Course Title: Experimental and Translational Neuroimaging

Identification number: M-Neuro AM2 a-c	**Workload** 360h	**Credit points** 12CP	**Frequency of occurrence** SS	**Duration** One Semester

	Type of lessons	**Contact times**	**Self-study times**	**Intended group size**
1	a) Lecture b) Seminar c) Practice	a) 25 h b) 12.5 h c) 37.5 h	285 Hrs, L, P, S, preparation and preparation of for the oral presentation/exam	a) max 6 b) max 6 c) max 6

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

Upon completion of this module the students are capable to describe how neuroscientific questions can be adequately addressed by neuroimaging techniques and to identify the appropriate imaging technique for a specific question. The students will be able to apply commonly used neuroimaging techniques in biomedical research with regard to human and animal studies. After attending the seminar the students will be capable to describe the regulatory and ethical prerequisites for clinical and experimental studies and fundamental principles of neuroimaging techniques.

3 **Contents of the module**

The practical course will cover the main topics of design, application, performance and documentation of neuroimaging studies as part of clinical trials with respect to their use as primary trials for novel diagnostic methods or as secondary read-outs for the efficacy of a therapeutic candidate. The students will learn about the theoretical background of imaging techniques, mainly magnet resonance imaging (MRI) and **positron emission tomography (PET)** and radiation protection. Hands-on training in a representative set of practical experiments will reinforce the theoretically acquired knowledge.

- In-vivo and in-vitro binding experiments / binding characteristics
- Quantitative preclinical PET
- Radiation dosimetry of PET tracers
- Impact of analysis procedures on reproducability of studies
- MRI contrast imaging
- Radiochemistry/Metabolites
- Applications of PET in Neurology and Psychiatry (human)
- Application of PET in drug development. Safety: general lab rules, genetics
- Pharmacokinetic model evaluation and validation
- Data processing, modelling and evaluation in small animal imaging, differences between animals and humans
- 3R in experimental studies with laboratory animals
- Principal design of a clinical trial (phases I - III)

4 **Teaching/Learning Methods**

- Lecture
- Seminars
- Practice

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 a written exam. Additionally, the seminar presentation and discussion will be evaluated. Exam: 60%
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, seminar and exercises
8	**Compatibility with other Curricula** None
9	**Significance of the module mark for the overall grade** In the Masteŕs degree course "Experimental and Clinical Neurosciences": 12% of the overall grade (see also appendix of the examination regulations)
10	**Modul coordinator:** Prof. Dr. med. David Elmenhorst **Lecturing tutors:** Prof. Dr. med. David Elmenhorst Prof. Dr. Andreas Bauer Dr. Simone Beer Dr. Ali Gordjinejad Dr. Andreas Matusch Dr. Tina Kroll Franziska Wedekind Dr. Antje Willuweit Dr. Gerard Bischof Dr. Masoud Tahmasian

11	**Additional Information** Block seminar and practical course will be held at the Forschungszentrum Jülich. **General Time Schedule:** Compulsory Intro: 30. March 2023, 10:00 Online Start of Module: 17. April 2023, 9:00 Jülich Onsite: Jülich, Wilhelm-Johnen-Strasse (Bld. 15.2, use entrance E1, go straight to the stairs to reach the 1st floor, go to the right an reach the seminar room 3027 on your right side) End of Module: 05. May 2023, 17:00 Jülich Written Exam: 15. May 2023, 9:00 – 11:00 Cologne or Jülich possible Monday to Friday 09:00 – 10:30 Lecture 10:30 – 10:45 Break 10:45 – 11:30 Seminar 11:30 – 13:00 Lunch 13:00 – 15:30 Practical **Literature:** t.b.a.