

General Biophysics

(5 ECTS, 1er semester)

I. Basic concepts on Biology and Biochemistry.

1. General features of the prokaryotic and eukaryotic cells: organelles and compartments.
2. Protein structure and function.
3. The flow of genetic information :RNA and DNA.
4. Carbohydrates
5. Lipids.
6. General concepts on cell signaling.

II. Elements of chemical kinetics.

1. Reaction velocity.
2. Stationary approximations.
3. Catalysis: Theory of Michaelis-Menten.
4. Specific interactions: ligands.

III. Molecular Interactions.

1. Scales: spatial, temporal and energy.
2. Bonds: atomic, covalent, hydrogen, dipolar, etc.
3. Experimental techniques: electroforésis, espectroscopy and AFM.
4. Biopolymers as polyelectrolytes: Debye-Hückel theory.

IV. Elements of physics in biological systems:

1. Thermodynamics of biological systems.
2. Statistical and nonequilibrium physics for biological systems.

Bibliography

- Biochemistry. Jeremy M. Berg, John L. Tymoczko and Lubert Stryer. Sixth Edition. W. H. Freedman and Company, NY, USA (2006)
- Lehninger: Principles of Biochemistry. David L. Nelson and Michael M. Cox. Fourth Edition. W. H. Freedman and Company, NY, USA (2004)
- "Molecular Biophysics: Structures in Motion", M. Duane, Oxford University Press (1999).
- "Molecular Driving Forces", K. A. Dill and S. Bromberg, Garland Science (2003)
- Peter Atkins and Julio de Paula, *Physical Chemistry for the Life Sciences*, Freeman(2005)
- Roland Glaser, *Biophysics*, Springer Verlag (2000)