Module Descriptions

Master of Science Molecular and Translational Neuroscience

Examination Regulations in the Version of: 2024

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Introduction to Human Neurophysiology

Modules referring to Introduction to Molecular and Translational Neuroscience

Code	8830074305
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Prof. Dr. Leda Dimou
Allocation of study programmes	Molecular and Translational Neuroscience MSc., start of studies: winter semester, compulsory module, 1st semester
Recommended prerequisites	None
Learning objectives	The module teaches the fundamentals of physiological processes in the human nervous system. The molecular and cellular mechanisms underlying the brain, such as the electrical properties of neurons, communication between neural cells, neuronal plasticity and neuronal circuits, are taught here. Students who have successfully completed this module, will • have learned the basics in Human Neurophysiology • have gained the basic knowledge of functional properties of the central nervous system in humans • have acquired knowledge of ion channels, neuronal properties, synapses, learning and memory, nociception as well as motor and sensory systems
Syllabus	The module covers the following topics: • ion channels, important equations for electrophysiology • resting membrane potential and action potential • excitation of nerve and muscle cells • synapses (electric, chemical, pre-, post-synapse, synaptic cleft) • plasticity, learning and memory • muscle physiology • reflexes, motor system • autonomic nervous system

- auditory system
- visual system
- nociception

Literature	All books dealing with human (Neuro) Physiology. Suggestions for current literature will be provided at the beginning of the lectures.
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Modul Advanced Molecular and Translational Neuroscience

Introduction to Human Neuroanatomy

Modules referring to Introduction to Molecular and Translational Neuroscience

Code	8830074311
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Deniz Yilmazer-Hanke
Instructor(s)	Prof. Dr. Deniz Yilmazer-Hanke
Allocation of study programmes	Molecular and Translational Neuroscience MSc., start of studies: winter semester, compulsory module, 1st semester
Recommended prerequisites	Contentually: None Formally: Refer to the subject-specific examination regulations of the respective study course, in the version effective when taking up the study programme.
Learning objectives	Students who have successfully completed this module, will • demonstrate an understanding of fundamental principles in neurobiology and neural development • have insight into cell types in nervous structures and their function • be able to identify regions of the nervous system based on their topography • demonstrate an understanding of neuronal systems and associate them with function
Syllabus	During the winter semester 28 hours of lectures (2 hours of instruction per week) will be given comprising: • Introduction to the Nervous System • Brain development • Repair and Regeneration • Molecular Signaling within Neurons • Spinal cord and nerve • Brainstem and cranial nerves • Diencephalic Structures

- Somatic Sensory System
- Acoustic and Vestibular Systems
- Visual System and Overview of Chemical Senses
- Somatic Motor System – Lower and Upper Motor Neuron Circuits
- Modulation of Movement – Basal ganglia and Cerebellum
- Eye Movements and Sensory Motor Integration
- Limbic System and Visceral Motor System
- Cerebral Cortex and Higher Cognitive Functions

Literature	Purves, Augustine, Fitzpatrick, Hall, LaMantia, Mc Namara, and White (editors) 2018, Neuroscience 6th Edition, Oxford University Press
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Modul Advanced Molecular and Translational Neuroscience

Molecular and Translational Neuroscience

Modules referring to Introduction to Molecular and Translational Neuroscience

Code	8830074023
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Prof. Dr. Leda Dimou
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	none
Learning objectives	Students who have successfully completed this module, will • understand the basis of Molecular and Translational Neuroscience • understand the major classes of brain disorders and diagnosis types • learn the most common used *in vitro* and *in vivo* models • acquire a comprehensive perspective of translational Neuroscience, especially on the level of drug development, design, application, delivery as well as clinical trials
Syllabus	The module covers the following topics: • Translational Neuroscience – definition and concept • Personalized medicine • Brain disorders – diagnosis • *In vitro* models for translational neuroscience • *In vivo* models for translational neuroscience • Characterization of *in vitro* and *in vivo* models for MTN • Drug development, design, applications and delivery • Clinical trials • Patients studies, patient selection, biomarkers • Translational approaches

Literature	Literature will be provided at the beginning of the lecture.
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Modul Advanced Molecular and Translational Neuroscience

Practical Training in Laboratory Methods

Modules referring to Introduction to Molecular and Translational Neuroscience

Code	8830074313
ECTS credits	9
Attendance time	9
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Prof. Dr. Leda Dimou
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	Basic knowledge of scientific research
Learning objectives	Students, who have successfully completed this module, will learn basic and advanced laboratory methods.
Syllabus	Methods: Cell culture, transfection, overexpression of proteins, western blot, immune fluorescence microscopy, DNA isolation, PCR, immune fluorescence staining of cells, protein knock down by siRNA, experiments with the zebrafish model organism, genotyping and LacZ-staining of mouse embryos, cloning, transformation of DNA into bacteria cells, kinase assays
Literature	Current literature concerning the used methods, to be announced before each course.
Teaching and learning methods	Practical Training (9 hours per semester week, 9 credit points)
Workload	Attendance time: 140 h (4 weeks, 7 h a day) Additionally preparation for the course, documentation of the results and writing the protocol: 130 h Sum: 270 h

Assessment	The module examination consists of the graded participation in all phases of the laboratory course and the preparation of a labbook. The grading scheme will be announced at the beginning of the lab.
Grading procedure	In the Transcript of Records, the calculated grade for the module examination is entered and shown as one examination performance. The exact modalities will be announced at the beginning of the course.
Basis for	• Modul Advanced Molecular and Translational Neuroscience • Practical trainings in the 3rd semester • Practical master's thesis

Molecular and Translational Neuroscience Advanced Lecture

Modules referring to Advanced Molecular and Translational Neuroscience

Code	8830074317
ECTS credits	3
Attendance time	3
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Prof. Dr. Leda Dimou et. al. (see course catalogue)
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	Compulsory modules to "Introduction to Molecular and Translational Neuroscience"
Learning objectives	Students will • get information for basic and translational research, • learn different methods used in translational neuroscience ranging from induced pluripotent cells and organoids to omics-techniques and the use of animal models, • understand valuable case studies of translational neuroscience in action, • understand how future generations of translational neuroscientists can utilize the full spectrum of techniques at hand.
Syllabus	The module covers the following topics: • Glial cells in health and disease • Embryonic cellular development • hiPSCs and organoids • Transcriptomics • Proteomics • cellular approaches • Glioma • Generation of animal models • Animal models for CNS drug discovery • Behavioral testing of rodents

