CH 705: BIOPHYSICAL CHEMISTRY (3-0-0: 3)

Bioenergetics

Standard free energy change in biochemical reactions, exergonic, endergonic, hydrolysis of ATP, synthesis of ATP from ADP.

Protein and nucleic acids

Amino acids, protein structure and interactions, introduction to protein folding problems.
Classifications, nucleotides structure and their functions, replication of DNA and RNA transcription, DNA-ligand binding and its significance.

Enzymes and catalysis

Substrate specificity of enzymes, requirement of coenzymes, regulation of enzyme activity and allosteric effect, enzyme nomenclature, enzyme kinetics and the Michaelis-Menten equation, various types of enzyme inhibition. Application of enzymes in chemical synthesis, enzyme models and their applications.

Cell membrane and molecular weight determination of biopolymers

Structure and functions of cell membrane, ion transport through cell membrane, molecular weight determination of biopolymers by various experimental techniques, sedimentation equilibrium, hydrodynamic methods, diffusion, sedimentation velocity, viscosity and electrophoresis.

Spectroscopy in biology

X-ray diffraction, scattering from solutions of macromolecules, differential scanning calorimetry (DSC), isothermal calorimetry (ITC), steady-state fluorescence, time resolved fluorescence, linear and circular dichroism, Fourier transform infrared (FT-IR) spectroscopy, Raman spectroscopy and single-molecule methods.

References

1. D. Voet and J. G. Voet, “Biochemistry”, John Wiley.
2. J. R. Lakowicz, “Principles of Fluorescence Spectroscopy”, Springer.
3. D. A. Skoog, F.J. Holler and S. R. Crouch, “Principles of Instrumental Analysis”, Cenage Learning.
4. B. R. Puri, L. R. Sharma and M. S. Pathania, ‘Principle’s of Physical Chemistry’, Vishal Publishing Co.