Table 5.2 Course specification

Type and level of studies: Bachelor

Course name: Structure and Function of Proteins

Course status: Obligatory

Number of ECTS credits: 6

Requirement:

Course aim

(1) to provide students with the systematic knowledge of all levels of protein structure, (2) to introduce students to the mechanisms of protein synthesis and folding, (3) to enable students to understand the relationship between the three-dimensional structure of proteins and their biological function, (4) to introduce students to different classes of proteins (5) to introduce students to modern experimental methods used in determination of protein structure and function

Course outcome

After successful completion of course, the student is able to: (1) show systematic knowledge of all levels of protein structure (2) explain the mechanisms of protein synthesis and folding to native conformation (3) explain the relationship between three-dimensional structure of proteins and their biological function (4) classify proteins according to their function and describe the main representatives of each class (5) describe the experimental methods for protein structure and function determination

Course content

Theory: The primary protein structure, methods for sequencing. Non-covalent interactions that stabilize protein structure. Secondary and supersecondary structure. Domains, tertiary structure. Quaternary structure. Methods for protein structure determination. Translation. Protein folding. Conformational changes of proteins. Classification of proteins according to function. Fibrous proteins. Membrane proteins (ion channels, ion pumps, transporters, receptors). Immunoglobulins and MHC proteins. Analytical methods based on antigen-antibody reactions.

Practice: Acid-base properties of amino acids. Calculating the ionization state of amino acids and peptides. Calculating pI of peptides. Introduction to protein databases and how to use them. Introduction to computer programs for visualization of three-dimensional structures of proteins and the analysis of interactions within the protein, interactions with other proteins, nucleic acids and ligands. The application of NMR and X-ray crystallography in analysis of 3D protein structure. Denaturation / renaturation of proteins. The separation of plasma proteins by SDS-PAGE electrophoresis. Western-blot analysis. Application of ELISA methods.

Literature

1. Branden C, Tooze J.: *Introduction to Protein Structure*, 2nd Ed., Garland Publishing, New York 1999.
2. Petsko G, Ringe D: *Protein Structure and Function*, Blackwell Publishing, 2003.
3. Zubay GL, Parson WW, Vance DE.: *Principles of Biochemistry*, Wm C Brown, Iowa,1995.
4. Nelson DL, Cox MM.: *Lehninger principles of biochemistry*, 4th Ed., W.H. Freeman & Company, 2004.

Number of classes of active teaching				Other classes
Lectures: 3	Practice: 2	OFT:	SRW:	

Teaching methods

Lectures, practical classes, computational exercises, consultations, e-learning

Assessment of knowledge (maximum of 100 points)

Pre-exam obligations	**Points**	**Final exam**	**points**
activity during lecture classes	**10**	written exam	60
practical teaching	**15**		
seminars	**15**		