DD2435 Mathematical Modelling of Biological Systems 9.0 credits

Neuronnäts- 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 DD2435 valid from Autumn 2009

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Computer Science and Engineering,Information Technology,Information and Communication Technology

Specific prerequisites

Single course students: 90 university credits including 45 university credits in Mathematics or Information Technology. English B, or equivalent.

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 student should be able to

- explain the useage of, and the assumptions behind biophysical and biochemical models and methods
- compute basic biophysical and biochemical entities in stochiometry, ion statics and ion dynamics, diffusion and cell compartments
- exemplify the usage of continous, stochastic or boolean models
- explain models for synapes and their plasticity and of networks of neurons
- use and develop simulation programs for genetic, biochemical, and neural networks

so that the student

- is able to explain the useage of, and the assumptions behind biological models
- in the working life can perform biological modeling and simulation work

Course contents

Methods for mathematical modelling and computer simulation of biological processes and functions. Of primary concern is the nervous system (nerve cells and neuronal networks) but other systems are also treated. Intracellular processes like biochemical networks, enzyme kinetics, cell signalling, genetic networks and switches are treated, as well as biological morphogenesis and some current theories of biological perception, learning and memory.

Course literature

To be announced at least 4 weeks before course start at course web page. Previous year: D. Johnston & S. Miao-Sin Wu: Fundamentals of cellular neurophysiology, MIT Press.

Examination

- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- PRO2 - Project, 3.0 credits, grading scale: P, F
- TEN2 - Examination, 4.5 credits, grading scale: A, B, C, D, E, FX, F

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 all the regulations of the code of honor at the School of Computer science and Communication apply, see: http://www.kth.se/csc/student/hederskodex/1.17237?l=en_UK.

Other requirements for final grade

Examination (TEN2; 4,5 university credits).
Laboratory assignments (LAB1; 1,5 university credits). Project assignment (PRO2; 3 university credits.).

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.