

BTY269:BIOPHYSICS

L:2 T:0 P:0 Credits:2

Course Outcomes: Through this course students should be able to

CO1 :: Define the fundamental biophysical principles governing biomolecules, chemical bonds, and the structural and conformational features of DNA and RNA.

CO2 :: Explain protein function, hierarchical structure, torsional angles, secondary structure characterization, stability, and folding.

CO3 :: Apply thermodynamic and kinetic principles to biomolecular structures, protein folding, and functional protein design.

CO4 :: Analyze electrical phenomena in excitable cells, nerve cell signaling, ionic mechanisms, and the role of membrane proteins.

CO5 :: Evaluate the functional mechanisms of biological channels, transporters, ion pumps, ion-channel rhodopsins, cilia, and flagella.

CO6 :: Schematize the mechanisms of molecular motors, microtubule organization, intracellular movement, and the significance of mechanobiology in human health.

Unit I

Introduction to biophysics : Biomolecules, Chemical Bonds in Biochemistry, Conformational Changes in DNA Molecules, From DNA to RNA, The Biophysics of RNA

Unit II

Protein chemistry : Protein Function, Hierarchical Structure of Proteins, Torsional angles in proteins and nucleic acids, Characterization of secondary structure using CD, Protein stability and folding

Unit III

Thermodynamics of biomolecules : Thermodynamics of biomolecular structures, Protein folding: thermodynamics and kinetics, Functional Design of Proteins

Unit IV

Electrical phenomena in the biological system : Electrical Phenomena in Excitable Cells, Electrically Excitable Cells, Electrical Signals of Nerve Cells, The Ionic Hypothesis and Rules of Ionic Electricity, Membrane proteins

Unit V

Transporters in the Biological system : Channels and Transporters in Biological system, Functional Properties of Voltage-Gated Ion Channels, Ion pumping and Ion Channel rhodopsins and their use, Cilia and Flagella: Structure and Movement

Unit VI

Molecular motors and mechanobiology : Molecular Motors: Kinesin, Dynein and Myosin, and intracellular movement, Microtubule structure, Mechanobiology and its importance in human health

Text Books:

1. BIOCHEMISTRY by U. SATYANARAYANA, ELSEVIER

References:

1. BIOPHYSICS: AN INTRODUCTION by COTTERILL R, WILEY

