KD1500 Physical Biochemistry 7.5 credits

Fysikalisk biokemi

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

Establishment

Course syllabus for KD1500 valid from Autumn 2019

Grading scale

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

Education cycle

First cycle

Main field of study

Technology

Specific prerequisites

BB1150, KD1020

Language of instruction

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

Intended learning outcomes

After completion of the course the student shall have

Knowledge and understanding to:

- Describe the basic theories of thermodynamics, for example the first and second laws with terms such as internal energy, enthalpy, entropy and Gibb's free energy.
- Be able to apply the basic theories to explain driving forces in biological and biochemical systems.
- Be able to apply kinetic theory to draw conclusions about biochemical processes such as enzymatically catalyzed reactions.

Course contents

The course consists of two parts that deal with biochemical thermodynamics and kinetics in biochemistry.

Biochemical thermodynamics

A living organism is constantly changing: ions are pumped over membranes, signal substances diffuse through the cytoplasm, proteins are built up, formed and broken down, molecules are broken down to give us energy. The driving forces behind these processes can be described based on the laws of thermodynamics. Based on given conditions, the sequence of events can be predicted. In this course, the concepts are described and put into a biological context. The course aims to give the student the opportunity to understand and predict biological and biochemical processes based on basic physical chemistry.

The parts of thermodynamics:

- The first law of thermodynamics.
- Internal energy and enthalpy.
- The second law of thermodynamics.
- Entropy.
- Gibb's free energy.
- Phase equilibrium and phase transitions, among others for biopolymers and bioaggregates.
- Chemical balance.
- Effects of catalysts and of temperature, proton transfers and equilibrium
- Ion and electron transport.

Kinetics in Biochemistry

Kinetics is the science of the speed of chemical reactions. By studying how quickly an enzyme breaks down a substrate, detailed information about the reaction mechanism can be obtained.

The parts of kinetics:

- Reakton cross-sections.
- Reaction laws and mechanisms.
- Complex biochemical processes.
- Enzyme catalysis.

Prerequisites equivalent to KD1510 Chemical equilibrium are recommended.

Examination

- TEN2 - Examination 2, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- TEN1 - Examination 1, 3.0 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Assignment, 1.5 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.