# CB2330 Foundations of scientific computing for life sciences-7.5 credits

## Grunder i beräkningsmetoder för livsvetenskaperna

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

## Establishment

The official course syllabus is valid from the autumn semester 2026 as decided by the Faculty Board decision PA-2025-0010. Date of decision: 2025-10-01.

## Grading scale

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

## Education cycle

Second cycle

## Main field of study

Biotechnology

## Specific prerequisites

Completed bachelor's degree project 15 credits, 20 credits in cell biology, biochemistry, microbiology and genetic engineering/molecular biology, 15 credits in mathematics, numerical analysis and computer technology, and courses in programming equivalent to at least 5 credits.

## Intended learning outcomes

After completing the course, the student should be able to:

- explain and apply central concepts in probability theory, statistics, modeling and inference relevant to the life sciences.
- translate biological questions into mathematical and computational problems.
- construct, adapt and evaluate models of biological systems using Python.
- analyze simple data structures and apply basic optimization methods.
- communicate quantitative reasoning effectively.

## Course contents

The complexity, scale, and messiness of biological data require computational tools, but also critical thinking and an understanding of computational science. This course provides a solid but accessible introduction to the mathematical, statistical, and computational foundations needed to handle incomplete data, construct models, and draw meaningful conclusions. Designed as a “bootcamp” for students without a background in computational science, it focuses on developing skills in the languages of data analysis, modeling, and algorithmic thinking. Students learn to quantify variation, adapt models, and structure real-world systems as networks, equations, or code. The course aims to lay the foundation for independent and critical engagement in modern quantitative biology and biotechnology.

The course is based on an interactive and practically oriented pedagogical method. Each lecture is accompanied by a guided computer exercise in Python. The approach reinforces practical skills in parallel with theoretical understanding. Students gradually build up their own reference material and carry out a project where they apply the course concepts to a computational problem in the life sciences.

## Examination

- TEN1 - Written exam, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 1.5 credits, grading scale: P, F
- PRO1 - Project , 2.0 credits, grading scale: P, F
- REF1 - Reference sheet, 0.5 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.