Dublin City Schools Science Graded Course of Study
Early Childhood

I. Content Standard: Earth and Space Science Standard

Young children are naturally interested in everything they see around them – soil, rocks, streams, rain, sand and shells. Science should include experiences that provide for the study of the Earth's materials and the discovery of their patterns and changes over time. Since children cannot interact directly with sky or space, learning experiences with the sky or space are based on observation. Preschool children learn about the Earth and space when they play shadow tag, talk about things they do during the day and at night, add water to dirt while making mud pies, and paint with water on the sidewalk and notice that the pictures soon disappear. Continuous opportunities to clean up their immediate space, the playground, and to collect and recycle materials support young learners' understanding about their role in respecting, protecting, preserving and caring for the natural world and environment. Children are very interested in the outdoor environment, naturally use it as a laboratory for learning, and enjoy drawing or charting what they see and think.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Observe constant and changing patterns of objects in the day and night sky.	**Benchmark A Indicator(s)**: • Begin to use terms such as night and day, sun and moon to describe personal observations. • Observe and represent the pattern of day and night through play, art materials or conversation.
Benchmark B: Explain that living things cause changes on Earth.	**Benchmark B Indicator(s)**: • Observe, explore and compare changes that animals and plants contribute to their surroundings (e.g., humans building roads and houses, holes left by worms or squirrels).
Benchmark C: Observe, describe and measure changes in the weather, both long term and short term.	**Benchmark C Indicator(s)**: • Explore and compare changes in the environment over time (e.g., soil erosion, fossils, outdoor temperature). • Explore how their actions may cause changes in the environment that are sometimes reversible (e.g., hand in flowing water changes the current) and sometimes irreversible (e.g., rock dropped that breaks. • Demonstrate understanding of fast and slow relative to time, motion, and phenomena (e.g., ice melting, soil eroding, water running quickly down a steep hill compared to running slowly down an gentle hill. • Observe and use language or drawings to describe changes in the weather (e.g., sunny to cloudy day).

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II. Content Standard: Life Science Standard

Life science is about living things. Young children should be provided direct experiences with living things, their life cycles and their habitats. Although understanding is emerging, children develop concepts of living and non-living things, the behavior and needs of living things and respect for living things. Key ideas emerge from exploring the immediate environment. Therefore, a preschooler in Ohio might explore familiar plants and animals native to the area, studying how living things get food, their characteristics and how they change as they grow.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Discover that there are living things, non-living things and pretend things, and describe the basic needs of living things (organisms).	**Benchmark A Indicator(s):** • Identify common needs (e.g., food, air, water) of familiar living things. • Begin to differentiate between real and pretend through stories, illustrations, play and other media (e.g., talking flowers or animals).
Benchmark B: Explain how organisms function and interact with their physical environment.	**Benchmark B Indicator(s):** • Observe and begin to recognize the ways that environments support life by meeting the unique needs of each organism (e.g., plant/soil, birds/air, fish/water).
Benchmark C Describe similarities and differences that exist among individuals of the same kind of plants and animals.	**Benchmark C Indicator(s):** • Match familiar adult family members, plants and animals with their young (e.g., horse/colt, cow/calf). • Recognize physical differences among the same class or people, plants or animals (e.g., dogs come in many sizes and colors).

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III. Content Standard: Physical Science Standard

Physical science is the study of the physical properties of materials and objects. Through exploration of materials, children learn about weight, shape, size, color and temperature. They explore how things move and change. Beginning concepts develop as young children act on objects to produce a desired effect, put objects together to form new constructions of various kinds and draw conclusions about how the desired effect was produced. When children make a block ramp to race cars, look through a kaleidoscope or pick up objects with magnets, they are learning about the physical properties of objects.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Discover that many objects are made of parts that have different characteristics. Describe these characteristics and recognize ways an object may change.	**Benchmark A Indicator(s):** • Explore and identify parts and wholes of familiar objects (e.g., books, toys, furniture). • Explore and compare materials that provide many different sensory experiences (e.g., sand, water, wood). • Sort familiar objects by one or more property (size, shape, function).
Benchmark B: Recognize that light, sound and objects move in different ways.	**Benchmark B Indicator(s):** • Demonstrate understanding of motion-related words (e.g., up, down, fast, slow, rolling, jumping, backward, forward). • Explore ways of moving objects in different ways (e.g., pushing, pulling, kicking, rolling, throwing, dropping).
Benchmark C: Recognize sources of energy and their uses.	**Benchmark C Indicator(s):** • Explore musical instruments and objects and manipulate one's own voice to recognize the changes in the quality of sound (e.g., talk out loud, soft, high, low, fast, slow. • Explore familiar resources of the range of colors and the quality of light in the environment (e.g., prism, rainbow, sun, shadow).

