

Summer School

Modeling and Numerical Simulation of Biological Systems

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The course presents an approach for modelling and simulation of biological systems. The approach is based on partial differential equations and their numerical solution. For the simulation, we combine finite volume schemes with robust adaptive multigrid methods. This approach allows the mathematical description of biological processes resolving the full three-dimensional morphology of structures involved.

After a general introduction to modelling, we explain the concepts using realistic examples. To begin with, we treat the problem of transdermal drug delivery. Then we continue with a detailed model of signaling in neurons. We also touch topics like parameter estimation and validation of the results.

The course consists of lectures and computer demonstrations.

Prerequisites:

Basic courses of mathematics, numerics and physics.