

| <b>Course Title: Basic Research Techniques applied in Metabolic Neuroscience</b> |   |  |  |  |
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| <b>Identification number</b>   | <b>Workload</b>   | <b>Credit points</b>                       | <b>Frequency of occurrence</b>   | <b>Duration</b>                                      |
| M-Neuro-AM15 a-b   | 180h  | 6CP  | WS   | One Semester   |
| 1  | <b>Type of lessons</b><br>a) Lecture<br>b) Seminar  | <b>Contact times</b><br>a) 12 h<br>b) 10.5 | <b>Self-study times</b><br>157.5 Hrs, L, S,<br>preparation and<br>preparation for the<br>oral<br>presentation/exam | <b>Intended group size</b><br>a) max 14<br>b) max 14 |
| 2  | <b>Aims of the module and acquired skills</b><br><p>The students will get an overview of currently applied basic research techniques for the study of the central nervous system within the context of metabolism. They will learn the general theory behind each technique and understand the use of the technique through presentation of current literature, specifically with research examples from the MPI for Metabolism Research where possible. At the end of the course, the students will have a global understanding of the technology behind each technique and the various applications of the methods in a neuroscientific field. In preparation for the oral exam, the students will also generate a research idea and understand how to apply the techniques learned in the course to answer basic research questions.</p> |  |  |  |
| 3  | <b>Contents of the module</b> <ul style="list-style-type: none"> <li>• Classic techniques and central control of metabolism overview</li> <li>• Optogenetics</li> <li>• Chemogenetics (DREADD, KOR, etc)</li> <li>• Calcium Imaging/ Fiber photometry</li> <li>• Brain clearing (CLARITY, uDISCO, passive), LSM and hands on imaging</li> <li>• AAV/Retrovirus/Advanced Genetic model systems (Cre/Dre)</li> <li>• PET</li> <li>• Functional and structural connectivity in human MRI</li> <li>• Generation of research idea and application of technique to address research question</li> </ul>   |  |  |  |
| 4  | <b>Teaching/Learning Methods</b> <ul style="list-style-type: none"> <li>• Lecture</li> <li>• Seminar (Journal Club)</li> </ul>  |  |  |  |
| 5  | <b>Requirements for Participation</b><br><p>Enrollment in the Master's degree course "Experimental and Clinical Neurosciences" at the University of Cologne</p>   |  |  |  |

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| 6  | <p><b>Type of module examination</b></p> <p>The final examination will be an oral exam where the student will present a research idea implementing at least one technique discussed in the module and its application to a selected disease to at least 3 lecturers and then answer questions regarding the technique and the proposed implementation. The resulting presentation and discussion will be evaluated.</p> |
| 7  | <p><b>Requirement for the allocation of credits</b></p> <p>Regular and active participation in the exercises Final exam (= module exam) after the module Exam content: material of the lecture and exercises</p>  |
| 8  | <p><b>Compatibility with other Curricula</b></p> <p>None</p>  |
| 9  | <p><b>Significance of the module mark for the overall grade</b></p> <p>In the Master's degree course "Experimental and Clinical Neurosciences": 6% of the overall grade<br/>(see also appendix of the examination regulations)</p>  |
| 10 | <p><b>Module coordinator:</b> Dr. Anna Sieben, Dr. Corinna Bauder, Dr. Corina Melzer</p> <p><b>Lecturing Tutors:</b><br/> Sinika Henschke<br/> PhD Tamara Sotelo-Hitschfeld<br/> PhD Marie Holm Solheim<br/> Dr. Nasim Biglari<br/> Dr. Heiko Backes<br/> Dr. Anna Sieben<br/> Dr. Corinna Bauder<br/> Dr. Corina Melzer</p>  |
| 11 | <p><b>Additional Information</b></p> <p><b>Literature:</b> -</p>  |