Subdivided Module Catalogue
for the Subject
Translational Neuroscience
as a Master’s with 1 major
with the degree "Master of Science"
(120 ECTS credits)

Examination regulations version: 2015
Responsible: Faculty of Medicine
Course of Studies - Contents and Objectives

The Faculty of Medicine at JMU offers an international Master of Science (M.Sc. Translational Neuroscience) in Translational Neuroscience with a strong emphasis on research. The degree Master of Science offers graduates further professional qualifications as well as extensive research experience.

The degree program is suited to students who have completed a Bachelor of Science (Life Sciences, Mathematics, Physics, Chemistry, Psychology) or their studies in Medicine (as their first professional degree) and have a strong interest in patient-oriented translational research in the fields of basic neurosciences and clinical-applied research.

The degree program allows students to deepen their fundamental knowledge of molecular principles and mechanisms, genetic background, pathology and clinical diagnostics together with independent concept development and project design in the field of experimental and clinical research.

The degree program links basic life sciences with clinical-oriented research in areas, e.g. neurobiology, neurology, psychiatry, and psychology including patient-oriented molecular diagnostics and diagnostics using imaging techniques.

A successfully completed Master’s degree qualifies the candidate for admittance to a doctoral program pursuant to the respective and current doctoral program guidelines.
Abbreviations used

Course types: \( E = \) field trip, \( K = \) colloquium, \( O = \) conversatorium, \( P = \) placement/lab course, \( R = \) project, \( S = \) seminar, \( T = \) tutorial, \( Ü = \) exercise, \( V = \) lecture

Term: \( SS = \) summer semester, \( WS = \) winter semester

Methods of grading: \( \text{NUM} = \) numerical grade, \( B/NB = \) (not) successfully completed

Regulations: \( (L)\text{ASPO} = \) general academic and examination regulations (for teaching-degree programmes), \( \text{FSB} = \) subject-specific provisions, \( \text{SFB} = \) list of modules

Other: \( A = \) thesis, \( LV = \) course(s), \( PL = \) assessment(s), \( TN = \) participants, \( VL = \) prerequisite(s)

Conventions

Unless otherwise stated, courses and assessments will be held in German, assessments will be offered every semester and modules are not creditable for bonus.

Notes

Should there be the option to choose between several methods of assessment, the lecturer will agree with the module coordinator on the method of assessment to be used in the current semester by two weeks after the start of the course at the latest and will communicate this in the customary manner.

Should the module comprise more than one graded assessment, all assessments will be equally weighted, unless otherwise stated below.

Should the assessment comprise several individual assessments, successful completion of the module will require successful completion of all individual assessments.

In accordance with

the general regulations governing the degree subject described in this module catalogue:

\( \text{ASPO2015} \)

associated official publications (FSB (subject-specific provisions)/SFB (list of modules)):

\( 13-\text{Jul-2015 (2015-27)} \)

This module handbook seeks to render, as accurately as possible, the data that is of statutory relevance according to the examination regulations of the degree subject. However, only the FSB (subject-specific provisions) and SFB (list of modules) in their officially published versions shall be legally binding. In the case of doubt, the provisions on, in particular, module assessments specified in the FSB/SFB shall prevail.
The subject is divided into

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**Contents**

Molecular techniques, microscopic methods, immunohistochemistry, mouse models and gene-knockout approaches, protein and molecular biology techniques, PCR, advanced protein biochemistry, imaging techniques, biodistribution of imaging biomarkers, pain behaviour, gait analysis, biostatistics of psychiatric genetic studies, mouse brain neuroanatomy with a focus on neuromorphology and adult neurogenesis, neural stem cells.

**Intended learning outcomes**

Students are able to review and expand their knowledge of standard molecular techniques and are able to choose methods and techniques to design experiments in a specific research area of neurosciences.