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IV. Content Standard: Science and Technology

For young children, central ideas and skills related to science technology include identifying simple and familiar tools such as a magnifying glass or hammer, using appropriate tools to explore objects and phenomena or solve a problem, and exploring creative uses for materials or objects. When preschool children appropriately use a hammer and a magnifying glass or use a paper towel roll as a telescope, they are learning about the importance and use of science technology.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Explain why people, when building or making something, need to determine what it will be made of, how it will affect other people and the environment.	**Benchmark A Indicator(s):** • Explore new uses for familiar materials through play, art or drama (e.g., paper towel rolls as kazoos, pan for a hat).
Benchmark B: Explain that to construct something requires planning, communication, problem solving, and tools.	**Benchmark B Indicator(s):** • Identify the intended purpose of familiar tools (e.g., scissors, hammer, paintbrush, cookie cutter). • Use familiar objects to accomplish a purpose, complete a task. Or solve a problem (e.g., using scissors to create paper tickets for a puppet show, creating a ramp for a toy truck). • Demonstrate the safe use of tools, such as scissors, hammers, writing utensils, with adult guidance.

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V. Content Standard: Scientific Inquiry

Preschool children learn science by exploring the world around them. They develop an understanding of science as they investigate and interact with real objects and phenomena. Children should be provided with a variety of simple equipment, materials and opportunities for playing, questioning, exploring, demonstrating, investigating and experimenting. Through scientific processes of inquiry or seeking answers based on their curiosities, young children predict, observe, collect or chart information over time, and represent and formulate conclusions. Sharing books and stories, engaging in conversations and playing provide varied opportunities for exploration, discovery and the communication of findings.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Ask a testable question. (e.g., "What If questions)	**Benchmark A Indicator(s):** • Ask questions about objects, organisms, and events in their environment during shared stories, conversations and play (e.g., ask about how worms eat). • Show interest in investigating unfamiliar objects, organisms and phenomena during shared stories, conversations and play (e.g., ask about how worms eat). • Predict what will happen next based on previous experiences (e.g., when a glass falls off the table and hits the floor, it will probably break). • Investigate natural laws acting upon objects, events and organisms (e.g., repeatedly dropping objects to observe the laws of gravity, observing the life cycle of insects).
Benchmark B: Design and conduct a simple investigation to explore a question.	**Benchmark B Indicator(s):** • Use one or more of the senses to observe and learn about objects, organisms and phenomena for a purpose (e.g., to record, classify, compare, talk about). • Explore objects, organisms and events using simple equipment (e.g., magnets and magnifiers, standard and non-standard measuring tools).

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Benchmark C:	**Benchmark C Indicator(s):**
• Gather and communicate information from careful observations and simple investigation through a variety of methods.	• Begin to make comparisons between objects or organisms based on their characteristics (e.g., animals with four legs, smooth and rough rocks). • Record or represent and communicate observations and findings through a variety of methods (e.g., pictures, words, graphs, dramatizations) with assistance.

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VI. Content Standard: Scientific Ways of Knowing

Children's early impressions about who learns science and practices science appear to be persistent and lasting. For young children, science should be experienced in ways that actively engage young learners in the construction of ideas and explanations of doing science. Children's ideas and explanations, whether accurate or not, should be valued and serve as a basis for further investigation and discovery. Science should be modeled as an activity for all learners, where they individually and collectively contribute to a growing understanding of the natural world.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations.	**Benchmark A Indicator(s):** • Offer ideas and explanations (through drawings, emergent writing, conversations, movement) of objects, organisms and phenomena, which may be correct or incorrect.
Benchmark B: Recognize the importance of respect for all living things.	**Benchmark B Indicator(s):** • Recognize the difference between helpful and harmful actions toward living things (e.g., watering or not watering plants).
Benchmark C: Recognize that diverse groups of people contribute to our understanding of the natural world.	**Benchmark C Indicator(s):** • Participate in simple spontaneous scientific explorations with others (e.g., digging to the bottom of the sandbox, testing materials that sink or float).

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VI. Content Standard: Scientific Ways of Knowing

Students realize that the current body of scientific knowledge must be based on evidence, be predictive, logical, subject to modification and limited to the natural world. This includes demonstrating an understanding that scientific knowledge grows and advances as new evidence is discovered to support or modify existing theories, as well as to encourage the development of new theories. Students are able to reflect on ethical scientific practices and demonstrate an understanding of how the current body of scientific knowledge reflects the historical and cultural contributions of women and men who provide us with amore reliable and comprehensive understanding of the natural world.

Benchmark	Early Childhood Indicator(s)
Benchmark A: Recognize that there are different ways to carry out scientific investigations. Realize that investigations can be repeated under the same conditions with similar results and may have different explanations.	**Benchmark A Indicator(s):** • Offer ideas and explanations (through drawings, emergent writing, conversations, movement) of objects, organisms and phenomena, which may be correct or incorrect.
Benchmark B: Recognize the importance of respect for all living things.	**Benchmark B Indicator(s):** • Recognize the difference between helpful and harmful actions toward living things (e.g., watering or not watering plants).
Benchmark C: Recognize that diverse groups of people contribute to our understanding of the natural world.	**Benchmark C Indicator(s):** • Participate in simple, spontaneous scientific explorati0ns with others (e.g., digging to the bottom of the sandbox, testing materials that sink or float).