



SK2535 Cellular Biophysics 7.5 credits

Cellulär biofysik

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

The course syllabus is valid from Spring 2022 according to the school principal's decision: S-2022-0529 Decision date: 2022-02-24

Grading scale

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

Education cycle

Second cycle

Main field of study

Engineering Physics

Specific prerequisites

Completed degree project at the undergraduate level in engineering physics or medical technology.

English B / English 6

Language of instruction

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

Intended learning outcomes

Cellular Biophysics is a general course in biophysics where the student learns the fundamental physical, quantitative and structural aspects of the biological cell. An important course goal is to equip the student with a physical and mathematical toolbox to both understand and apply results and observations from cell-biological experiments.

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

- describe the basic physical principles of cell function regarding the transport of water, ions and nutrients.
- define and use mathematical models for the transport of water, ions and solutes in and across the cell membrane.
- describe how the cell regulates water and ion balance and how it is affected by the cell's environment.
- calculate the potential of the cell membrane and how it varies in different situations.
- perform measurements of cell physics parameters using microscope-based methods.

Course contents

Models and equations for:

- Active and passive transport in cells
- Diffusion in solution and membrane
- Osmosis and osmotic pressure
- Active transport
- Electrodiffusion, Nernst potential and membrane potential
- Electrical properties of the nerve cell
- Cellular homeostasis

Examination

- INL1 - Hand in assignment, 2.0 credits, grading scale: P, F
- LAB1 - Laboratory work, 3.0 credits, grading scale: P, F
- TEN1 - Written exam, 2.5 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.

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.