

Cell chemistry and biosynthesis: the chemical components of a cell; Membrane structure: the lipid bilayer, membrane proteins; Membrane transport of small molecules and electrical properties of membranes: principles of membrane transport, active membrane transport, ion channels; Intracellular compartments and protein sorting: compartmentalization of cells, the transport of molecules between intracellular compartments; Intracellular vesicular traffic: endocytosis, exocytosis, molecular mechanisms; Cell signaling: general principles, signaling through GPCRs and enzyme-coupled surface receptors; Cytoskeleton: self-assembly and dynamic structure of cytoskeletal filaments, molecular motors; Cell cycle: an overview, cell cycle regulation; Apoptosis: cell death, extrinsic and intrinsic pathways; Cell junctions, cell adhesion and extracellular matrix: cadherins and cell-cell adhesion, tight junctions, passageways from cell to cell, integrins and cell-matrix adhesion, extracellular matrix; Genome: organization of genomes, gene expression and regulation, siRNA and miRNA; Principles and applications of genomic and proteomic tools: DNA electrophoresis, Reverse transcription and real-time PCR, gene sequencing, gene mapping, gene cloning, microarrays, SDS PAGE, ELISA and Western blotting, recombinant DNA technology, gene therapy.

TEXT BOOKS/ REFERENCES:

Alberts B, Johnson A, Lewis J, Raff M, Roberts K and Walter P, "Molecular Biology of the Cell", Fifth Edition, Garland Publishing Inc. 2008.

Gerald Karp, "Cell and Molecular Biology", Fifth Edition, John Wiley, 2008.