Course Title: Basic Research Techniques applied in Metabolic Neuroscience

Identification number	Workload	Credit points	Frequency of occurrence	Duration
M-Neuro-AM15 a-b	180h	6CP	WS	One Semester

	Type of lessons	Contact times	Self-study times	Intended group size
1	a) Lecture b) Seminar c) Practice	a) 1.5 h b) 10.5 c) 10.5	157.5 Hrs, L, P, S, preparation and preparation of for the oral presentation/exam	a) max 14 b) max 14 c) max 14

2 **Aims of the module and acquired skills**

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. The students will also generate a research idea and understand how to apply the techniques learned in the course to answer basic research questions.

3 **Contents of the module**

- Classic techniques and central control of metabolism overview
- Optogenetics
- Chemogenetics (DREADD, KOR, etc)
- Calcium Imaging/ Fiber photometry
- Brain clearing (CLARITY, uDISCO, passive), LSFM and hands on imaging
- AAV/Retrovirus/Advanced Genetic model systems (Cre/Dre)
- How basic methods transition to human application, gambling tasks, how basic and clinical neuroscience research differ?
- Tractography
- Generation of research idea and application of technique to address the question

4 **Teaching/Learning Methods**

- Lecture
- Seminar
- Practice part

5 **Requirements for Participation**

Enrollment in the Master's degree course "Experimental and Clinical Neurosciences" at the University of Cologne

6	**Type of module examination** 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.
7	**Requirement for the allocation of credits** Regular and active participation in the exercises Final exam (= module exam) after the module Exam content: material of the lecture and exercises
8	**Compatibility with other Curricula** None
9	**Significance of the module mark for the overall grade** In the Master´s degree course "Experimental and Clinical Neurosciences": 6% of the overall grade (see also appendix of the examination regulations)
10	**Module coordinator:** Dr. Anna Sieben, PhD, Dr. Rachel Lippert, PhD **Lecturing tutors:** Dr. Anna Sieben Dr. Rachel Lippert Dr. Hong Jiang, Dr. Lionel Rigoux Corina Melzer Dr. Elisa Ciglieri Corinna Bauder Nasim Biglari Dr. Tamara Sotelo
11	**Additional Information** **Literature:**