

<b>Module Name</b> Experimental Neuroscience - from cells to circuits						
<b>Type of Module</b> ○ Advanced Module				<b>Module Code</b> Experimental Neuroscience		
<b>Identification Number</b> MN-B-SM (N 7)	<b>Workload</b> 360 h	<b>Credit Points</b> 12 CP	<b>Term</b> 2 <sup>nd</sup> term of studying	<b>Offered Every</b> Summer term, 2 <sup>nd</sup> half	<b>Start</b> summer term only	<b>Duration</b> 7 weeks
<b>1</b>	<b>Course Types</b> a) Lectures b) Practical/Lab c) Seminar		<b>Contact Time</b> 14 h 100 h 8 h		<b>Private Study</b> 48 h 160 h 30 h	
<b>2</b>	<b>Module Objectives and Skills to be Acquired</b> Students who successfully completed this module <ul style="list-style-type: none"> <li>• have acquired detailed knowledge about concepts and experimental approaches in the analysis of behavior and its neural basis</li> <li>• have fundamental knowledge of basic techniques for the development of optogenetic and biosensor tools</li> <li>• can apply their knowledge to plan, perform and analyze experiments that are designed to analyze network function and behavior</li> <li>• are familiar with brain anatomy and neurotransmitter systems</li> <li>• understand basic principles of hypothesis forming and testing</li> <li>• are able to deal with experimental data in a critical and qualified way</li> <li>• have learned how to present research results in oral and written form and to critically discuss scientific publications related to the topic of the module on a professional level.</li> <li>• are able to transfer skills acquired in this module to other fields of biology.</li> </ul>					
<b>3</b>	<b>Module Content</b> This module introduces students to modern experimental approaches for studying neural circuits in behaving mice. It covers different topics, such as in vivo calcium imaging using miniscopes and electrophysiological recordings (single-unit activity and local field potentials), optogenetics, combined with behavioral analysis. Students will learn to analyze neural and behavioral data using tools such as SLEAP, as well as to evaluate immunohistochemical stainings for validation of recording sites and cell types. In addition, the module provides an introduction to the design and application of genetically encoded biosensors and actuators. <ul style="list-style-type: none"> <li>• Analysis of behavior and neuronal data in mice</li> <li>• Techniques in monitoring and recording behavior</li> <li>• Data analysis of neuronal network performance</li> <li>• Staining techniques for neurons and microscopy</li> <li>• Data analysis with Python</li> <li>• Scientific writing (paper) and presentation (oral, seminar)</li> </ul>					

4	<p><b>Teaching Methods</b></p> <p>Lectures; Practical/Lab (Project work); Seminars; Guidance to independent research; Training on presentation techniques in oral and written form; training on paper/grant writing</p>
5	<p><b>Prerequisites (for the Module)</b></p> <p>Enrollment in the Master's of Science degree course "Neuroscience"</p> <p><b>Additional academic requirements</b></p> <p>Previous attendance of the lecture module "Neurobiology: Genes, Circuits, and Behavior (N)".</p>
6	<p><b>Type of Examination</b></p> <p>The final examination consists of two parts: oral presentation (20-30 min; 50 % of the total module mark), written report (50 % of the total module mark)</p>
7	<p><b>Credits Awarded</b></p> <p>Regular and active participation Each examination part at least "sufficient" (see appendix of the examination regulations for details)</p>
8	<p><b>Compatibility with other Curricula</b></p> <p>None</p>
9	<p><b>Proportion of Final Grade</b></p> <p>12 %</p>
10	<p><b>Module Coordinator</b></p> <p>Prof. Dr. Olivia Masseck, phone 470-3119, e-mail: omasseck@uni-koeln.de</p>
11	<p><b>Further Information</b></p> <p><b>Participating faculty:</b> Prof.Dr. Heike Endepols</p> <p><b>Literature:</b> Information about textbooks and other reading material will be given on the ILIAS representation of the course (<a href="https://www.ilias.uni-koeln.de/ilias/goto_uk_cat_2815610.html">https://www.ilias.uni-koeln.de/ilias/goto_uk_cat_2815610.html</a>)</p> <p><b>General time schedule:</b> Week 1-6 (Mon.-Fri.): Lectures, practical/lab, analysis of data, preparation of writing written report; Week 7 (Mon.-Fri): Preparation for the oral presentation <b>Note:</b> The module contains hand-on laboratory work conducted individually and is taught in research laboratories. The module does not contain computer-based practicals/research as a main component.</p> <p><b>Introduction to the module:</b> online (in this case, further information/link will be sent to your Smail-Account); for preparation to the module before this introduction see ILIAS link under literature.</p> <p><b>Oral presentation:</b> More details will be given at the beginning of the module.</p>