- Analgesia, anesthesia
- Glioblastoma

Literature	Literature will be provided at the beginning of the course.
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the numer of participants. The type of examination will be announced in time - at least 4 weeks prior to the date of the exam.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Molecular and Translational Neuroscience Advanced Seminar

Modules referring to Advanced Molecular and Translational Neuroscience

Code	8830075650
ECTS credits	4
Attendance time	3
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Prof. Dr. Leda Dimou
Allocation of study programmes	Molecular and Translational Neuroscience MSc, start of studies: wintersemester, compulsory module, 3rd semester
Recommended prerequisites	Compulsory modules referring to "Introduction to Molecular and Translational Neuroscience"
Learning objectives	Building on the lab rotations and in preparation for the master's or even a possible PhD thesis, the module teaches the basics of developing a sound and coherent experimental study design. Based on a scientific question, an experimental strategy to answer it is developed and its general functionality is tested, presented and discussed orally in an appropriate form. This trains the critical questioning of methodological approaches and the conceptual and analytical thinking of the students.
Syllabus	The module covers the following topics: • independent but supervised development of an experimental strategy to answer a scientific question, • integration of methodological and academic knowledge and critical comparison of different options and approaches, • application of basic elements of experimental study designs such as control groups, blinding, experimental controls etc. .

Literature	No specific literature needed, students have to look by themselves for the appropriate papers.
Teaching and learning methods	Seminar (3 hours per semester week, 4 credit points)
Workload	Attendance time: 42 h Private Study: 78 h Sum: 120 h
Assessment	The module examination consists of completing an assignment on a given topic and the graded oral presentation of the results and active participation in the discussion.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement. The exact modalities will be announced at the beginning of the course.
Basis for	-

Advanced Methods in Molecular and Translational Neuroscience

Modules referring to Advanced Molecular and Translational Neuroscience Internships

Code	8830074316
ECTS credits	10
Attendance time	10
Language of instruction	English
Duration	1
Cycle	each Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Mentors of the workgroups
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	A prerequisite for this internship is the successfull completion of the module "Practical training in laboratory methods" (CM 1st semester, module number 74313).
Learning objectives	The practical training will be carried out in one scientific working group. The subject and scope of the project will be set in consultation with the respective head of the lab. After the practical training, students will summarize their data in a written report or an oral presentation and critically discuss published data related to their project. The practical training will enable insights into current methods in translational Neuroscience and provide hands-on experience.
Syllabus	In this module, the following contents are conveyed: • Work on current issues from the research area of the supervising lab group • Instructions for literature, literature management • Development of the theory of a scientific theme • Incorporation into specifically designed tasks required for resolution of the scientific problem • Learning or further deepening of different methods in the lab • Progressive independence in lab work

Literature	Subject specific literature
Teaching and learning methods	Practical Training (10 hours per semester week, 10 Credit points)
Workload	Attendance: 4 weeks (10 SWS) - around 160 h lab presence Pre- and postprocessing: 140 h Sum: 300 h
Assessment	The module examination consists of the graded participation in all phases of the laboratory course and the grade for the preparation of a research protocol or a mini-paper or a presentation.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement.
Basis for	Master's thesis

Molecular and Translational Neuroscience Advanced Practical Training

Modules referring to Advanced Molecular and Translational Neuroscience Internships

Code	8830074319
ECTS credits	10
Attendance time	10
Language of instruction	English
Duration	1
Cycle	each Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Mentors of the workgroups
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	A prerequisite for this internship is the successfull completion of the module "Practical training in laboratory methods" (CM 1st semester, module number 74313).
Learning objectives	The practical training will be carried out in one scientific working group. The subject and scope of the project will be set in consultation with the respective head of the lab. After the practical training, students will summarize their data in a written report or an oral presentation and critically discuss published data related to their project. The practical training will enable insights into current methods in translational Neuroscience and provide hands-on experience.
Syllabus	In this module, the following contents are conveyed: • Work on current issues from the research area of the supervising lab group • Instructions for literature, literature management • Development of the theory of a scientific theme • Incorporation into specifically designed tasks required for resolution of the scientific problem • Learning or further deepening of different methods in the lab • Progressive independence in lab work

Literature	Subject specific literature
Teaching and learning methods	Practical Training (10 hours per semester week, 10 Credit points)
Workload	Attendance: 4 weeks (10 SWS) - around 160 h lab presence Pre- and postprocessing: 140 h Sum: 300 h
Assessment	*not specified*
Grading procedure	*not specified*
Basis for	Master's thesis

Disputation

Modules referring to Master's Thesis and Disputation

Code	8830080001
ECTS credits	10
Attendance time	*keine Angaben*
Language of instruction	The defense is usually held in English. If the Master's thesis is written in German with the consent of the first examiner and the Examination Board, an application may also be made for the defense to be held in German. The application for approval must be submitted to the Examination Board in good time before the application for admission to the Master's thesis.
Duration	1
Cycle	each Semester
Coordinator	Program Director Master Molecular and Translational Neuroscience
Instructor(s)	Both examiners of the thesis
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	The subject-specific examination regulations (FSPO Master MTN) in the current version must be taken into account. In terms of content, the relevant compulsory and compulsory elective modules as well as complementary modules of the degree program count as prior knowledge. The disputation supplements the written part of the Master's thesis and must take place within 6 weeks of submission of the Master's thesis.
Learning objectives	see module master's thesis
Syllabus	see module master's thesis
Literature	subject specific literature

Teaching and learning methods	The disputation consists of a presentation of the results of the Master's thesis followed by a discussion. The defense usually takes place at Ulm University in the presence of both examiners. As a rule, the defense should not exceed 60 minutes and is held in English. The disputation includes a presentation of up to 30 minutes by the candidate followed by a discussion and questions posed by the examiners on the topic of the Master's thesis.
Workload	see module master's thesis
Assessment	The module examination consists of a graded oral examination.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Master's Thesis

