

INTERNATIONAL FSP SCIENCE CONTEST

COURSE OUTLINE

Vibrant Youngsters Level (Grades IX & X)

1. Biology and Technology

- Application of biology in technology (genetic engineering, biotechnology).
- Impact of technology on biology (medical advancements, environmental monitoring).

2. Cell Biology

- Cell structure: cell membrane, cytoplasm, nucleus, and organelles.
- Cell functions: metabolism, growth, reproduction, and response to stimuli.
- Cell division: mitosis and meiosis.

3. Microorganisms

- Types: bacteria, viruses, fungi, and protozoa.
- Importance: decomposition, fermentation, and disease causation.
- Immune system: defense mechanisms against microorganisms.

4. Classification

- Taxonomy: classification of living organisms (Kingdom, Phylum, Class, Order, Family, Genus, Species).
- Characteristics of different kingdoms (Monera, Protista, Fungi, Plantae, Animalia).

5. Environment

- Ecosystems: interactions between living and non-living components.
- Ecological balance: importance of conservation and sustainability.
- Human impact on the environment: pollution, deforestation, climate change.

6. Heredity

- Mendel's laws of inheritance: segregation, independent assortment, and dominance.
- Genetic traits: dominant, recessive, and codominant.

- DNA structure and replication.

7. Natural Resources

- Types: renewable (solar, wind, water) and non-renewable (fossil fuels, minerals).

- Conservation and management of natural resources.

8. Structure of Atom

- Atomic number, mass number, and electron configuration.

- Periodic table: arrangement of elements based on atomic number.

9. Periodic Classification

- Classification of elements: metals, non-metals, and metalloids.

- Periodic trends: atomic radius, electronegativity, and ionization energy.

10. Chemical Reactions

- Types: synthesis, decomposition, displacement, and combustion.

- Chemical equations: balancing and stoichiometry.

11. Electrochemistry

- Electrolysis: decomposition of substances using electricity.

- Electrochemical cells: galvanic and electrolytic cells.

12. Organic and Inorganic Chemistry

- Organic compounds: hydrocarbons, functional groups, and biomolecules.

- Inorganic compounds: acids, bases, salts, and minerals.

13. Newton's Laws of Motion

- First law (inertia): objects at rest or in motion remain so unless acted upon.

- Second law (force and acceleration): $\text{force} = \text{mass} \times \text{acceleration}$.

- Third law (action and reaction): every action has an equal and opposite reaction.

14. Work, Energy, and Power

- Work: transfer of energy from one object to another.

- Energy: kinetic, potential, thermal, and electrical.

- Power: rate of doing work or transferring energy.

15. Simple Machines

- Types: lever, pulley, wheel and axle, inclined plane, wedge, and screw.
- Mechanical advantage: ratio of output force to input force.

16. Electrostatics

- Electric charges: positive, negative, and neutral.
- Electric fields: force per unit charge.
- Electric potential: potential difference between two points.

17. Current Electricity

- Electric current: flow of electrons.
- Resistance: opposition to electric current.