Course Unit Descriptor

Study Programme: Bachelor Academic Studies in Bichemistry

Course Unit Title: Regulations of biochemical processes

Course Unit Code: IB-605

Name of Lecturer(s): Full professor Neda Mimica-Dukić, Assistant professor Emilija Svirčev

Type and Level of Studies: Bachelor of Science Degree

Course Status (compulsory/elective): elective

Semester (winter/summer): summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 5

Prerequisites: None

Course Aims:

(1) To provide students with basic knowledge necessary to understand the function and structure of signaling pathways - from primary messengers through receptors, effector molecules, and secondary messengers to effector proteins; (2) Enable understanding of the basic principles of transduction as well as the mechanisms for their termination. (3) To provide students with basic knowledge of mechanisms involved in muscle contraction and relaxation processes, blood coagulation mechanisms, humoral immune response, tumor metastases (which are the result of intercellular communication and the stimulation of specific receptors on target cells).

Learning Outcomes:

After completing the course, students are able to: (1) describe basic pathways of signal transduction and list the biomolecules involved in the process, (2) understand the general features of signal transduction such as: specificity, sensitivity, cooperativity, signal amplification through enzymatic cascades, modularity, desensitization, integration, (3) understand a different types of cell response to different stimuli. (4) search biochemical literature (books, scientific papers, and resources from the Internet) and independently write texts on a selected topic in the field of biochemical signaling.

Syllabus:

Theory

Ligand-receptor interactions, different types of receptors. The function of different effector molecules in the signals transmission. Production of secondary messengers. Activation of selected cytosolic proteins in the signal transmission. Mechanisms of signal termination. The role of adapter proteins. Cell-cell interactions - two way signaling by membrane proteins - integrins. Their role in immune response, blood clotting and tumor metastases. The importance of acetylcholine receptors and internal depots of Ca^{2+} in muscle contraction and relaxation. Sensory transduction in vision, olfaction, and gustation. Oncogenes, tumor suppressor genes, programmed cell death.

Practice

Animations of antibody-antigen interactions, the process of vision, GPCRs in olfaction; process of muscle contraction and relaxation. Writing and presenting a seminar paper.

Required Reading:

1. Storey, K.B. Functional Metabolism-Regulation and adaptation. Wiley-Liss, 2004.

2. Moran, A.L., Horton A.R., Scrimgeour G., Perry M. Principles of Biochemistry (5th Ed), Pearson, 2012.

3. Krauss G. Biochemistry of Signal Transduction and Regulation, Fifth, Completely Revised Edition, Wiley-VCH, 2014.

Weekly Contact Hours: 4	**Lectures:** 2	**Practical work:** 2
Teaching Methods: Lectures, seminar(s)		
Knowledge Assessment (maximum of 100 points): 100		

Pre-exam obligations	points	**Final exam**	points
Active class participation	5	written exam	45
Practical work		oral exam	20
Preliminary exam(s)		…….	
Seminar(s)	30		

The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.