Modules referring to Master's Thesis and Disputation

Code	8830080000
ECTS credits	20
Attendance time	*keine Angaben*
Language of instruction	The Master's thesis is generally written in English. The Master's thesis may be written in German with the consent of the first examiner and the Examination Board. The application for approval must be submitted to the Examination Board in good time before the application for admission to the Master's thesis.
Duration	1
Cycle	each Semester
Coordinator	Programme Director of the Master Study Programme Molecular and Translational Neuroscience
Instructor(s)	First and second examiner Entitled examiners see list of the examination board and subject specific examination regulations
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory modules
Recommended prerequisites	Acquisition of at least 84 credit points for admission to the master thesis. Subject-specific study and examination regulations (FSPO Master MTN in the current version) and guidelines for the Master's theses must be taken into account.
Learning objectives	Students who have successfully completed this module • are able to elaborate on a scientific question from the field of neuroscience on the basis of known technologies and document their results (in writing and oral presentation) in accordance with the Guidelines of Research Integrity and Good Scientific Practice. • are able to present a research project in the scientific context and to discuss methods and approaches applied in the broader scientific community. • plan further research and additional investigations on the basis of the results achieved and knowledge gained. • act in compliance with the effective health, safety and environmental regulations. • have learned common methods of literature research, data administration and data processing.

- have acquired soft skills like team work, intercultural capacities and adequate time-management.

Syllabus	This module covers the following subject-specific topics: • Approaches to answer open scientific questions • Common methods of literature research, data administration and data processing • Experimental design, setup, documentation • Interpretation of results in the context of according scientific literature • Discussion of results in the broader scientific community • Implementation of results into new approaches • Critical analysis of methods • Guidelines of scientific publishing • Safety, health and environmental protection, hazard exposure assessment, animal protection • Time management • Team work • Self-organization
Literature	Subject specific literature
Teaching and learning methods	Master thesis (experimental work, laboratory work, etc. with written elaboration)
Workload	900 h (Master's thesis and Disputation)
Assessment	The module examination consists of a graded written elaboration (Master´s Thesis).
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

From Basic Research to Product

Modules referring to Translational Area

Code	8830074040
ECTS credits	6
Attendance time	4
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Lecture series: Dr. Bernd Sommer (responsible), other lecturers from the Boehringer Ingelheim company Seminar: Prof. Dr. Bastian Hengerer
Allocation of study programmes	Molecular and Translational Neuroscience MSc., start of studies: winter semester, compulsory module, 2nd semester.
Recommended prerequisites	None
Learning objectives	Students who have successfully completed this module, • will understand the value creation chain in pharmaceutical research and development • will have basic knowledge of the processes in pharma research • will understand the interdependence of the various working packages • are aware of critical parameters in translating preclinical results to clinical effects
Syllabus	Basic knowledge of the process for identification and validation of novel target molecules in the context of the unmet medical need • Genetics of neurodegenerative diseases • Neuroimmunology • Neurogenesis • Neuronal circuits and optogenetics • Synaptic plasticity, learning and memory Role, value and predictive power of animal models in psychiatric diseases

- Generation and application of gene-modified rodents
- Selection and application of suitable in vivo tests and assays
- Non-invasive functional imaging and related methods

Methods and processes for compound identification and characterization

- Course of the preclinical research phases
- High throughput screening and automatization
- Biologicals for the treatment of CNS diseases
- Cellular imaging, calcium imaging, high content screening

Specific questions at the transition from preclinical to clinical phases

- Properties of drug candidates e.g. DMPK
- Identification and selection of suitable biomarkers
- Issues and phase transitions in clinical research

Literature	Literature will be provided beforehand
Teaching and learning methods	• Lecture (2 hours per semester week, 3 credit points) • Seminar and Excursion if possible (2 hous per semester week, 3 credit points)
Workload	**Lecture:** Attendance time: 28 h Private study: 62 h Sum: 90 h **Seminar (blockevent) and Excursion:** Attendance time: 21 h Private study: 69 Sum: 90 h **Total:** 180 h
Assessment	The module examination consists of a graded written or oral examination, depending on the numer of participants. The type of examination will be announced in time - at least 4 weeks prior to the date of the exam.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Neurological Diseases

Modules referring to Translational Area

Code	8830074335
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	PD Dr. Makbule Senel
Instructor(s)	various lecturers (see course catalogue)
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory module
Recommended prerequisites	
Learning objectives	This module gives students theoretical insight into current knowledge about principle mechanisms of physiologic function of the nervous system and pathology of neurological human diseases. Students are introduced to techniques of clinical diagnosis and state of the art of neuroimaging. The students will then get insights into the major neurological diseases complemented by learning contents about clinical studies and the intersection between clinical medicine and research. After successful accomplishment of this module the students have knowledge about • the functioning and interaction of the central- and peripheral-nervous system • specific pathophysiological mechanisms involved in the pathogenesis of neurological / neurodegenerative diseases including disorders of the pyramidal motor and extrapyramidal motor system, dementia, neuromuscular diseases, neuroinflammation, stroke and epilepsy. Students have the ability to ascribe clinical symptoms to its underlying pathomechanisms. • syndroms, diagnosis and treatment of the major neurological diseases • scopes and conduction of clinical studies
Syllabus	*Lectures will be comprising*

- Introduction and neurological examination
- Peripheral nervous system and cranial nerves
- neurodegenerative diseases I (motoneuron disease)
- neurodegenerative diseases II (extrapyramidal system)
- Neurodegenerative diseases III (dementia)
- Myopathies
- Neuro- and Cerebrovascular diseases
- Epilepsy
- Neoplasia oft he nervous system
- Acute and chronic inflammatory diseases
- Liquor cerebrospinalis in clinical diagnosis and research
- Immunadsorption in neurological diseases
- Neuroimaging

Literature	Oxford Handbook of Neurology, Hadi Manji, Sean Connolly, Neil Kitchen, Christian Lambert; 2014 | 2nd Revised edition; Oxford University Press (Verlag) Klinische Neurologie; Peter Berlit, Springer Berlin Auflage: 3 Jahr: 2011; ISBN: 978-0-19-960117-2 Neurologie, Klaus Poeck, Werner Hacke; 2006 | 12., aktualisierte u. erw. Aufl.Springer Berlin (Verlag); ISBN: 9783642169199
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28h Private Study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Additional Laboratory Internship I

