Interdisciplinary Biotechnology Unit

M.Sc (Biotechnology)

Biology Chemistry	B. Sc. (Hons.) Level
Elementary Mathematics	Secondary Level

Biology (Botany & Zoology)

Cell Biology : abiotic origin of life, classification of living organisms, prokaryotes and eukaryotes and archaea. Cell structure and function of bacteria and Archaea. Microbial growth and nutrition and control of microorganisms. Viruses, virus like agents viral diseases.

Organelles of plant and animal cells, cell cycle and cell division, cytoskeletal systems. Genetic code and protein biosynthesis. Tissues of higher animals : blood, muscle tissue, nervous tissue Nutrition, digestive, circulatory, excretory and reproductive systems of higher animals, hormones and their function.

Properties of nucleic acids, chromosomes, DNA replication, damage and repair. Gene manipulation, cloning vectors, gene libraries, screening of libraries, gene cloning. Applications of recombinant DNA technology, PCR, RFLP, Western, Northern and Southern blotting.

Immunology : cells of the immune system, lymphoid tissues, complement, antibodies, hybridoma technology, applications of monoclonal antibodies, antigen recognition, processing and presentation, cell mediated immunity, cytokines, hypersensitivity, vaccine technology, auto-immunity, transplantation, immune responses to various infections.

Plant systems : Water transport through xylem, transpiration, mechanism of stomatal movement, macro and micronutrients, mineral deficiency symptoms and plant disorders, mechanism of food translocation in plants Photosynthesis, biological nitrogen fixation, ammonia assimilation Plant movements, photoperiodism, phytohormones and their roles, Ecosystem, biotic and abiotic components, trophic organization, autotrophy, heterotrophy, parasitism, detritus and decomposition. Plant pathogens. General characters of algae, fungi, bryophytes, pteridophytes, gymnospersms and angiosperms, Vegetative and sexual reproduction in plants, pollination, fertilization, dormancy, seed dispersal and germination. Ecosystems, diversity, structure and functions, ecological pyramids, food chains and webs, niche concept. Clinical aspects of carbohydrate, protein and lipids. In born errors of metabolism.

Chemistry

Electronic structure of atoms, periodic table and periodic properties. General characteristics, structure and reactions of non-transition and transition elements. Coordination compounds, structure, crystal field and ligand field theories, spectral and magnetic properties.

Chemical equilibria, first law and second law of thermodynamics, enthalpy, entropy, free energy. Properties of dilute solutions, chemical kinetics, rates of reactions and factors affecting rates of reactions, spectroscopy, principles of UV-Visible and IR spectroscopy.

Synthesis, reactions and mechanisms of alkenes, alkynes, arenas, alcohols, phenols, ethers and epoxides, aldehydes, ketones, carboxylic acids and their derivatives, halides, nitro compounds and amines, organometallic and organosulfur compounds, heterocyclic compounds.

Chromatographic separations, principles and applications of ion exchange, size exclusion and affinity chromatography.

Structure and properties of carbohydrates, amino acids, proteins, lipids nucleic acids and elementary aspects of their metabolism.

Elementary Mathematics (Secondary Level)

Real numbers : natural numbers, integers, rational numbers, terminating / non terminating recurring decimals, non recurring / non terminating decimals, non rational numbers; Algebra : polynomials, pair of linear equations in two variables, quadratic equations, arithmetic progressions.

Geometry : introduction to eclide's geometry, lines and angles, triangles, quadrilaterals, area, circles, constructions; Trigonometry : introduction to trigonometry, trigonometric identities, heights and distances.

Menstruation : areas related to circles, surface area and volumes; Statistics and Probability: presentation of data, bar graphs, histograms, frequency polygons, mean, median, mode of ungrouped data, empirical probability.