**Courses**

(type, number of weekly contact hours, language — if other than German)

V (0) + P (2)

**Method of assessment**

(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I**

(examination regulations for teaching-degree programmes)

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Module title | Clinical Neurobiology 1
---|---
Abbreviation | 03-TN-NB1-152-m01

Module coordinator | holder of the Chair of Clinical Neurobiology
Module offered by | Faculty of Medicine

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Contents

Students will get a theoretical introduction to neurobiology and clinical neurobiology. The following topics will be discussed: introduction to neurons and glia, ion channels and membrane potential, ion channelopathies, synapses, transmitter release, NMJ, myasthenia gravis, cerebellum, basal ganglia, ataxia and Morbus Parkinson, somatosensory system, touch, pain, schizophrenia and autism spectrum disorders, disorders of cognition, muscle and muscle diseases, anatomy and function of the motor system, spinal reflexes, motoneuron diseases, hippocampus, learning and memory, anterograde amnesia, visual agnosia, cortex and the limbic system, emotions, disorders of conscious and unconscious mental processes, attention, smell and taste and hearing, sleep, EEG, epilepsy, vision and diseases of the visual system. The literature seminars are based on fundamental literature on lecture-relevant topics to document the experiments underlying our present knowledge in neurobiology.

Intended learning outcomes

Students who successfully completed this module will have acquired insights into current theoretical concepts in neurobiology. The students will have examined clinical aspects of neurobiology with a focus on the molecular, cellular and physiological mechanisms. Additionally, they will have learned how to evaluate and present data in oral form.

Courses (type, number of weekly contact hours, language — if other than German)

V (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

Allocation of places

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Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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**Contents**

The literature seminar is based on fundamental literature on lecture-relevant topics to document the experiments underlying our present knowledge in neurobiology.

**Intended learning outcomes**

The students will learn to critically read scientific publications in the field of neurobiology and will be trained in the ability to extract relevant information from the original literature.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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Module title | Abbreviation
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Neurology/ Neurosurgery 1 | 03-TN-NN1-152-m01

Module coordinator | Module offered by
Department of Neurology, Department of Neurosurgery | Faculty of Medicine

ECTS | Method of grading | Only after succ. compl. of module(s)
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5 | numerical grade | --

Duration | Module level | Other prerequisites
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1 semester | graduate | --

Contents

Intended learning outcomes
Students who successfully completed this module will have acquired insights into the current molecular and systems pathophysiology of diseases prevalent in neurology and neurosurgery. They will understand basic mechanisms of disease in the motor and sensory system and of higher functions. They will understand about brain trauma and brain tumour biology. They will know about animal models for neurological and neurosurgical diseases and will have been introduced to behavioural, neurophysiological, morphological and molecular biological analysis methods. They will have learned how to ask the appropriate questions in bed-to-bench research and how to devise study plans.

Courses (type, number of weekly contact hours, language — if other than German)
V (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

Allocation of places
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Additional information
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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## Neurology/Neurosurgery 2

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### Contents

The literature seminar is based on fundamental literature on lecture-relevant topics to document the experiments underlying our present knowledge in neurology/neurosurgery.

### Intended learning outcomes

Students will have learned how to critically read scientific publications and how to extract the data and bring it forward in their own project. In addition, they will have learned how to record and analyse data and how to present it in oral and written form.

### Courses

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**Method of assessment**

\(e\) presentation (20 to 45 minutes)

### Allocation of places

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### Additional information

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### Referred to in LPO I

(examination regulations for teaching-degree programmes)

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**Contents**

Basic knowledge about the characteristics of various psychiatric disorders, the proposed neurobiological basis (e.g. gene by environment interaction) as well as treatment options: - anxiety disorders, - depression (uni-polar and bi-polar), - schizophrenia, - ADHD, - dementia (Alzheimer's disease), - Parkinson's disease. Brain regions and neurotransmitter systems involved in neuronal networks involved in experiencing anxiety and fear, attentional networks, learning and memory, and their importance for emotionality in humans. Analysis of gene variants and their association with various psychiatric disorders and behavioural traits; animal models for psychiatric disorders, gene by environment interaction; neuroadaptive mechanisms as a result of stress exposure during different periods of lifetime; resilience, epistatic load hypothesis, mis match hypothesis; anatomical, cellular/neuronal plasticity at selected brain regions, e.g. hippocampus and amygdala.

**Intended learning outcomes**

Students who successfully completed this module will have gained an overview of the characteristics of diverse psychiatric disorders. They will have acquired insights into the neurobiological basis of the etiopathogenesis of these disorders (e.g. which neurotransmitter systems and brain regions are involved), how they are treated and into current concepts and experimental approaches studying these psychiatric disorders.