Modules referring to Complementary Area

Code	8830076249
ECTS credits	10
Attendance time	10
Language of instruction	English
Duration	*keine Angaben*
Cycle	*keine Angaben*
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Mentors of the workgroups
Allocation of study programmes	Molecular and Translational Neuroscience MSc., complementary module
Recommended prerequisites	A prerequisite for this internship is the successfull completion of the module "Practical training in laboratory methods" (CM 1st semester / module number 74313).
Learning objectives	The practical training will be carried out in one scientific working group. The subject and scope of the project will be set in consultation with the respective head of the lab. After the practical training, students will summarize their data in a written report or an oral presentation and critically discuss published data relatedto their project. The practical training will enable insights into current methods in translational Neuroscience and provide hands-on experience.
Syllabus	In this module, the following contents are conveyed: • Work on current issues from the research area of the supervising lab group • Instructions for literature, literature management • Development of the theory of a scientific theme • Incorporation into specifically designed tasks required for resolution of thescientific problem • Learning or further deepening of different methods in the lab • Progressive independence in lab work

Literature	Subject specific literature
Teaching and learning methods	Practical Training (10 SWS, 10 ECTS)
Workload	Attendance: 4 weeks (10 SWS) - around 160 h lab presence Pre- and postprocessing: 140 h Sum: 300 h
Assessment	The module examination consists of the graded participation in all phases of the laboratory course and the grade for the preparation of a research protocol or a mini-paper or a presentation.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement.
Basis for	-

Additional Laboratory Internship II

Modules referring to Complementary Area

Code	8830075645
ECTS credits	10
Attendance time	10
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Mentors of the workgroups
Allocation of study programmes	Molecular and Translational Neuroscience MSc., complementary area
Recommended prerequisites	A prerequisite for this internship is the successfull completion of the module "Practical training in laboratory methods" (CM 1st semester / module number 74313).
Learning objectives	The practical training will be carried out in one scientific working group. The subject and scope of the project will be set in consultation with the respective head of the lab. After the practical training, students will summarize their data in a written report or an oral presentation and critically discuss published data related to their project. The practical training will enable insights into current methods in translational Neuroscience and provide hands-on experience.
Syllabus	In this module, the following contents are conveyed: • Work on current issues from the research area of the supervising lab group • Instructions for literature, literature management • Development of the theory of a scientific theme • Incorporation into specifically designed tasks required for resolution of the scientific problem • Learning or further deepening of different methods in the lab • Progressive independence in lab work

Literature	Subject specific literature
Teaching and learning methods	Practical Training (10 SWS, 10 ECTS)
Workload	Attendance: 4 weeks (10 SWS) - around 160 h lab presence Pre- and postprocessing: 140 h Sum: 300 h
Assessment	The module examination consists of the graded participation in all phases of the laboratory course and the grade for the preparation of a research protocol or a mini-paper or a presentation.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement.
Basis for	-

Additive Key Qualifications I

Modules referring to Complementary Area

Code	8830086100
ECTS credits	*keine Angaben*
Attendance time	*keine Angaben*
Language of instruction	*not specified*
Duration	1
Cycle	each Summer Semester
Coordinator	*not specified*
Instructor(s)	*not specified*
Allocation of study programmes	*not specified*
Recommended prerequisites	*not specified*
Learning objectives	*not specified*
Syllabus	*not specified*
Literature	*not specified*
Teaching and learning methods	*not specified*
Workload	*not specified*
Assessment	*not specified*
Grading procedure	*not specified*
Basis for	*not specified*

Additive Key Qualifications II

Modules referring to Complementary Area

Code	8830086200
ECTS credits	*keine Angaben*
Attendance time	*keine Angaben*
Language of instruction	*not specified*
Duration	1
Cycle	each Summer Semester
Coordinator	*not specified*
Instructor(s)	*not specified*
Allocation of study programmes	*not specified*
Recommended prerequisites	*not specified*
Learning objectives	*not specified*
Syllabus	*not specified*
Literature	*not specified*
Teaching and learning methods	*not specified*
Workload	*not specified*
Assessment	*not specified*
Grading procedure	*not specified*
Basis for	*not specified*

German for English-language study programmes II

Modules referring to Complementary Area

Code	8830076659
ECTS credits	3
Attendance time	2
Language of instruction	No English version available yet.
Duration	1
Cycle	each Winter Semester
Coordinator	No English version available yet.
Instructor(s)	No English version available yet.
Allocation of study programmes	No English version available yet.
Recommended prerequisites	No English version available yet.
Learning objectives	No English version available yet.
Syllabus	No English version available yet.
Literature	No English version available yet.
Teaching and learning methods	No English version available yet.
Workload	No English version available yet.
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.

Grading procedure	The module grade is equal to the examination grade.
Basis for	No English version available yet.

Introduction to Computer Science for Psychologists

Modules referring to Complementary Area

Code	8830072430
ECTS credits	6
Attendance time	4
Language of instruction	englisch
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Birte Glimm
Instructor(s)	Prof. Dr. Birte Glimm Dr. Yevgeny Kazakov
Allocation of study programmes	• Cognitive Systems, M.Sc., FSPO 2024 Basic subject for non-computer scientists
Recommended prerequisites	None
Learning objectives	The students can describe the elementary concepts and methods of computer science. They can develop algorithms for small problems in a programming language using simple control structures (loops, conditionals). The students can list the basic data structures (arrays, lists, trees, graphs) and judge their suitability for certain situations. They can explain basic computational mechanisms (modularisation, Divide-and-Conquer, iteration). Finally, they can name, describe, and apply standard algorithms for searching and sorting.
Syllabus	• Definition and properties of algorithms • Number representations • Elementary concepts, principles and methods of computer science • Principles of computing components • Principles of operating systems • Principles of programming languages (syntax, semantics, elementary datatypes, data- and control structures)

Literature	• Nell Dale and John Lewis. Computer Science Illuminated. Jones & Bartlett Learning. 2014. 5th edition. ISBN 978-1-4496-7284-3
Teaching and learning methods	Introduction to Computer Science (for non-computer scientists) (Vorlesung) (2 SWS), Introduction to Computer Science (for non-computer scientists) (Übung) (2 SWS)
Workload	Präsenzzeit: 60h Vor- und Nachbereitung: 120h Summe: 180h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. If a specified academic work is achieved, a grade bonus is awarded at the immediately following examination. The examination grade is improved by one grade level, but not better than 1.0. An improvement from 5.0 to 4.0 is not possible. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	The module helps for any of the interdisciplinary topics that are scheduled later in the curriculum.

