



Module 3: Planetary & Space Sciences - Earth, Systems, and the Cosmos

(Science – Earth & Space Systems)



Core Focus

From molecules to mountains, and atoms to asteroids, this module explores our planet as a system within a vast and dynamic universe.

Learners will investigate Earth's systems, its place in the solar system, and the larger structures of the universe, continuing the systems-of-systems approach.

Key Concepts & Learning Goals

Theme	Topics
1. Earth's Structure	- Layers of the Earth (crust, mantle, core) - Plate tectonics and earthquakes - Rock cycle and land formation
2. Atmosphere & Weather	- Layers of the atmosphere - Weather vs. climate - Water cycle, clouds, and storm systems
3. Earth's Systems & Cycles	- Geosphere, hydrosphere, atmosphere, biosphere - Carbon and nitrogen cycles - Interconnectivity and feedback loops
4. The Solar System	- Sun, planets, moons, asteroids, comets - Orbits and gravitational interactions - Earth's unique conditions for life
5. The Moon & Tides	- Moon phases and eclipses - Tidal forces - Lunar exploration and its scientific impact
6. Space Science & Exploration	- Telescopes, satellites, probes - History of space exploration - International Space Station and future missions
7. The Universe Beyond	- Stars, galaxies, black holes - The Big Bang and cosmic background radiation - Scales of distance and time in space
8. Earth in Context	- Earth's fragility and habitability - Space weather and planetary defense - The search for extraterrestrial life - Humanization of the Solar System (colonization, Mars, lunar bases) - Near Earth Orbit Economy (satellites, space mining, tourism)

Hands-On Activities

- **Rock Cycle Simulation**
 - **Weather Mapping Project**
 - **Solar System Scale Walk**
 - **Crater Formation Lab**
 - **Build a Sundial**
 - **Constellation Mapping with Stellarium**
-

STEAM Integration

- **Science:** Planetary science, astronomy, geology, meteorology
 - **Technology:** Space tools, weather instruments, modeling software
 - **Engineering:** Designing satellites, rovers, and environmental sensors
 - **Arts:** Planetary diagrams, cosmic timelines, astronomy photography
 - **Math:** Orbital math, scales, temperature modeling
-

21st Century Skills Emphasized

- Spatial Thinking
- Data Modeling
- Interdisciplinary Connections
- Environmental Awareness
- **Future-Oriented Problem Solving**