**Courses** (type, number of weekly contact hours, language — if other than German)

- \( V \) (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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<td>03-TN-PSYT2-152-m01</td>
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<td>1 semester</td>
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**Contents**

The literature seminar is based on fundamental literature on lecture-relevant topics to document the experiments underlying our present knowledge in neuropsychiatric diseases.

**Intended learning outcomes**

Students will acquire a theoretical understanding of how methods in molecular biology work and will learn how to publish scientific results in the field of neurobiology/neuropsychiatry.

**Courses** (type, number of weekly contact hours, language — if other than German)

| S (2) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

| e) presentation (20 to 45 minutes) |

**Allocation of places**

| -- |

**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

| -- |
Module title | Abbreviation
--- | ---
Biopsychology 1 | 06-TN-BPSY1-152-m01

Module coordinator | Module offered by
--- | ---
holder of the Professorship of Experimental Clinical Psychology, holder of the Professorship of Clinical Psychology, Biological Psychology and Psychotherapy | Institute of Psychology

ECTS | Method of grading | Only after succ. compl. of module(s)
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5 | numerical grade | --

Duration | Module level | Other prerequisites
--- | --- | ---
1 semester | graduate | --

Contents
In this module, the students acquire basic knowledge of Biopsychology, which deals with biological processes associated with intrapsychic processes. In the lecture, the students mainly gain methodological knowledge and become familiar with a broad range of non-invasive research methods used in Biopsychology. Special focus is laid on techniques of human subject research (e.g. EEG, MRI, peripheral physiology, neurostimulation) which are illustrated with examples from current research.

Intended learning outcomes
The students acquire profound knowledge of the questions and methodological inventory of Biopsychology. They acquire professional knowledge of the dynamic interactions between mental and biological processes in humans and become familiar with different methods of depicting these processes.

Courses (type, number of weekly contact hours, language — if other than German)
V (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

Allocation of places
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Additional information
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**Contents**

This module elaborates on the interaction between intrapsychic and biological processes on the basis of specific topic areas (e.g. perception and attentiveness, learning and memory, emotion and motivation). It introduces and discusses current research projects and provides a detailed insight into the research methodology of Biopsychology. Whilst focusing on human subject research, the module also addresses its connections to research approaches of animal studies.

**Intended learning outcomes**

The students acquire profound knowledge of biopsychological content questions and gain professional knowledge regarding the application of well-founded biological research methods for the examination of intrapsychic processes. They gain insights into psychological theories and models and become acquainted with neuroscientific approaches to the explanation of fundamental and applied questions (e.g. from Clinical Psychology).

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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### Contents

Students get an intense training in at least two different methods from different fields of neurosciences.

### Intended learning outcomes

Students have reinforced previously acquired lab skills, acquired new lab techniques and learned how to apply theoretical knowledge in the lab. Students have gained expertise in the analysis and presentation of raw data.

### Courses (type, number of weekly contact hours, language — if other than German)

P (2)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) log (approx. 10 to 30 pages) or b) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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### Module title
Pain

### Abbreviation
03-TN-P-152-m01

### Module coordinator
University Hospital, Department of Anaesthesia and Critical Care

### Module offered by
Faculty of Medicine

### ECTS
5

### Method of grading
Only after succ. compl. of module(s)

### Duration
1 semester

### Module level
graduate

### Other prerequisites
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### Contents
Main topics: medical examination of patients with pain, practical courses in medical examination, immunohistochemistry/immunofluorescence of dorsal root ganglia/sciatic nerve, calcium imaging of dorsal root ganglia and in transfected HEK293 cells.

### Intended learning outcomes
In this course, students will learn about the (patho-)physiology of pain, neuroanatomical structures and therapeutic opportunities. In molecular biology-based experiments and calcium imaging in a hands-on lab course, methods in molecular pain research will be demonstrated. An insight into pain examination in the clinical routine will be given by demonstration of patients and in self-experience-based practical courses. Results will be summarised by students and discussed in a short presentation at the end of the course.