Neurobiology and Behaviour (Lecture)

Modules referring to Complementary Area

Code	8830076594
ECTS credits	3
Attendance time	2
Language of instruction	english
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. Annika Herwig
Instructor(s)	Prof. Dr. Annika Herwig
Allocation of study programmes	Biology, M.Sc., FSPO 2022/Compulsory elective area/Advanced topics in biological resilience
Recommended prerequisites	Content: Good knowledge of neurobiology and behavioral biology, e.g., from animal physiology in th bachelor's degree. Formal: none
Learning objectives	Students who have successfully completed this module have, an in-depth understanding of biological rhythms, energy balance and thermoregulation as well as their neurobiological regulatory mechanisms.
Syllabus	• temporal organization of physiological processes and repeated patterns of behavior of organisms • neuronal and molecular control of circadian and seasonal rhythms • thermoregulation and metabolism • neuronal control of energy balance and thermoregulation • principles for scientific work with mammals
Literature	Refinetti: Circadian Physiology, Routlege Taylor & Francis Group
Teaching and learning methods	Neurobiology and Behaviour (Lecture) (2 classroom hours per week, 3 CP, exam no.: 18011)

Workload	Attendance: 30 h Private study: 60 h Sum: 90 h
Assessment	The module assessment consists of a graded written exam.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Master's thesis in our group (institute of neurobiology)

Pharmacology II

Modules referring to Complementary Area

Code	8830072396
ECTS credits	3
Attendance time	2
Language of instruction	German
Duration	1 Semester
Cycle	each Winter Semester
Coordinator	Prof. Dr. Panagiotis Papatheodorou
Instructor(s)	Prof. Dr. Panagiotis Papatheodorou, PD Dr. Barbara Möpps, Prof. Dr. Christoph Schmidt
Allocation of study programmes	Pharmaceutical Biotechnology MSc
Recommended prerequisites	Formal: Compare the subject-specific examination regulations for the corresponding course of study in the version valid or chosen at the time of commencement of studies. Contentual: Courses on toxicology, pharmacology
Learning objectives	Students who have successfully completed this module • know the basic principles of drug development, are able to define pharmacologically relevant aspects of a pharmaceutical (e.g. pharmacokinetics, interactions, adverse drug reactions, etc.) and are aware of the special features of drug therapy under special circumstances (e.g. in old age or in renal/liver insufficiency) • can identify pharmacotherapeutic options for the treatment of important diseases and their pathogenetic and molecular basis.
Syllabus	Presentation of the mode of action of drugs for the therapy of important diseases and the corresponding anatomical and physiological principles: • Drug development: drug safety; drug law & drug testing; clinical studies; drug regulation • Pharmacological properties of commonly used drugs: effects; indications, contraindications; pharmacokinetics; adverse drug reactions; interactions • Main features of pharmacogenetics

- drug therapy under special conditions: pregnancy/breastfeeding; childhood; age; renal and/or liver failure
- Therapy of cardiovascular diseases: coronary heart disease; chronic heart failure; hypertension; cardiac arrhythmia
- Therapy of bronchopulmonary diseases: bronchial asthma; COPD
- Therapy of gastrointestinal diseases: gastroesophageal reflux disease; peptic ulcers; chronic inflammatory intestinal diseases; diseases of the liver and bile ducts; acute/chronic pancreatitis
- Therapy of endocrine diseases: thyroid dysfunction; osteoporosis
- Therapy of metabolic diseases: Diabetes mellitus;lipid metabolism disorders
- Basics of anti-infective therapy: bacterial infections; fungal infections; viral infections; protozoan infections
- Treatment of rheumatic diseases: rheumatoid arthritis
- pain therapy: acute and chronic pain
- Therapy of neurological diseases: idiopathic Parkinson syndrome; seizure disorders; sleep disorders
- Pharmacotherapy of psychiatric diseases: affective disorders; schizophrenia; anxiety disorders

Literature

- Ernst Mutschler, Gerd Geisslinger, Heyo K. Kroemer, Peter Ruth, MonikaSchäfer-Korting: Mutschler Arzneimittelwirkungen. Lehrbuch der Pharmakologie und Toxikologie. Mit einführenden Kapiteln in die Anatomie, Physiologie undPathophysiologie. 9., neubearb. u. erw. Aufl., April 2008, Wissenschaftliche Verlagsgesellschaft
- Klaus Aktories, Ulrich Förstermann, Franz Hofmann, Klaus Starke: Allgemeine und spezielle Pharmakologie und Toxikologie. 11. überar. Aufl., 2013, Urban & Fischer, München.
- Heinz Lüllmann, Klaus Mohr, Lutz Hein: Pharmakologie und Toxikologie. Arzneimittelwirkungen verstehen, Medikamente gezielt einsetzen. 17., überarb.Aufl., April 2010, Thieme, Stuttgart

Teaching and learning methods

Pharmacology for natural scientists (L), 2 SWS, 3 CP

Workload

Presence study: 30 h
Self study: 60 h
Total: 90 h

Assessment

The module examination consists of a graded written exam.

Grading procedure

The module grade is equal to the examination grade.

