Course description

Informing students on course requirements

Program	PhD full-time training, elective course
Course name:	**Molecular neurobiology**
Course code:	EODI-IDE-05
Name of department:	Department of Cellbiology and Molecular Medicine
Coordinator:	Prof. Dr. Karoly Gulya
Course requirement:	none
Course announcement (Fall or Spring semester)	fall semester
Suggested course registration:	in the first or third semester of the program
Number of classes weekly:	2
Total number of classes:	28
Credits:	6
Evaluation:	five scale report
Maximal number of course registrations:	1
Course announcing department:	Department of Cellbiology and Molecular Medicine
Type of course:	theoratical
Type of exam:	oral
Lecturers of the course:	Students who register for the course will be notified of the course location and time.
Topics of the course:	General characteristics of signal transduction. General characteristics of neuronal cell surface and cytoplasmic receptors. Modularity of signaling systems. Signal integration. Classical/functional classification of receptors. General characteristics of the main intracellular signaling pathways. General characteristics of G protein-coupled receptors. Signaling based on changes in cAMP levels. Signaling based on changes in phosphoinositide metabolism. Structure and functions of heterotrimeric G proteins. General characteristics of eukaryotic protein kinases. MAP kinases. Kinases activated by second messenger molecules. Intracellular Ca2+ changes during cell-cell signaling. Calcium-binding proteins and their functions. The role of calmodulin in intracellular signaling. Receptors with enzyme activity: TGFbeta receptors, receptor tyrosine kinases, cytokine receptors, receptor guanylate cyclases, receptor phosphotyrosine phosphatases, T-cell receptors. Proteolysis-linked signaling pathways: the Wnt, Hedgehog, Notch/Delta, and NF-κB signaling pathways. Intracellular receptors: signaling pathways regulated by NO and nuclear receptors. Specific features of neuronal gene expression: general characterization of

	regulatory proteins, regulation of gene function at the transcriptional and translational levels. **Course objectives:** understanding the basic concepts of intercellular and intracellular signal transduction, identifying the main types of intracellular signaling, their various components and basic functions, recognizing the relationships between signaling pathways. Understanding the importance of signal integration and the modularity of signaling systems.
Required reading:	Berridge MJ (2014): Cell Signaling Biology. doi:10.1042/csb0001001 Summaries relevant to the subject based on PubMed. Slides containing the material of the lectures.