concept map that illustrates the interdependence of all life in symbiotic relationship including mutualism, commensalism, and food webs
- Students will explain in written, graphic, or oral presentation, the significance of human impact on the environment
- Identify Earth resources used in their life
- Students will explain in written, graphic, or oral presentation, how organisms at the micro level, impact those at the macro level
- Students will relate the different members of the 5 kingdoms to their habitat and explain the interdependence among the five groups
- Students will classify a variety of organisms based on their characteristics and use this knowledge to organize the information of the diversity of life forms
- Students will describe/identify random differences between individuals of the same species of plant or animal
- Describe the major functions of the living cell and discuss how different groups of cells perform interrelated functions in any organism
- Students will collect data on inherited characteristics and use the data to explain how traits are passed from generation to generation
- Students will explain the difference between acquired and inherited characteristics or traits of an organism
- Students will describe/identify similarities and differences among multiple offspring of same parents, and between parents and offspring, e.g. Mitosis and meiosis
- Explain how new genetic traits can arise and become established in a population e.g. Mutations of DNA, new gene linkages, crossing over
- Relate different kinds of animals and plants to their habitat by observing their physical characteristics
- Relate common cycles such as the water cycle, the nitrogen cycle, and the carbon cycle to each other

- **Note:** Greater emphasis on laboratory reporting, research, and lab activities in both seventh and eighth grade science content areas.

Grade Ten – Biology

Essential Skills
- Interdependence of all life
- Process of cell, DNA coding, reproduction and growth
- The evolution of life
- Develop appropriate food webs for the major biomes of the earth and accurately describe the major biochemical cycles which control the interactions between the biotic and physical worlds
- Design and perform an experiment to show that the number of living things any environment support is limited by the available energy, water, oxygen, minerals, and ability of an ecosystem to recycle organic material
- Construct models that demonstrate which chemical elements make up the molecules of substances found in living organisms and how these elements pass through food webs
- Describe how essential materials enter cells and how waste and other materials leave the cell, e.g. diffusion, osmosis
- Compare the transformation of matter and energy during photosynthesis and respiration
- Use tools and models to demonstrate that all cells have specialized structures that carry out specialized functions in any organisms

- Describe the major functions of the living cell and discuss how different groups of cells perform interrelated functions in any organisms
- Explain, in general terms, the role DNA plays in controlling cell functions
- Discuss, using observations, experimentation, and modeling, the connections between structure and function of cells, tissues, organs, and organ systems
- Describe/explain homeostasis
- Describe the life cycles of representative organisms that cause human disease
- Describe the use of technology in the prevention, diagnosis, and treatment of diseases
- Investigate behavioral patterns found in different life forms
- Relate common cycles such as the water cycle, nitrogen cycles and the carbon cycle to each other

Content
- Specialization
- Adaptation
- Natural selection

Grade Eleven –

Anatomy & Physiology/Health Occupations
- Students will explore systems of the human body, learning through lecture, demonstration, laboratory experience, projects and independent research.
- Students will be taught certificate courses in CPR and First Aid.
- Awareness of the vast number of career opportunities and the requirements for them will be a part of this study.

Biology (Advanced)
- Juniors and seniors with a strong interest and demonstrated ability in science and sophomores, who have completed Chemistry 010 with a B+ or better grade, emphasizes molecular and cellular biology.
- Significant class time is spent on lab activities as well as individual and class projects.

Environmental Science
- The study of local ecosystems with that of current environmental issues.
- Human use and misuse of the environment is emphasized. Topics range from tree identification, soil ecology, water quality, and mammal tracking to habitat destruction, human population growth, global warming and solid waste issues.
- All students plan an active roll on ConVal's recycling program.
- Frequent trips outdoors, even in cold weather, should be expected**.**

Grade Twelve -

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Environmental Science (Advanced)
- The same content area as above but assumes a higher level of academic skills and performance. Grading places greater emphasis on individual projects.
- Students are also required to keep a nature journal and should expect nightly homework assignments