

Study programme(s): PhD in Biology				
Level: Doctoral degree				
Course title: MOLECULAR MECHANISMS OF CELLULAR COMMUNICATION				
Lecturers: Prof. Dr Silvana Andric, Prof. Dr Tatjana Kostic				
Status: Elective				
ECTS: 15				
Requirements: -				
Learning objectives Objective of this course is to enable students to understand and learn integrated knowledge of the communications between the cells and their environment, as well as signaling pathways involved in the transfers of the information in the cells till ultimate effectors systems. In addition, students should gain the ability of scientific-based interpretations of the experimental data from the field of molecular mechanisms of cell communications.				
Learning outcomes At the end of this course students will be able to understand and describe characteristics of intracellular signaling pathways and ways of formation of networks for detection, transduction, transmission, propagation and amplification of the information in order to realized adequate biological response of the cell. In addition, students will have ability to critically analyze scientific papers, scientific hypothesis and the experimental data in the field of molecular mechanisms of cell communication and signaling, and to perform experiment form the field of molecular mechanisms of cell communication and signaling.				
Syllabus <i>Theoretical instruction</i> Overview of different ways of cellular communications and basic signaling transduction pathways. Receptors and signaling pathways connected with trimeric G-proteins (<u>G-Proteins Coupled Receptors</u> – GPCRs). Receptors enzymes and receptors connected with enzymes. Receptors and signaling pathways involving proteolysis. Intracellular receptors. Functional organization of the proteins in membranes and their translocation. Basic signaling pathways in apoptosis. <i>Practical instruction</i> Analysis of NO-cGMP signaling pathway will be used to present and learn basic methodological approach(s) required for studying communications between the cells. This will include: RT-PCR; Western blot; stimulation/inhibition of the signaling pathways elements; up (over-expression) and/or down regulation (siRNA, dsRNA, anti-sense) of the signaling pathway element(s); analysis of phosphorylation of the signaling pathway element(s). <i>Seminars.</i> Short presentation of the specified topics connected with the subject of student's PhD thesis. <i>Journal Club.</i> Presentation of the original peer-review scientific paper from the field of molecular mechanisms of cell communication and signaling.				
Recommended Literature: Bolander FF (2004): <i>Molecular Endocrinology</i> . Elsevier Academic Press Bradshaw RA & Dennis EA (2004): <i>Handbook of Cell Signaling, Three Volumes set 1-3</i> . Academic Press. Conn MP & Means AR (2000): <i>Principles of Molecular Regulation</i> . Humana Press. Gomperts BD, Kramer IM & Tatham PER (2003): <i>Signal Transduction</i> . Elsevier Academic Press Hancock JT (2005): <i>Cell Signaling</i> . Oxford University Press. Krauss G (2005): <i>Biochemistry of Signal Transduction and Regulation</i> . WILEY-VCH. Wilson J & Hunt T (2002): <i>Molecular Biology of the Cell Problems Approach Book 4thed</i> . Garland Science. Review peer-review scientific paper from the field of molecular mechanisms of cell communication and signaling.				
Weekly teaching load				Other:
Lectures: 2	Exercises:	Other forms of teaching: 3	Student research: 5	
Teaching methodology <i>Theoretical part</i> – Lectures/Consultative discussions. <i>Practical part</i> – Combination of laboratory work and computer simulations. <i>Seminars</i> - Short presentation of the specified topics connected with the subject of student's PhD thesis. <i>Journal Club.</i> Presentation of the original peer-review scientific paper from the field of molecular mechanisms of cell comm. & signaling.				
Grading method (total number of points 100)				
<i>Scientific project problem</i> – up to 30; <i>Seminar</i> – up to 5; <i>Presentation of the original scientific paper (Journal club)</i> – up to 20; <i>Oral exam</i> – up to 45.				