### Courses
V (0) + P (2)

### Method of assessment
e) presentation (20 to 45 minutes)

### Allocation of places
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### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)
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Module title | Neuroinflammation
---|---
Abbreviation | 03-TN-NI-152-m01

Module coordinator | Department of Neurology, Section of Developmental Neurobiology and Institute of Virology and Immunobiology
Module offered by | Faculty of Medicine

ECTS | 5
Method of grading | Only after succ. compl. of module(s)
Duration | 1 semester
Module level | graduate
Other prerequisites | --

Contents
Introduction to neural cells and structures relevant for neuroinflammation (glial cells, myelin, myelin molecules, synapses, nodes of Ranvier), components of the innate immune system I: macrophages and microglial cells, components of the innate immune system II: dendritic cells, NK cells, granulocytes; antigen presentation; lymphatic organs, components of the adaptive immune system: lymphocytes and antigen recognition, the phenomenon of tolerance and autoimmunity, experimental models for neuroinflammation (EAE, cuprizone, EAN); the BBB, clinics, pathogenesis and therapy of multiple sclerosis, role of inflammation in primarily neurological/neurodegenerative disorders (Alzheimer's disease; inherited neuropathies).

Intended learning outcomes
Students who successfully completed this module will have acquired solid insights into fundamental and disease-relevant aspects of neuroimmunology and neuroinflammation. They will have learned to critically read scientific publications and will have been trained in the ability to extract relevant information from the original scientific literature.

Courses (type, number of weekly contact hours, language — if other than German)
V (0) + S (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

Allocation of places
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Additional information
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**Contents**

Main topics: physiological properties of membranes, structure-function relationships of ligand-gated and voltage-gated ion channels, regulation and pharmacology of ion channels, anatomical expression profiles, developmental regulation, evolution of ion channels, sensory systems, ion channelopathies, cLabs/Neuron to simulate various electrophysiological conditions, whole cell patch clamp recordings to determine ion channel properties.

**Intended learning outcomes**

Students who successfully completed this module will have acquired distinct knowledge on various families of ion channels and their importance for brain physiology. Students will have learned in a bottom-up approach to put the molecular findings into the context of pathomechanisms in various kinds of channelopathies. They will have been trained in recording techniques to study ion channel properties on transfected/injected cell lines/oocytes as well as primary murine neurons. Additionally, they will have been trained to critically read, reflect and present scientific reports in the field of channel physiology.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (0) + S (0) + P (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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## Contents

Content: target identification for functional and molecular neuroimaging, basic concepts of radiochemistry, radiolabelling of surrogate markers for PET and SPECT, basic concepts of magnetic resonance imaging, basic concepts of positron emission tomography, single photon emission computed tomography and hybrid devices (PET/CT, SPECT/CT), anatomic and functional structures of the brain in small animals, anatomic and functional structures in humans and patients with neurodegenerative disorders and dementia, multimodality multiparametric imaging of brain tumours using MR, PET and SPECT.

## Intended learning outcomes

Students who successfully completed this module will have acquired insights into current experimental approaches in neurobiology. They will have been introduced to preparations and recording techniques to study the function and pathomechanisms of neural model systems. The students will have examined clinical aspects of neurobiology with a focus on the molecular, cellular and physiological mechanisms. Additionally, they will have learned how to document their own data that they collected during lab courses. In addition, the students will have learned to critically reflect their data in the context of the experimental methods used.

## Courses (type, number of weekly contact hours, language — if other than German)

V (0) + S (2)

## Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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## Allocation of places

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## Additional information

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## Referred to in LPO I (examination regulations for teaching-degree programmes)

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Master’s with 1 major Translational Neuroscience (2015)
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**Contents**

Fundamentals of fMRI signal (BOLD response), preprocessing of fMRI data and the definition of single-subject models, the analysis of behavioural data of the experimental paradigm and its implementation into first-level analyses, group (second-level) analyses of fMRI data, ANOVA models, multiple regression models.

**Intended learning outcomes**

Students who successfully completed this module will have acquired insights into the basics of fMRI data analysis, preprocessing of functional and anatomical MR data. Behavioural data during an attentional paradigm will be analysed and implemented into the statistical analysis of brain activation patterns from patients with and without ADHD.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (0) + Ü (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module title
Biology and Disease of the Peripheral Nerve

### Abbreviation
03-TN-PN-152-m01

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### Contents
Cellular elements of the PN I: origin, development, structure, myelin formation. Cellular elements of the PN II: lesion, regeneration and surgical reconstitution, physiology and pathophysiology. Diseases I: inflammatory (GBS, CIDP, myasthenia; clinic and therapy), Diseases II: diabetes; iatrogenic (e. g. vincristine; clinic and therapy), Diseases III: inherited NPs (including models and attempts for treatment approaches). The literature seminar is based on fundamental literature on lecture-relevant topics to document the experiments underlying our present knowledge in peripheral nerve research.