Basis for

Preparation of the master's thesis

Pharmakology - not graded (Optional Module)

Modules referring to Complementary Area

Code	8830075057
ECTS credits	3
Attendance time	2
Language of instruction	german
Duration	1
Cycle	each Winter Semester
Coordinator	PD Dr. Barbara Möpps
Instructor(s)	PD Dr. Barbara Möpps u.a.
Allocation of study programmes	Biochemistry MSc, optional module
Recommended prerequisites	Formal: Compare the subject-specific examination regulations for the relevant degree program in the version that was valid or selected at the time you started your studies. Content: Lecture ”Pharmacology and Toxicology I” (Bachelor).
Learning objectives	Students who have successfully completed this module • know the basics of drug development, can define pharmacologically relevant aspects of a drug (e.g. pharmacokinetics, interactions, ADRs...) and know about the special features of drug therapy under special circumstances (e.g. in old age or in the case of kidney/liver insufficiency) • can name pharmacotherapeutic options for the treatment of important diseases as well as their pathogenetic and molecular basis
Syllabus	The pharmacology lecture includes the presentation of the mode of action of drugs for the therapy of important diseases as well as the associated anatomical and physiological basics: • Drug development: drug safety; Drug Law & Drug Testing; Clinical studies; drug prescription • Pharmacological properties of commonly used drugs: effects; indications, contraindications; pharmacokinetics; adverse drug reactions; interactions • Fundamentals of pharmacogenetics • Drug therapy under special conditions: pregnancy/breastfeeding; childhood; Age; Renal and/or hepatic insufficiency

- Therapy of cardiovascular diseases: coronary heart disease; chronic heart failure; Hypertension; cardiac arrhythmias
- Therapy of bronchopulmonary diseases: bronchial asthma; COPD
- Therapy of gastrointestinal diseases: gastroesophageal reflux disease; peptic ulcers; inflammatory bowel disease; diseases of the liver and biliary tract; acute/chronic pancreatitis
- Therapy of endocrine diseases: thyroid dysfunction; osteoporosis
- Therapy of metabolic diseases: diabetes mellitus; dyslipidemia
- Basics of anti-infective therapy: bacterial infections; fungal infections; viral infections; protozoal infections
- Therapy of rheumatic diseases: rheumatoid arthritis
- Pain therapy: acute and chronic pain
- Therapy of neurological diseases: idiopathic Parkinson's syndrome; seizure disorders; sleep disorders
- Pharmacotherapy of psychiatric disorders: mood disorders; Schizophrenia; anxiety disorders

Literature

- Ernst Mutschler, Gerd Geisslinger, Heyo K. Kroemer, Peter Ruth,Monika Schäfer-Korting: Mutschler Arzneimittelwirkungen. Lehrbuch der Pharmakologie und Toxikologie. Mit einführenden Kapiteln in die Anatomie, Physiologie und Pathophysiologie. 9., neu bearb. u. erw. Aufl., April 2008, Wissenschaftliche Verlagsgesellschaft
- K. Aktories, U. Förstermann, F. Hofmann, K. Starke: Allgemeine und spezielle Pharmakologie und Toxikologie. 10. überar. Aufl., 2009, Urban & Fischer,München.
- Heinz Lüllmann, Klaus Mohr, Lutz Hein: Pharmakologie und Toxikologie. Arzneimittelwirkungen verstehen, Medikamente gezielt einsetzen. 17., überarb.Aufl., April 2010, Thieme, Stuttgart

Teaching and learning methods

Pharmacology for scientists II (V), 2 SWS, 3 CP, WiSe

Workload

Presence study: 60 h
Self study: 30 h
Total: 90 hours

Assessment

The credit points will be awarded once the written exam has been passed. No prerequisites are necessary for exam registration.

Grading procedure

The module is not graded.

Basis for

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Toxicology for Natural Sciences

Modules referring to Complementary Area

Code	8830075245
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Holger Barth
Instructor(s)	Prof. Dr. Holger Barth, Prof. Dr. Panagiotis Papatheodorou
Allocation of study programmes	Molecular Medicine M.Sc., part of the specialization in Toxicology, compulsory elective module, 1st semester
Recommended prerequisites	Basic knowledge in biology, biochemistry
Learning objectives	**Learning targets:** to understand, recapitulate and critically reflect mechanisms associated with issues associated with poisons and toxins **Scientific skills:** to obtain a solid basic knowledge on toxicology and relevant substance classes (see under "content" for details) **Relevance of the module for the study programme:** essential basis for all further modules in the specialization "Toxicology"
Syllabus	1. Basics of toxicology, introduction, important vocabulary, "What makes a substance a poison?": dose, exposition, molecular mechanism; basics in anatomy and physiology in the context of toxicology; acute vs. chronic intoxication

2. Basics in clinical toxicology: first aid, antidota, poison elimination, reasons for acute intoxication
3. Selected groups of toxicologically important substances: Gases, particles (dust, asbestos, etc.), toxicology of the lungs; metals (HG, Cd, Pb); alcohols and organic solvents; drugs: toxicology of the liver; pesticides; chemical carcinogenesis; natural toxins (animals, plants, fungi, bacteria)

Literature	Will be provided during the course if necessary.
Teaching and learning methods	Lecture
Workload	
Assessment	The module examination consists of a graded written or oral examination, depending on the numer of participants. The type of examination will be announced in time - at least 4 weeks prior to the date of the exam.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Master in Molecular Medicine, specialization in "Toxicology"

Appropriate Medical Device Design

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830075312
ECTS credits	4
Attendance time	3
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Walter Karlen
Instructor(s)	Prof. Walter Karlen
Allocation of study programmes	Master Communications and Computer Engineering Master Electrical Engineering and Information Technology Master Communication and Information Technology Master Molecular and Translational Neuroscience Bachelor Computational Science and Engineering Biophysics M.Sc., FSPO 2024, compulsory elective, specialization, 1st - 3rd semester
Recommended prerequisites	None
Learning objectives	At the end of the course, students can • name and describe the 4 main principles that define appropriate technology • apply these principles to critically analyse and assess health systems and technology • project him/herself into an unfamiliar person and environment • modify specifications of existing systems to improve appropriateness • discuss the challenges and illustrate the consequences of proposed design modifications • communicate effectively the results of his/her system analysis

Syllabus

This course elaborates upon relevant aspects in the conception, implementation and distribution of health devices and systems that effectively meet peoples and societies' needs in a local context. Four key elements of appropriateness (usage, cost, durability and performance) that are integral to the engineering design process are extensively discussed. Applications of point-of-care and mobile health devices to various user groups, such as the elderly or low income communities, are analysed.

The main **learning objectives** are to

- Evaluate the appropriateness of medical devices to the cultural, financial, environmental, and medical context in which they will be applied
- Design medical devices from a user's perspective for a specific context and health system

The course will be interactive and involve roleplay. Please do not sign up for this course if you are not ready to leave your comfort zone in class. The lectures are divided in two parts: The first part elaborates upon the important concepts of the design of health care devices and systems, and discusses implementation and dissemination strategies. We focus on communities such as low income households, the elderly, and patients with chronic illnesses that have special needs. Topics covered include point-of-care diagnostics, information and communication technologies, mobile health, user interactions, and also social-cultural considerations. The second part consists of elaboration of an appropriate device conducted by student groups. Each group will analyse an existing product or solution, critically assess its appropriateness according to the criteria learned in class, and provide explanations as to why the system succeeds or fails. The students will also present design improvements. The grade bonus will be based on a written case report due in the middle of the semester, the ungraded study achievement is a poster discussion and demo at the end of the semester.

