



FDD3435 Graduate Course in Mathematical Modeling of Bio- logical system 9.0 credits

Doktorandkurs i neuronäts- och biomodellering

This is a translation of the Swedish, legally binding, course syllabus.

If the course is discontinued, students may request to be examined during the following two academic years

Establishment

Course syllabus for FDD3435 valid from Autumn 2016

Grading scale

Education cycle

Third cycle

Specific prerequisites

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After the course, the students should be able to

- explain the use of and assumptions behind biophysical and biochemical models and methodologies
 - calculate basic biophysical and biochemical units in stoichiometry ion statistics, ion dynamics, diffusion and cell compartments
 - illustrate the use of continuous, stochastic or boolean models
 - explain models for synapses and its plasticity as well as for network of neurons
 - use and develop simulation software for genetic, biochemical and neuronal networks
- in order to
- be able to explain the use of and assumptions behind biological models
 - in the working life be able to carry out biological modelling and simulation work..

Course contents

Methods for mathematical modelling and computer simulation of biological processes and functions. Primarily, the nervous system (neurons and **neural networks**) will be treated, but also other organ systems will be brought up. Intracellular processes such as biochemical networks, enzyme kinetics, cell signalling and genetic networks and switches will be treated as well as biological morphogenesis and some current theories of biological perception, learning and memory.

Course literature

Will be announced no later than 4 weeks before the start of the course on the course web. Previous academic year D. Johnston & S. Miao-Sin Wu: Fundamentals of cellular neurophysiology, MIT Press was used.

Examination

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

In this course, the code of honor of the school is applied, see: <http://www.kth.se/en/csc/utbildning/hederskodex>

Ethical approach

- All members of a group are responsible for the group's work.

- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.