### Intended learning outcomes
Students who successfully completed this module will have acquired insights into cellular elements of the peripheral nerve, physiology and pathophysiology. The students will have examined clinical aspects of diseases with the involvement of peripheral nerves with a focus on the molecular mechanisms and therapeutical options. Additionally, they will have learned how to evaluate and present data in oral form. In addition, the students will have learned to critically read scientific publications in the field of peripheral nerve diseases and will have been trained in the ability to extract relevant information from the original literature.

### Courses (type, number of weekly contact hours, language — if other than German)
V (0) + S (2)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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### Allocation of places
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### Additional information
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### Developmental Neuropsychiatry

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### Contents

Neurodevelopmental aspects of ADHD, anxiety disorders, autism spectrum disorder and eating disorders, developmental psychopharmacology, transcranial ultrasound: theory and application, EEG: theory and application.

### Intended learning outcomes

Students who successfully completed this module will have acquired insights into neurodevelopmental aspects of child and adolescent psychiatric disorders including clinical aspects, aetiology and research approaches on ADHD, anxiety disorders, autism spectrum disorder and eating disorders. Developmental aspects of psychopharmacology are further discussed.

### Courses (type, number of weekly contact hours, language — if other than German)

V (0) + S (2)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (30 to 60 minutes, including multiple choice questions)
- b) log (approx. 10 to 30 pages)
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- d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)
- e) presentation (20 to 45 minutes)

### Allocation of places

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### Additional information

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### Referred to in LPO I (examination regulations for teaching-degree programmes)

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Subdivided Module Catalogue for the Subject
Translational Neuroscience
Master's with 1 major, 120 ECTS credits

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<td>Faculty of Medicine</td>
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**Contents**

Structure, function, and molecular functional components of the peripheral nerves of the nervous system including its neuronal and non-neuronal cells as well as the neuromuscular endplate (model system mouse), motor behavioural tests in mouse models for motoneuron diseases; functional and morphological analysis of motoneurons and motor endplates, neural stem cells: characteristics, approaches for therapeutic strategies, anatomical, cellular/neuronal plasticity at selected brain structures, e.g. hippocampus and cerebellum (mouse model), immunohistochemistry/immunofluorescence in hippocampal/cerebellar slices, confocal microscopy, primary neuron preparations of dorsal root ganglia and hippocampal neurons, mouse perfusion, cLabs/Neuron to simulate various electrophysiological conditions, whole cell patch clamp recordings to determine ion channel properties.

**Intended learning outcomes**

Students who successfully completed this module will have acquired insights into current experimental approaches in neurobiology. They will have been introduced to preparations and recording techniques to study the function and pathomechanisms of neural models systems. The students will have examined clinical aspects of neurobiology with a focus on the molecular, cellular and physiological mechanisms. Additionally, they will have learned how to document their own data that they collected during lab courses. In addition, the students will have learned to critically reflect their data in the context of the experimental methods used.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (0) + P (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

Log (approx. 10 to 30 pages)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

Brain regions and neurotransmitter systems involved in neuronal networks involved in experiencing anxiety and fear, attentional networks, learning and memory, and their importance for emotionality in humans, analysis of gene variants and their association with various psychiatric disorders and behavioural traits; animal models for psychiatric disorders, gene x environment interaction; neuroadaptive mechanisms as a result of stress exposure during different periods of lifetime; resilience, epistatic load hypothesis, mis match hypothesis, anatomical, cellular/neuronal plasticity at selected brain regions, e. g. hippocampus and amygdala; adult neurogenesis; immunohistochemistry/immunofluorescence using forebrain slices; neuronal reconstructions using the Neurolucida software.

