Linnæus University

Dnr: 2016/4678-3.1.2.2

Course syllabus

Faculty of Health and Life Sciences

Department of Chemistry and Biomedical Sciences

1KE007 Biokemi, 7,5 högskolepoäng
1KE007 Biochemistry, 7.5 credits

Main field of study
Biomedical Science, Chemistry

Subject Group
Chemistry

Level of classification
First Level

Progression
G1F

Date of Ratification
Approved 2009-10-22
Revised 2016-09-02 by Faculty of Health and Life Sciences.
The course syllabus is valid from autumn semester 2016

Prerequisites
General chemistry, 7.5 credits, or the equivalent.

Objectives

Module 1. Basic biochemistry, 6.0 credits
After completing the module, the student should be able to:

- provide an overview of the biochemical composition of prokaryotic and eukaryotic cells
- describe the molecular structure of membranes
- describe the general structure of amino acids and, based on the chemical structure of the side chain, name and describe the chemical properties of amino acids, including their charge at different pH levels
- describe the formation and properties of peptide bonds, present the structural levels of proteins, and provide examples of proteins with different structures and functions
- explain the principle behind enzyme catalysis, simple enzyme kinetics (Michaelis-Menten kinetics), and some of its regulatory mechanisms
- describe the general structure of nucleotides and name them based on the chemical structure of the nitrogenous base

- describe the phosphodiester bond in nucleic acids and the 5'-3' direction of a polynucleotide
- provide an overview of the replication, transcription, and translation processes, and give examples of how they can be regulated
- provide examples of biologically important groups of carbohydrates and their structural composition
- describe the general structure of phospholipids, triacylglycerols, fatty acids, and steroids
- provide a general explanation of the metabolism of carbohydrates, proteins, lipids, and nucleic acids, as well as of the interplay between the different metabolic processes
- give examples of how metabolism is regulated and influenced by metabolic changes.

Module 2. Independent work on a clinically relevant protein/peptide, 1.5 credits
After completing the module, the student should be able to:

- use protein databases to retrieve structural information about clinically relevant proteins/peptide hormones
- present a literature review with clinical relevance, in speech and in writing.

Content

Module 1. Basic Biochemistry, 6.0 credits
This module includes the following components:

- biochemical structure of prokaryotic and eukaryotic cells
- amino acids: structural formulas and properties
- polypeptides: structure and function
- proteins: structural organisation and structure-function relationships
- carbohydrates: structure and biochemical function
- lipids: structure and biochemical function
- RNA and DNA: structure and function
- the structure of biological membranes
- fundamentals of enzymology
- regulation mechanisms of enzyme activity
- replication, transcription, and translation, as well as protein targeting
- carbohydrate, lipid, and nitrogen metabolism
- the respiratory chain
- integration of metabolic pathways
- examples of metabolism regulation and disorders
- bioinformatics: searching in protein sequence and protein structure databases.

Module 2. Independent work on a clinically relevant protein/peptide, 1.5 credits
In this module, the student presents the molecular structure of a clinically relevant protein, along with its biochemical contexts and clinical significance, and briefly describe a routinely used analytical method. The presentation should be given in speech as well as in writing and be based on protein database searches and library resources.

Type of Instruction

Teaching is delivered in the form of lectures, group discussions, and seminars. Participation in seminars is mandatory. Distance students need access to the internet.

Examination

The course is assessed with the grades Fail (U), Pass (G) or Pass with Distinction (VG).

Module 1 is examined individually in writing at the end of the module, and is assessed using the grades Pass with Distinction, Pass, and Fail. The course objectives (see above) constitute the grading criteria for the grade of Pass.

Module 2 is examined through a written (individual) and an oral (individual or group) presentation, and is assessed using the grades Pass with Distinction, Pass, and Fail.

The grade given for Module 1 constitutes the basis for the final grade for the course.

Resit examination is offered within six academic weeks.

Course Evaluation

During or shortly after the course, a course evaluation should be conducted. The result and analysis of the course evaluation should be promptly communicated to the students who have taken the course. Students who are taking the course when it is offered the next time should be informed of the result at the course introduction. The course evaluation is anonymous.

Required Reading and Additional Study Material

Tymoczko, Berg & Stryer. *Biochemistry a short course*. Freedman and Company. The latest edition.