

Synaptic Physiology in Health and Disease					
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration
MN-B-EM	180h	6 CP	During term break	Winter term	3 weeks
1	Type of lessons		Contact times	Self-study times	Intended group size*
	a) Lectures		10 h	30 h	max. 6
	b) Practical/Lab		74 h	66 h	
2	Aims of the module and acquired skills Students who successfully completed this module ... <ul style="list-style-type: none"> • have acquired in-depth knowledge on identification and functional analysis of synapses in the mouse brain. • have obtained an understanding of the advantages and disadvantages of different model systems (primary neuronal cell culture, ex-vivo mouse brain slice culture, and in-vivo mouse brain). • have acquired experimental skills in state-of-the art imaging of synaptic physiology and can independently design and perform small scientific projects related to the topics of the module. • have learned how to present research results in oral and written form and to critically discuss experimental results on a professional level. • can apply acquired knowledge in clinical and experimental fields of neuroscience and to other fields of biology. 				
3	Contents of the module <ul style="list-style-type: none"> • Primary culture of mouse cortical neurons, plasmid and viral transfections • Organotypic slice culture of mouse cerebellum and viral transfections • Imaging of synaptic activity using GCAMP- and pFluorin-based reporters in mouse primary neurons and organotypic slice culture • Analysis of mouse models of neurodegenerative diseases • Identification and analysis of synapses in electron microscopy (EM) images • Fluorescence microscopy and quantitative analysis of microscopy data 				
4	Teaching/Learning methods <ul style="list-style-type: none"> • Lectures; Practical/Lab (Project work); Guidance to independent research; Training on presentation techniques in oral and written form. • The blended learning approach is used for the entire module (online material for self-study will be available for downloading). • Some lectures will be given in “active learning” form, i.e. students prepare answers to pre-assigned topics and then “teach” that topic to their peers. 				

5	<p>Requirements for participation</p> <p>Enrollment in the Master's degree course "Biological Sciences" or in the Master's degree course "Experimental and Clinical Neuroscience" („first come first serve“)</p> <p>Additionally recommended: Successful completion of the "Lecture Neurobiology: Genes, Circuits, and Behavior" module or "the Neural Function I" module, or participation in a neuroscience-oriented module that provides equivalent content.</p>
6	<p>Type of module examinations</p> <p>The final examination consists of the oral presentation about the practical work</p>
7	<p>Requisites for the allocation of credits</p> <p>Regular and active participation; pass in the exam.</p>
8	<p>Compatibility with other Curricula*</p> <p>Elective module in the Master's degree course "Experimental and Clinical Neuroscience"</p> <p>Elective module in the Master's degree course "Biological Sciences"</p>
9	<p>Significance of the module mark for the overall grade</p> <p>In the Master's degree course "Experimental and Clinical Neuroscience": 6 % of the overall grade (see also appendix of the examination regulations)</p> <p>In the Master's degree course "Biological Sciences": not applicable (pass or fail).</p>
10	<p>Module coordinator</p> <p>Prof. Dr. Natalia L. Kononenko, phone 470-84302, e-mail: natalia.kononenko@uk-koeln.de</p>
11	<p>Additional information</p> <p>Elective module of the Master's degree course "Biological Sciences" and the Master's degree course "Experimental and Clinical Neuroscience".</p> <p>Focus of research: (N) Neurobiology</p> <p>Participating faculty: Prof. Dr. N. Kononenko, Dr. Marianna Tolve, M. Overhoff</p> <p>Literature:</p> <ul style="list-style-type: none"> • Kandel, E.R., Schwartz, J.H., Jessell, T. (2000) Principles of Neural Science. 4th edition, McGraw-Hill. Chapters 21, 22, 32 • Purves, D., Augustine, G.J., Fitzpatrick, D., Hall, C.W. <i>et al.</i> (2007) Neuroscience. 4th edition, Palgrave Macmillan. Chapters 5-7, 14 • Siegel, G.J., Albers, R.W., Brady, S.T., Price, D.L. (2006) Basic Neurochemistry. 7th edition, Academic Press. Chapters 10-18, 28, 29, 31, 40 <p>General time schedule: March 7 to March 23, 2022: Lectures, practical/lab, data evaluation, and preparation of oral presentations. Project presentations: March 24, 2022 at 10:00 a.m.</p> <p>Note: The module contains hands-on laboratory work conducted by small groups of students and is taught in research laboratories. The module does not contain computer-based practicals/research as a main component.</p> <p>For registration, students should contact the module coordinator by e-mail until February 7, 2022.</p> <p>Introduction to the module: March 7, 2022 at 10:00 a.m., CECAD (4th floor, AG Kononenko)</p>