

**Scope and Sequence for Earth Space Science  
2022-2023**

**1. Understand atmospheric processes and the water cycle.**

- 1.1 Know the composition and structure of the Earth's atmosphere and how the Sun is the principle source of the energy required for atmospheric phenomena (e.g., temperature and pressure in different layers of the atmosphere, circulation of air masses) **Trimester 1, 3 weeks**
- 1.2 Know the processes involved in the water cycle, including how clouds affect weather and impact climate and how the Sun is the principle source of the energy required for atmospheric phenomena (e.g., evaporation, condensation, precipitation, surface run-off, percolation, radiation, retention of heat energy emitted from the Earth's surface conduction, convection, reflection and scattering of light from the sun,) **Trimester 1, 2 weeks**
- 1.3 Know other factors that can impact the Earth's climate (e.g., changes in the composition of the atmosphere, human impact, changes in ocean temperature, and geological shifts such as meteor impacts, retreat of glaciers, and volcanic eruptions) **Trimesters 1, 2 and 3 3 weeks**
- 1.4 Know how the tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns (i.e., heat falls more intensely on one part or another of the Earth during its trip around the Sun)  
**Trimester 2, 2 weeks**

**2. Understand Earth's composition and structure.**

- 2.1 Know the Earth is comprised of layers including the core, mantle, and crust that is divided into plates that move at extremely slow rates in response to movements in the mantle and how landforms are created through a combination of constructive and destructive forces of the plates (e.g., constructive forces such as crustal deformation, volcanic eruptions, and deposition of sediment; destructive forces such as weathering and erosion)  
**Trimester 3, 2 weeks**
- 2.2 Know the components of soil and other factors that influence soil texture, fertility, and resistance to erosion (e.g., plant roots and debris, bacteria, fungi, worms, rodents) **Trimester 3, 3 weeks**
- 2.3 Know that sedimentary, igneous, and metamorphic rocks contain evidence of the minerals, temperature, and forces that created them via the processes involved in the rock cycle (e.g., old rocks at the surface gradually weather and form sediments that are buried, then compacted, heated, and often recrystallized into new rock) **Trimester 3, 3 weeks**
- 2.4 Know how successive layers of sedimentary rock and the fossils contained within them can be used to confirm the age and history, changing life forms and environmental conditions on the Earth over time, and how the evidence is affected by folding, breaking, and uplifting of layers **Trimester 3, 3 weeks**

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**3. Understand essential ideas about the composition and structure of the universe and the Earth's place in it.**

- 3.1 Know the characteristics of our Sun and its position in the universe and the movement patterns of the nine planets, asteroids, comets, and meteoroids in our solar system and that gravity is the force that keeps the planets in orbit around the Sun and the moons in orbit around the planets (e.g., planets differ in size, composition, and surface features; planets move around the Sun in elliptical orbits; some planets have moons, rings of particles, and other satellites orbiting them) **Trimester 2, 3 weeks**
- 3.2 Know how the regular and predictable motions of the Sun and Moon explain phenomena on Earth (e.g., the day, the year, the phases of the Moon, eclipses, tides, and shadows) **Trimester 2, 2 weeks**
- 3.3 Know that many billions of galaxies exist in the universe and that incomprehensible distances separate these galaxies and stars from one another and from Earth **Trimester 2, 3 weeks**
- 3.4 Know that the planet Earth and our solar system appear to be unique, although similar systems may exist elsewhere in the universe (e.g., Earth appears to be the only body in the solar system capable of supporting life) **Trimester 2, 2 weeks**

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**11. Understand the nature of scientific knowledge**

- 11.1 Know that an experiment must be repeated many times and yield consistent results before the results are accepted as correct **On going**
- 11.2 Understand the nature of scientific explanations (e.g., use of logically consistent arguments; emphasis on evidence; use of scientific principles, models, and theories; acceptance or displacement of explanations based on new scientific evidence) **On going**
- 11.3 Know that all scientific ideas are tentative and subject to change and improvement in principle, but for most core ideas in science, there is much experimental and observational confirmation **On going**

**Standard 12. Understand the nature of scientific inquiry**

- 12.1 Design and conducts a scientific investigation (e.g., formulates hypotheses, designs and executes investigations, interprets data, synthesizes evidence into explanations, proposes alternative explanations for observations, critiques explanations and procedures) and knows that there is no fixed procedure called "the scientific method," but that investigations involve systematic observations, carefully collected, relevant evidence, logical reasoning, and some imagination in developing hypotheses and explanations **On going**
- 12.2 Use appropriate tools (including computer hardware and software) and techniques to gather, analyze, and interpret scientific data **On going**
- 12.3 Know that scientific inquiry includes evaluating results of scientific investigations, experiments, observations, theoretical and mathematical models, and explanations proposed by other scientists (e.g., reviewing experimental procedures, examining evidence, identifying faulty reasoning, identifying statements that go beyond the evidence, suggesting alternative explanations) and understands that questioning, response to criticism, and open communication are integral to the process of science (e.g., scientists often differ with one another about the interpretation of evidence or theory in areas where there is not a great deal of understanding; scientists acknowledge conflicting interpretations and work towards finding evidence that will resolve the disagreement) **On going**