

Title: Modeling Biological Systems and Processes [3-0-0-6]**Content :**

Examples of simple models to understand different types of biological processes such as Lotka-Volterra model, simple epidemic model, reaction-diffusion models, drift-diffusion models. Introductions to stochastic processes in biology, Introduction to Fokker-Planck and Langevin equations. Introduction to computer simulations. Introductions to different types of simulations-Molecular Dynamics, Monte Carlo and Langevin dynamics simulations. Simple examples of application of direct Monte Carlo simulation and Gillespie algorithm to a number of simple stochastic biological systems.

Texts / References:

- Physical Biology of the Cell, R Phillips, J Kondev, J. Theriot, Garland Science, 2009.
- A Course in Mathematical Biology: Quantitative Modeling with Mathematical and Computational Methods, Gerda de Vries, Thomas Hillen, Mark Lewis, Birgitt Schönfisch, Johannes Muller, SIAM, 2006.
- Dynamic Models in Biology, Stephen P. Ellner, John Guckenheimer, Princeton University Press, 2006.