**Intended learning outcomes**

Students who successfully completed this module will have acquired insights into current concepts and experimental approaches in psychiatry and especially in the neurobiological basis of the etiopathogenesis and the treatment of psychiatric disorders. They will have been trained in molecular biology methods, e. g. genotyping, gene expression analysis and in various methods studying structural neuronal plasticity of the brain. Additionally, they will have learned how to evaluate and present data in oral and written form that was collected during the lab course. In addition, the students will have learned to critically read scientific publications in the field of neurobiology/neuropsychiatry.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (0) + P (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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## Module: Developmental cognitive Neuroscience

### Module details:
- **Abbreviation:** 03-TN-DCN-152-m01
- **Module coordinator:** University Hospital, Department of Child and Adolescent Psychiatry, Psychosomatics and Psychotherapy
- **Module offered by:** Faculty of Medicine
- **ECTS:** 5
- **Method of grading:** Only after succ. compl. of module(s)
- **Duration:** 1 semester

### Contents:
- **Main topics:**
  - Normal cognitive development of learning and memory processes and its associated brain circuits including the hippocampus and the prefrontal cortex.
  - Abnormal cognitive development of learning and memory processes in the context of learning disabilities and behavioural disorders.
  - Normal language processing development and its associated brain regions.
  - Abnormal language development in the context of dyslexia.
  - Normal cognitive development of attention and its associated brain circuits including the prefrontal cortex, parietal regions and the striatum.
  - Abnormal brain development.
  - Normal development of ‘theory of mind’ and its associated brain regions.
  - Abnormal development in the context of autism.
  - Normal emotional development and its associated brain regions.
  - Abnormal development in the context of anxiety and depression.

### Intended learning outcomes:
- Students who successfully completed this module will have acquired insights into the current scientific debate of normal and abnormal cognitive skills and brain development. Developmental changes of basic cognitive skills such as learning and memory, speech, attention, theory of mind and emotion processing will be addressed via behavioural and neuroscientific studies. Abnormal development will be explained in the context of the neuropsychiatric disorders learning disabilities, reading disabilities, attention-deficit/hyperactivity disorder, autism and anxiety/depression. The influences of genes, hormones and sex will be discussed.

### Courses
- **Type:** (V, S, Ü)
- **Number of weekly contact hours:** (0) + (0) + (2)

### Method of assessment
- **Type:** (written examination, log, oral examination, oral examination in groups, presentation)
- **Scope:** (30 to 60 minutes, approx. 10 to 30 pages, 30 to 60 minutes, approx. 20 to 45 minutes)
- **Language:** (if other than German)
- **Examination offered:** (if not every semester, information on whether module can be chosen to earn a bonus)

### Allocation of places
- **--**

### Additional information
- **--**

### Referred to in LPO I
- (examination regulations for teaching-degree programmes)
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Contents

Cutting edge topics in neurosciences, content varies each semester.

Intended learning outcomes

Students gain an overview of current topics in neurosciences.

Courses (type, number of weekly contact hours, language — if other than German)

V (4)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

Allocation of places

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Additional information

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Referred to in LPO I (examination regulations for teaching-degree programmes)

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**Contents**

Cutting edge topics in neurosciences, content varies each semester.

**Intended learning outcomes**

Students gain an overview of current topics in neurosciences.

**Courses** (type, number of weekly contact hours, language — if other than German)

V (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module title

Advanced Subject Lecture 3 (actual lectures to be specified)

### Abbreviation

03-TN-ASL-3-152-m01

### Module coordinator

programme coordinator

### Module offered by

Faculty of Medicine

### ECTS

5

### Method of grading

Only after succ. compl. of module(s)

### (not) successfully completed

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### Duration

graduate

### Module level

Please consult with course advisory service in advance.

### Other prerequisites

#### Contents

Cutting edge topics in neurosciences, content varies each semester.

#### Intended learning outcomes

Students gain an overview of current topics in neurosciences.

#### Courses (type, number of weekly contact hours, language — if other than German)

V (2)

#### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes)

#### Allocation of places

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#### Additional information

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### Contents
Design and presentation of a poster with description of the research results of a project.

### Intended learning outcomes
Poster design and oral presentation of scientific results, ability to answer specific questions in the context of the research project with a special regard to experimental design and interpretation of data.

### Courses
(type, number of weekly contact hours, language — if other than German)

S (2)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

poster in accordance with conference specifications

### Allocation of places
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### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)

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**Contents**

Design and presentation of a talk with description of the research results of a project.

