Natural Sciences Syllabus

GRADES 3 - 4: FOUNDATIONAL CONCEPTS

1. Life Science

- Plant and Animal Life Cycles (birth, growth, reproduction, death)
- Inherited Traits of Plants and Animals
- Animal Groups and Classifications
- Plant Parts and Their Functions (roots, stem, leaves, flower)
- Basic Needs of Living Things (air, water, food, shelter)
- Food Chains (producer, consumer, decomposer)
- Animal Adaptations (physical and behavioral)
- Habitats and Ecosystems
- How Environments Affect Organisms
- Fossils as Evidence of Past Life

2. Earth and Space Science

- The Sun, Earth, and Moon
- Objects in the Day and Night Sky (stars, planets)
- The Four Seasons and Their Causes
- Weather Patterns and Measurement (temperature, precipitation)
- Types of Clouds
- The Water Cycle (evaporation, condensation, precipitation)
- Natural Resources (renewable and non-renewable)
- Properties of Rocks, Soil, and Minerals
- Weathering and Erosion
- Natural Hazards (floods, earthquakes, volcanoes)

3. Physical Science

- States of Matter (Solid, Liquid, Gas)
- Properties of Matter (mass, volume, texture, color)
- Changes in Matter (heating, cooling, mixing)
- Forces (Pushes and Pulls)
- Gravity as a Force
- Simple Machines (lever, pulley, wheel and axle, etc.)
- Magnetism (attraction and repulsion)
- Forms of Energy (Light, Heat, Sound)
- Sources of Light and Heat
- Properties of Sound (pitch, volume)
- Basic Concepts of Electricity (simple circuits)

Natural Sciences Syllabus

GRADES 5 - 6: SYSTEMS AND INTERACTIONS

1. Life Science

- Plant and Animal Cells (basic structures and functions)
- Photosynthesis (how plants make food)
- Flow of Energy in Ecosystems (food webs)
- Roles of Organisms (producers, consumers, decomposers)
- Cycling of Matter in Ecosystems
- Interactions in Ecosystems (competition, predation)
- Human Body Systems (digestive, circulatory, respiratory)
- Classification of Living Organisms (kingdoms)
- Microorganisms (bacteria, fungi, viruses)

2. Earth and Space Science

- The Solar System (planets, asteroids, comets)
- Earth's Rotation and Revolution (day/night, seasons)
- Lunar Phases (the phases of the Moon)
- Earth's Spheres (geosphere, hydrosphere, atmosphere, biosphere)
- Plate Tectonics (introduction)
- The Rock Cycle (igneous, sedimentary, metamorphic)
- Weather Fronts and Air Masses
- Climate vs. Weather
- Ocean Currents and Their Effects
- Human Impact on Earth's Systems (pollution, conservation)

3. Physical Science

- Physical vs. Chemical Changes in Matter
- Mixtures and Solutions
- Atoms and Molecules (basic introduction)
- Elements and Compounds
- Properties of Light (reflection, refraction)
- Energy Transfer (conduction, convection, radiation)
- Forms of Energy (kinetic, potential, chemical, electrical)
- Energy Transformations (e.g., electrical to light)
- Forces and Motion (speed, velocity, acceleration)
- Friction and Gravity

Natural Sciences Syllabus

GRADES 7 - 8: CORE SCIENTIFIC PRINCIPLES

1. Life Science

- Cell Theory (all living things are made of cells)
- Organelles and Their Functions (nucleus, mitochondria, chloroplasts)
- Cellular Respiration and Photosynthesis (detailed processes)
- Genetics and Heredity (dominant/recessive traits, DNA, genes)
- Punnett Squares
- Natural Selection and Evolution
- Evidence for Evolution (fossils, comparative anatomy)
- Human Body Systems (nervous, endocrine, immune)
- Ecology (population dynamics, biomes, symbiotic relationships)
- Biotechnology (basic concepts)

2. Earth and Space Science

- Plate Tectonics (continental drift, plate boundaries)
- Earthquakes and Volcanoes
- Earth's Interior Layers
- Geologic Time Scale
- Astronomy (stars, galaxies, the Big Bang theory)
- Earth's Atmosphere (layers and composition)
- Global Wind Patterns and Ocean Currents
- Climate Change and Global Warming
- Natural Resource Management
- Topographic Maps

3. Physical Science (Chemistry & Physics)

- Atomic Structure (protons, neutrons, electrons)
- The Periodic Table of Elements (groups, periods)
- Chemical Bonds (ionic, covalent)
- Chemical Equations (reactants, products, conservation of mass)
- Acids and Bases (pH scale)
- Density and Buoyancy
- Newton's Laws of Motion
- Conservation of Energy and Momentum
- Waves (transverse, longitudinal, properties like wavelength and frequency)
- The Electromagnetic Spectrum
- Electricity and Magnetism (circuits, electromagnets)

Natural Sciences Syllabus

GRADES 9 - 12: DISCIPLINARY DEPTH

Biology

- Biochemistry (carbohydrates, lipids, proteins, nucleic acids)
- Cellular Processes (transport, division - mitosis/meiosis)
- Molecular Genetics (DNA replication, transcription, translation)
- Patterns of Inheritance (Mendelian and non-Mendelian)
- Evolutionary Mechanisms (natural selection, genetic drift, gene flow)
- Classification and Phylogeny (cladograms)
- Ecology (population growth, community interactions, nutrient cycles)
- Plant Biology (structure, reproduction, hormones)
- Human Anatomy and Physiology (all major body systems in detail)
- Viruses and Bacteria

Chemistry

- Atomic Theory and Electron Configuration
- Stoichiometry (the mole concept, balancing equations)
- Gas Laws (Boyle's Law, Charles's Law, Ideal Gas Law)
- Chemical Bonding and Molecular Geometry (VSEPR theory)
- Intermolecular Forces
- Thermochemistry (enthalpy, Hess's Law)
- Solutions and Concentration (molarity)
- Reaction Rates and Chemical Equilibrium
- Acids and Bases (definitions, pH, titrations)
- Redox Reactions (oxidation and reduction)

Physics

- Kinematics (one and two-dimensional motion)
- Dynamics (Newton's Laws, friction, circular motion)
- Work, Energy, and Power (conservation of energy)
- Momentum and Collisions (conservation of momentum)
- Thermodynamics (laws, heat transfer)
- Wave Properties and Sound
- Optics (reflection, refraction, lenses, mirrors)
- Electricity (Ohm's Law, series/parallel circuits)
- Magnetism and Electromagnetism
- Introduction to Modern Physics (e.g., quantum mechanics, relativity)

Earth & Space Science / Environmental Science

- Stellar Evolution (life cycle of stars)
- Cosmology (origin and fate of the universe)
- Earth's Geologic History
- Hydrology (groundwater, watersheds)

Natural Sciences Syllabus

GRADES 9 - 12: DISCIPLINARY DEPTH

- Meteorology (weather systems, atmospheric science)
- Climate Systems and Feedbacks
- Biogeochemical Cycles (carbon, nitrogen, phosphorus)
- Ecosystems and Biodiversity
- Population Dynamics and Resource Management
- Pollution (air, water, soil) and Renewable/Non-renewable Energy