

LS 534A Biophysical Chemistry: Methods & Applications 2 Credits

Name of the Faculty: Prof. Sneha Sudha Komath *

Sr.No.	Topic	Faculty Name/ Contact Hours
Basic Concepts:		
1.	Thermodynamic state, state functions, path functions and thermodynamic systems. Feasibility, spontaneity and thermodynamic stability of natural processes. Entropy and hydrophobic effect.	SSK/2
2.	Thermodynamics of solutions. Solutions of macromolecules. Molecular weights of macromolecules.	SSK/3
3.	Statistical weights and partition functions. The Boltzmann distribution. Random walk.	SSK/2
4.	Rates and rate equations of chemical reactions. Standard states, steady states. Activation energies, equilibrium constants. Rapid reactions and transient kinetics.	SSK/3
5.	Waves, particles and quanta. Electromagnetic spectrum and transition energies. Quantum mechanical postulates and central concepts in spectroscopy.	SSK/5
Phenomena, Methods, Techniques:		
6.	Protein folding and stability; cooperativity in protein folding.	SSK/1
7.	van't Hoff analysis versus calorimetry (DSC and ITC).	SSK/2
8.	Transport and diffusion; sedimentation and electrophoresis.	SSK/1
9.	Thermodynamic equilibria.	SSK/1
10.	Binding isotherms; single and multiple equilibria in binding of small ligands to macromolecules. Scatchard plots.	SSK/2
11.	Relaxation processes, stopped-flow and temperature jump techniques.	SSK/1
12.	Absorption, circular dichroism spectroscopy of biomolecules.	SSK/3
13.	Fluorescence spectroscopy and microscopy (including anisotropy, TRES, FRET, FRAP, REES, FCS)	SSK/6

Further Reading:

- 1) Physical Chemistry by P. W. Atkins
 - 2) Physical Biochemistry by K. E. Van Holde, W. Curtis Johnson and P. Shing Ho
 - 3) Biophysical Chemistry by C. R. Cantor and P. R. Schimmel
- Other relevant readings will be suggested during the course.