Literature

- WHO, "Medical Devices: Managing the Mismatch", 2010.
- PATH, "The IC2030 report. Reimagining Global Health," 2015.
- R. Malkin and K. Von Oldenburg Beer, "Diffusion of novel healthcare technologies to resource poor settings," Annals of Biomedical Engineering, vol. 41, no. 9, pp. 1841:50, 2013.

Teaching and learning methods

Lecture: 1SWS

Exercise: 1SWS

Project: 1SWS

Workload

Active: 45

Prep & eval: 75

Sum 120

Assessment

The module examination consists of a graded written or oral examination, depending on the number of participants. If a specified academic work is

	achieved, a grade bonus is awarded in accordance with §17 (3a) of the General Examination Regulations at the immediately following examination. The examination grade is improved by one grade level, but not better than 1.0. An improvement from 5.0 to 4.0 is not possible. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Bioinformatics and Systems Biology

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830072138
ECTS credits	6
Attendance time	4
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Hans Armin Kestler
Instructor(s)	Prof. Dr. Hans Armin Kestler, Prof. Dr. Michael Kühl, Prof. Dr. Franz Oswald, Dr. Karlheinz Holzmann, Prof. Dr. Enno Ohlebusch, Jun. Prof. Dr. Medhanie Mulaw, Dr. Alexander Groß, Dr. Johann Kraus, Dr. Silke Werle, Dr. Sebastian Wiese, M.Sc. Paul Kaftan, M.Sc. Tobias Nietsch
Allocation of study programmes	Molecular Medicine M.Sc., first semester Molecular and Translational Neuroscience M.Sc., first semester Mathematische Biometrie M.Sc., first semester Biophysics M.Sc., first semester Informatik M.Sc., first semester Biology M.Sc., first semester Biochemie M.Sc., first semester
Recommended prerequisites	Basic knowledge of molecular biology and bioinformatics
Learning objectives	Students should be able to • describe the most important concepts in bioinformatics and systems biology. • apply, discuss and interpret state-of-the-art techniques out the field of bioinformatics and systems biology. • interpret basic mathematical networks and models.

Syllabus	Principles of molecular biology, data mining techniques, sequence alignment, phylogenetic inference and structural anaylsis, signal transduction, pathway analysis, modeling- and reconstruction techniques
Literature	• Alberts, B., Johnson, A., Lewis, J., Raff, M., Roberts, K., Walter, P.: Molecular Biology of the Cell, 6th Edition. Garland Science (2014) • Agostino, M.: Practical Bioinformatics, Garland Science (2013) • Draghici, S.: Statistics and Data Analysis for Microarrays Using R and Bioconductor. Chapman and Hall/CRC (2016) • Voit, E.: A First Course in Systems Biology, 2nd Edition. Garland Science (2017) • Alon, U.: An Introduction to Systems Biology: Design Principles of Biological Circuits. Chapman & Hall/CRC (2020) • Klipp, E. et al. Systems Biology: A Textbook, 2nd Edition. Wiley-VCH, (2016) • Adler, J.: R in a Nutshell, 2nd Edition. O'Reilly Media, Inc (2012)
Teaching and learning methods	seminar, exercises
Workload	~ 160 h (54 h presence, ~108 h self studies)
Assessment	The module examination consists of a graded written examination.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Master in Molecular Medicine

Clinical Neuroscience Basic Lectures

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830075008
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	PD Dr. Makbule Senel
Instructor(s)	see course catalogue
Allocation of study programmes	Molecular and Translational Neuroscience MSc., Compulsory Elective Module Biology MSc., Compulsory Elective Module 3104 Medizinische Neurowissenschaften, Compulsory elective area Research focus Medicine
Recommended prerequisites	None
Learning objectives	The students will get knowledge about the most common neurological and in particular neurodegenerative diseases, including etiology, genetics, symptoms and diagnosis. Most importantly the contributing common and unique pathomechanisms underlying the diseases will be topic of the lectures. Finally students will get an overview of current research approaches aiming for the improvement of diagnosis and therapy. After successful accomplishment of this module the students have knowledge about • characteristics of neurological/neurodegenerative diseases • basic contributing mechanisms (e.g. excitotoxicity, oxidative and metabolic stress, failure of protein quality control etc.) • research and experimental approaches to investigate pathomechanisms, identify biomarkers and therapeutic targets for neurological/neurodegenerative diseases.
Syllabus	During the winter semester 28 hours of lectures will teach the students basics of clinical neuroscience including the clinical pictures of the most frequent neurological/ neurodegenerative diseases and current knowledge about the underlying pathophysiological mechanism. Furthermore experimental approaches

	used in this field and especially at the experimental neurology department at Ulm University, such as biomarker discovery, transgenic animal research and development of therapeutic strategies will complete the topics.
Literature	Literature will be provided at the beginning of the semester.
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Module 74335 Neurological Diseases

Current Concepts in Stem Cell Biology and Regenerative Medicine

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830074635
ECTS credits	6
Attendance time	4
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Gilbert Weidinger
Instructor(s)	Prof. Dr. Gilbert Weidinger, Prof. Dr. Hartmut Geiger, Prof. Dr. Steffen Just, Prof. Dr. Jan Tuckermann, Dr. Bettina Möhrle, Dr. Sophia Meyer zu Reckendorf
Allocation of study programmes	Molecular Medicine M.Sc., first semester
Recommended prerequisites	Basic knowledge of molecular biology and cell biology
Learning objectives	Students should be able to • describe the most important concepts in developmental biology, stem cell biology, mechanisms of innate regeneration, and regenerative medicine with respect to basic science as well as potential therapeutic use. • present, discuss and access current research in the field of stem cell biology, mechanisms of innate regeneration and regenerative medicine. • discuss current concepts of stem cell biology with respect to ethical aspects.
Syllabus	• Principles of embryonic development: specification, differentiation, potency • Animal models of regeneration: classifications and definitions, source cells, stem-cell based whole body regeneration, cellular plasticity, dedifferentiation, transdifferentiation, differences to development, triggers, proliferation and patterning, termination & positional memory, nerve dependency, evolution of regeneration • Introduction to stem cells: Lineage tracing, methods to detect stem cells, history of stem cell research, stem cells in the news • Methods in stem cell biology • Embryonic stem cells and Induced pluripotent stem cells

