## 🌿 Module 4: Biological Sciences - Life, Ecology, and Living Systems

### *(Science – Life Science & Environmental Systems)*

### 🌿 Core Focus

**From microscopic cells to vast ecosystems, this module explores the systems of life that thrive on Earth.**  
Students examine biological structures, interactions among organisms, and the balance required for sustainable ecosystems across land, sea, and air.

### 🧠 Key Concepts & Learning Goals

| Theme | Topics |
| --- | --- |
| **1. What is Life?** | - Characteristics of living things- Cells as the basic unit of life- Classification of life (domains and kingdoms) |
| **2. Cell Biology** | - Structure and function of cells- Cell organelles and their roles- Photosynthesis and cellular respiration |
| **3. Genetics & Inheritance** | - DNA, genes, chromosomes- Traits and heredity- Variation and mutation |
| **4. Organism Structure & Function** | - Human and animal body systems- Plant structures and adaptations- Functionality in relation to survival |
| **5. Ecosystems & Habitats** | - Food chains and webs- Biomes (forest, desert, ocean, tundra, grassland)- Producers, consumers, and decomposers |
| **6. Environmental Science** | - Climate change and pollution- Natural resource management- Biodiversity and conservation |
| **7. Interdependence & Adaptation** | - Symbiosis, predation, competition- Evolution and natural selection- Adaptation in extreme environments |
| **8. Sustainability in Living Systems** | - Human impact on the biosphere- Sustainable agriculture and green living- Ecological design and restorative practices |

### 🧪 Hands-On Activities

* **Build-a-Cell Craft Project**
* **Microscope Life Lab**
* **DNA Modeling Activity**
* **Local Ecosystem Field Study**
* **Carbon Cycle Simulation**
* **Design a Sustainable Microhabitat**

### 🧩 STEAM Integration

* **Science**: Cell biology, anatomy, ecology, genetics
* **Technology**: Microscopy, genetic analysis, ecosystem modeling
* **Engineering**: Sustainable system design, biotechnologies
* **Arts**: Habitat illustrations, ecosystem posters
* **Math**: Population graphs, probability in genetics, carbon impact models

### 🌐 21st Century Skills Emphasized

* Environmental Literacy
* Systems Thinking
* Analytical Observation
* Sustainable Design Mindset