CB2030 Systems biology 7.5 credits

Systembiologi

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

Establishment

Course syllabus for CB2030 valid from Autumn 2019

Grading scale

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

Education cycle

Second cycle

Main field of study

Biotechnology, Molecular Life Science

Specific prerequisites

The following courses, or equivalent, are recommended:

- Bioinformatics corresponding to BB2441 Bioinformatics,
- Programming corresponding to BB1000 Programming in Python
- Probability theory corresponding to SF1911 Statistics for Bioengineering 6.0 credits
- Knowledge of modern omics experiments corresponding to BB2255 Applied Gene Technology

Language of instruction

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

Intended learning outcomes

The course will comprise a number of methods that are used for the analysis of data from high-throughput experiments. After the successful completion of the course the student will be able to:

1. Describe the methods
2. Explain the theory behind the methods
3. Apply the methods to biologically relevant problems.
4. Interpret the results from the methods in a medical or biological context.
5. Reflect over the choice of methods, and how that affects the results.

Course contents

The course contains fundamental theory of Systems Biology, i.e. the holistic understanding of biology as large numbers of interacting biomolecules. Particularly, the course weill describe the analysis of data from large-scale omics experiments. The following subjects will be covered:

- Experimental design
- Differential expression analysis
- Regulation of gene expression
- Integration of different types of expression data
- Databases: pathways, co-expression, metabolites
- Over-representation analysis and gene set enrichment analysis
- Graph algorithms, and their applications to interaction networks and co-expression networks
- Basic machine learning and clustering
- Case studies of applications of systems biology

Examination

- TEN1 - Written exam, 7.5 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.

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

Other requirements for final grade

Passed exam

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.