**Intended learning outcomes**

Talk design and oral presentation of scientific results, ability to answer specific questions in the context of the research project with a special regard to experimental design and interpretation of data.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (4)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

Transferable skills tutorials: scientific writing and presentation skills.

**Intended learning outcomes**

Students have developed fundamental scientific writing and presentation skills.

**Courses** (type, number of weekly contact hours, language — if other than German)

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**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Contents**
Transferable skills tutorials: patent law, validation of enormous amounts of imaging data using special software.

**Intended learning outcomes**
Students are familiar with the fundamental principles of patent law and special software.

**Courses** (type, number of weekly contact hours, language — if other than German)
T (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**
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**Additional information**
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**Contents**

Students work as tutors. They support teaching and are involved in the organisation and planning of lectures, seminars and practical courses.

**Intended learning outcomes**

Tutors will learn how to convey complex topics and to independently supervise a group of students. In addition, they will learn to organise and plan their own projects and to teach the contents to students.

**Courses** (type, number of weekly contact hours, language — if other than German)

T (1)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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**Contents**

Students work as tutors. They support teaching and are involved in the organisation and planning of lectures, seminars and practical courses.

**Intended learning outcomes**

Tutors will learn how to convey complex topics and to independently supervise a group of students. In addition, they will learn to organise and plan their own projects and to teach the contents to students.

**Courses** (type, number of weekly contact hours, language — if other than German)

T (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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### Module title
Advanced lab rotation 2

### Abbreviation
03-TN-LR2-152-m01

### Module coordinator
programme coordinator

### Module offered by
Faculty of Medicine

### ECTS
10

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
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### Duration
1 semester

### Module level
graduate

### Other prerequisites
Please consult with course advisory service in advance.

## Contents

Students spend 4 weeks working under supervision on a small, well-defined scientific lab project.

## Intended learning outcomes

Students have reinforced previously acquired lab skills, acquired new lab techniques and learned how to apply theoretical knowledge in the lab. Students have gained expertise in the analysis and presentation of raw data.

## Courses

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## Method of assessment

a) log (approx. 10 to 30 pages) or b) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or c) presentation (20 to 45 minutes)

## Allocation of places

--

## Additional information

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## Referred to in LPO I
(examination regulations for teaching-degree programmes)

--
### Module title
Advanced lab rotation 3

### Abbreviation
03-TN-LR3-152-m01

### Module coordinator

### Module offered by
programme coordinator
Faculty of Medicine

### ECTS
10

### Method of grading
numerical grade

### Only after succ. compl. of module(s)
--

### Duration
1 semester

### Module level
graduate

### Other prerequisites
Please consult with course advisory service in advance.

### Contents
Students spend 6 weeks independently working on their own small, well-defined scientific lab project.

### Intended learning outcomes
Students have reinforced previously acquired lab skills, acquired new lab techniques and learned how to apply theoretical knowledge in the lab. Students have gained expertise in the analysis and presentation of raw data.

### Courses
(type, number of weekly contact hours, language — if other than German)

- P (4)

### Method of assessment
(type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) log (approx. 10 to 30 pages) or b) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or c) presentation (20 to 45 minutes)

### Allocation of places
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### Additional information
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### Referred to in LPO I
(examination regulations for teaching-degree programmes)

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**Contents**

Research experience abroad in agencies, institutes or industry. Topics will vary according to the individual place selected for a placement.

**Intended learning outcomes**

Students are familiar with the structures of institutes and the industry abroad and acquire abilities that qualify them for a career in science.

**Courses** (type, number of weekly contact hours, language — if other than German)

| P (4) |

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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## Advanced Practical Course Neuroscience Lab 1

**Abbreviation:** 03-TN-AL-1-152-m01

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### Contents

Students independently work on a well-defined scientific lab project.

### Intended learning outcomes

Students have reinforced previously acquired lab skills, acquired new lab techniques and learned how to apply theoretical knowledge in the lab. Students have gained expertise in writing lab reports and know how to give presentations about scientific data.

### Courses (type, number of weekly contact hours, language — if other than German)

- P (4)

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (30 to 60 minutes, including multiple choice questions) or b) log (approx. 10 to 30 pages) or c) oral examination of one candidate each (30 to 60 minutes) or d) oral examination in groups of up to 3 candidates (approx. 30 to 60 minutes) or e) presentation (20 to 45 minutes)

### Allocation of places

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### Additional information

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### Contents

Current progress in the research group: presentation and discussion of the results of all research group members, exchange of experiences, troubleshooting tips.

