Department of Mathematics
(incl. Math. Statistics)

Stockholm University

Syllabus

for course at advanced level

Modelling of Processes in Cell Biology
Modellering av cellbiologiska processer

7.5 Higher Education Credits
7.5 ECTS credits

Course code:	DA7048
Valid from:	Autumn 2011
Date of approval:	2011-05-16
Department	Department of Mathematics (incl. Math. Statistics)
Main field:	Computer Science
Specialisation:	A1N - Second cycle, has only first-cycle course/s as entry requirements

Decision

This syllabus has been approved by the Board of the Faculty of Science at Stockholm University, May 16, 2011.

Prerequisites and special admittance requirements

For course admission knowledge equivalent to the following is required: the Analysis part of Mathematics I, 30 ECTS credits (MM2001), and Computer Science I, 15 ECTS credits (DA2001). English B/English 6 from Upper Secondary School level.

Course structure

Examination code	Name	Higher Education Credits
THEO	Theory	4.5
LABO	Practical Exercises	1.5
PROJ	Project	1.5

Course content

a. The course covers 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 also other systems are 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.

b. The course includes the following elements:
• Theory, 4.5 HECs
• Practical Exercises, 1.5 HECs
• Project, 1.5 HECs

Learning outcomes

It is expected that the student after taking the course will 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.

Education
The education consists of lectures and practical exercises.

Forms of examination
a. Examination for the course is in the following manner: measurement of knowledge of the element Theory takes place through a written examination.

b. Grading is carried out according to a 7-point scale related to learning objectives:
A = Excellent
B = Very Good
C = Good
D = Satisfactory
E = Sufficient
Fx = Fail
F = Fail

c. Grading criteria for the course will be distributed at the start of the course.

d. A minimum grade of E is required to pass the course, together with pass of the elements Practical Exercises and Project.

e. Students who fail to achieve a pass grade in an ordinary examination have the right to take at least four further examinations, as long as the course is given. The term “examination” here is used to denote also other compulsory elements of the course. Students who have achieved a pass grade on an examination may not retake this examination in order to attempt to achieve a higher grade. Students who have failed to reach a pass grade on two occasions have the right to request that a new examiner is appointed at the next examination opportunity. A request for such appointment must be sent to the departmental board. The department does not apply any restriction on the time during which re-examination is open to the student.

f. There is no facility to improve the grade Fx to a pass grade in this course.

Interim
Students may request that the examination is carried out in accordance with this syllabus even after it has ceased to apply. This right is limited, however, to a maximum of three occasions during a two-year-period after the end of giving the course. A request for such examination must be sent to the departmental board.

Misc
The course is a component of the Bachelor’s Programme in Biomathematics and Computational Biology, and it can also be taken as an individual course.

Required reading
Course literature is decided by the departmental board and is described in an appendix to the syllabus.