

Advanced Biophysics

(5 ECTS, 1st semester)

I. Biological soft-condensed matter

1. Biological polymers
2. Supramolecular self-assembly
3. Biocolloids
4. Molecular order and soft materials

II. Stochastic methods applied to Biophysics

1. Stochastic dynamics
2. Population dynamics
3. Gene expression dynamics

III. Systems Biology and Bioinformatics

1. Networks
2. Design principles and robustness
3. Introduction to Bioinformatics

IV. Introduction to neural dynamics and neuroscience

1. Electric properties of neurons
2. Integrate-and-fire models
3. Voltage dependent conductances

Bibliography

- M. Doi, Introduction to polymer physics
S. Safran, Statistical thermodynamics of surfaces, interfaces and membranes
R.A.L. Jones, Soft Condensed Matter (Oxford University press) (2002)
T. Witten, Structured Fluids, Oxford University Press
M. Kleman, O.D. Lavrentovich, Soft Matter Physics: An Introduction, Springer
U. Alon, An Introduction to Systems Biology, Chapman & Hall, CRC (2007)
James D. Murray, *Mathematical Biology*, Springer (2002)
Strogatz, Steven. *Nonlinear Dynamics and Chaos*, Perseus Publishin (2000)
Van Kampen, Stochastic processes in physics and chemistry, Elsevier (3rd Ed.) (2007)