### Intended learning outcomes

Students have developed problem solving skills, presentation skills, scientific discussion skills as well as troubleshooting skills and are able to plan experiments.

### Courses (type, number of weekly contact hours, language — if other than German)

| S (2) |

### Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- e) presentation (20 to 45 minutes)

### Allocation of places

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### Additional information

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**Contents**

Presentation and discussion of cutting edge literature.

**Intended learning outcomes**

Overview of cutting edge literature in the field of neuroscience, ability to critically read, present and discuss the content of publications.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Contents**

Invited guest speakers present and discuss cutting edge research including novel/current methods as well as fundamental research with relevance to the current programme/topics of the research group.

**Intended learning outcomes**

Students acquire an overview of cutting edge research in their field as well as an understanding of new and current methods.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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Intended learning outcomes
Students acquire an overview of cutting edge research in their field as well as an understanding of new and current methods.

Courses (type, number of weekly contact hours, language — if other than German)
S (2)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)
e) presentation (20 to 45 minutes)

Allocation of places
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**Contents**

Discussion of current methods and techniques required in lab projects. Insights into and training in novel methods.

**Intended learning outcomes**

Students acquire proficiency in those methods and techniques that are required in their lab projects.

**Courses** (type, number of weekly contact hours, language — if other than German)

W (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

- a) written examination (30 to 60 minutes, including multiple choice questions) or
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**Allocation of places**

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**Contents**
Discussion of current methods and techniques required in lab projects. Insights into and training in novel methods.

**Intended learning outcomes**
Students acquire proficiency in those methods and techniques that are required in their lab projects.

**Courses** (type, number of weekly contact hours, language — if other than German)

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**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

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**Contents**

Presentation of current research project results in the form of a poster and/or talk. Critical evaluation of results and their discussion in the research community. Discussion and evaluation of interim progress reports with supervisors/examination committee and troubleshooting.

**Intended learning outcomes**

Poster design skills, (oral) presentation skills, ability to critically discuss results taking into consideration current literature in the field, troubleshooting skills, evaluation of interim progress reports.

**Courses**

(type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Contents**

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**Intended learning outcomes**

Poster design skills, (oral) presentation skills, ability to critically discuss results taking into consideration current literature in the field, troubleshooting skills, evaluation of interim progress reports.

**Courses** (type, number of weekly contact hours, language — if other than German)

S (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

e) presentation (20 to 45 minutes)

**Allocation of places**

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**Additional information**

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**Contents**

The investigation of a current scientific topic using modern methods and technologies. The documentation of the research results in a written thesis, and an oral examination.

**Intended learning outcomes**

Students are able to independently plan and execute a scientific research project. They are able to collect, present and interpret raw data according to international standards of good scientific conduct. They are able to summarise their data in a written paper according to scientific rules and standards. Students are able to critically discuss and defend their experiment plan, results and interpretations in the context of current publications in their field. They have acquired a broad expertise in their field of study as well as in related fields.

**Courses**

No courses assigned to module

**Method of assessment**

Master’s thesis (50 to 100 pages)

**Allocation of places**

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**Additional information**

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**Contents**

The investigation of a current scientific topic using modern methods and technologies. The documentation of the research results in a written thesis, and an oral examination.

**Intended learning outcomes**

Students are able to independently plan and execute a scientific research project. They are able to collect, present and interpret raw data according to international standards of good scientific conduct. They are able to summarise their data in a written paper according to scientific rules and standards. Students are able to critically discuss and defend their experiment plan, results and interpretations in the context of current publications in their field. They have acquired a broad expertise in their field of study as well as in related fields.

**Courses** (type, number of weekly contact hours, language — if other than German)

K (2)

**Method of assessment** (type, scope, language — if other than German, examination offered — if not every semester, information on whether module can be chosen to earn a bonus)

presentation of Master's thesis (30 minutes) and discussion (15 minutes)

Language of assessment: Upon agreement of both examiners, assessment may also be held in English or another language.

**Allocation of places**

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**Additional information**

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**Referred to in LPO I** (examination regulations for teaching-degree programmes)

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