Title: Molecular Biophysics [2-1-0-6]

Content *:*

Energy landscape: concept and relevance;
Ergodic hypothesis: computing and experimentally finding conformer populations, macro- and micro-states; concept of conformer selection;
Ramachandran map: for peptides and other biomolecules;
Non-covalent interactions: van der Waals, H-bonding, electrostatic; double mutant cycles to measure strength of non-covalent interactions; effect of environment on the strength of interactions; stacking interactions and dangling base experiments in DNA
Hydrophobic effect;
Helix-coil transition and zipper model;
General features and thermodynamic aspects of protein folding, tests for intermediates, folding kinetics;
Ligand interactions, Scatchard plot, co-operative interactions, the Hill constant and linked functions; General characteristics of nucleic acid structure; backbone rotation angles and steric hindrances,
Lipids: thermotropic and lyotrpoic changes in lipid phases; gel phase and liquid crystalline phase; packing ratio and lipid assemblies; micelle and bilayer formation; studies of bilayer structure and function; order disorder transitions; transport across membranes (the Nernst Planks approach and rate theory of transport).

Texts / References:

- Biophysical Chemistry, Vol. 1 & 3. C.R.Cantor and P.R.Schimmel; W.H. Freeman, 1980.
- Proteins. Structure and Molecular properties. T.Creighton. W.H.Freeman, 2nd ed. 1992.
- Protein structure. A practical approach. T.Creighton. Oxford Univ. Press. 2nd ed. 1997.