# 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 2021.

## 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

After the successful completion of the course the student will be able to:

1. Describe methods essential for the representation of a system using some fundamental Systems Biology approaches.
2. Explain the theory behind the statistical methods commonly used within Systems Biology, and reflect on their applicability to different biological contexts.
3. Apply achieved methodological knowledge to biologically relevant problems.
4. Interpret the results from commonly used Systems Biology methods.
5. Design and justify the processing of omics data for the interpretation within Systems Biology.

## Course contents

The course is based on the fundamental theory of Systems Biology, i.e. the holistic understanding of biology as large numbers of interacting biomolecules. The following subjects will be covered:

- Hypothesis Testing and Multiple Hypothesis Corrections
- Basic machine learning and clustering
- Principal Component Analysis
- Pathway Analysis
- Graph algorithms, and their applications to interaction networks and co-expression networks
- Genome-scale metabolic models
- Flux Balance Analysis
- Co-regulation of genes
- Expression Quantitative Trait Loci (eQTLs)
- Time-dependent regulatory changes in transcription and translation

## Examination

- TEN2 - Written exam, 5.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Computer Exercises, 2.5 credits, grading scale: P, 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.

## 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.