- Advances in stem cell technology, Xenodevelopment, Organoids
- Hematopoietic stem cells in regenerative medicine + aging
- Stem cells in therapy
- Adult stem cells
- Heart & skeletal muscle regeneration
- Regeneration of the skeletal system / Mesenchymal stem cells
- Regeneration of the nervous system
- Discussion ethics of stem cell research & therapeutic use

Literature	• Alberts et al. Molecular Biology of the Cell, Garland • Stockum DL, Regenerative Biology and Medicine, Academic Press • Gerard L, Stem book, online at: <a href="http://www.ncbi.nlm.nih.gov/books/NBK27044/?report=reader#!po=25.0000">http://www.ncbi.nlm.nih.gov/books/NBK27044/?report=reader#!po=25.0000. And yearly changing literature as given in the list of seminar topics.
Teaching and learning methods	seminar
Workload	~ 160 h
Assessment	The module examination consists of a graded oral examination.
Grading procedure	The module grade is equal to the examination grade.
Basis for	Master in Molecular Medicine

European Patent Law for Molecular and Translational Neuroscience

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830074025
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	Knowledge of the basics of European Patent Law
Syllabus	The module covers the following topics: Overview of various intellectual property rights; The European Patent Office; Introduction to patents; Inventions and non-inventions; Requirements for patenting; Exceptions to patent protection; Biological and medical exceptions to patentability; Novelty and inventive step as requirements for patentability; Formal structure of a patent application; Procedures at the European Patent Office: The grant procedure at the European Patent Office; The opposition procedure; The national nullity procedure; The right to the patent; The protective effect of a patent; Extension of patent protection; Exhaustion of protection; Patent infringement; The Employee Inventions Act; Protection of active pharmaceutical ingredients; First and second medical indication; Supplementary protection certificate; The Unified Patent Court (UPC): Legal bases; Structure; Jurisdiction; Proceedings before the UPC.

Literature	Literature will be given during the lecture
Teaching and learning methods	Lecture (blockevent, 3 credit points)
Workload	Lecture Attendance: 14 h Private study: 76 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the numer of participants. The type of examination will be announced in time - at least 4 weeks prior to the date of the exam.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Laboratory Methods I

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830074314
ECTS credits	3
Attendance time	3
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Project leader of various institutes: Institute for Anatomy and Cell Biology, Institute of Applied Physiology, Institute of Biochemistry and Molecular Biology, Institute of Molecular and Cellular Anatomy, Institute for Physiological Chemistry, Institute for Psychology and Education, Institute of Virology, Clinic for Anaesthesiology, Clinic for Internal Medicine III, Clinic for Neurology, Clinic for Psychiatry and Psychotherapy III, Clinic for Psychosomatic Medicine and Psychotherapy
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	Students will get in-depth knowledge in one chosen technique and experience in working on an actual topic of a lab.
Syllabus	This module covers a 1-week practical course in leading laboratories of neuroscientific groups. Depending on the lab, different state-of-the-art techniques will be learned like protein biochemistry, proteome and transcriptome techniques, cell type specific isolation, histology of rodent or human samples etc
Literature	Subject specific literature

Teaching and learning methods	Practical training in a laboratory (1 week, 3 credit points)
Workload	Attendance practical training plus private study, Sum: 90 h
Assessment	The module examination consists of an ungraded participation in all phases of the laboratory course.
Grading procedure	The module is not graded.
Basis for	At least one of the two Lab Methods practical trainings (Laboratory Methods I and Laboratory Methods II) is the basis for the external internships in the 3rd semester (modules 74316 and 74319).

Mechanisms and Diseases of Aging and Interventions

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830075672
ECTS credits	6
Attendance time	4
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	Jun.-Prof. Dr. Ani Grigoryan, Prof. Dr. Hartmut Geiger
Instructor(s)	Dr. Bettina Möhrle et al.
Allocation of study programmes	Molecular and Translational Neuroscience, M.Sc., compulsory elective module Molecular Medicine, M.Sc., compulsory elective module
Recommended prerequisites	None
Learning objectives	On completion of the course, the students shall be able to: • define the cellular and molecular mechanisms of aging • describe disease development as a consequence of, for example, stem cell aging, and possibilities for interventions • critically review published research in aging field and be able to summarize the aim and findings of this research • identify and discuss the open questions in the aging field, suggest ways to study these identified issues experimentally, and argue for the need of such research in a written proposal
Syllabus	In this course, students deal with the mechanisms of ageing, age-related diseases and possible interventions, with a focus on the areas of research being conducted at Ulm University. Each teaching unit includes a presentation by experienced researchers followed by a discussion on published research and open questions. A separate workshop deals with the preparation of a written research proposal.

	The course begins with introducing the importance of ageing research from a clinical perspective. This is followed by teaching units on cellular and molecular mechanisms that contribute to cell and organ ageing. Further sessions deal with possible interventions to extend healthy lifespan. The aim of the course is to prepare students for work in areas such as genomic instability, cellular senescence and stem cell ageing. Students will learn how to write a research proposal with an emphasis on identifying an open question related to a specific mechanism of aging and proposing a relevant experimental setting to answer that question.
Literature	Literature references will be given at the beginning of the course.
Teaching and learning methods	Seminar with workshops and mentor meetings followed by a poster presentation
Workload	Attendance time: 56 h Private study: 124 h Sum: 180 h
Assessment	The module examination consists of a paper presentation (weighted by factor 0.4) and a research proposal (weighted by factor 0.3 for the written proposal and 0.3 for the poster presentation of the proposal). The poster presentation will be evaluated based on the aesthetics and content of the poster as well as the presentation skills.
Grading procedure	The module grade is the same as the result of the module examination. The grade for the module examination is based on the partial performances and is calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement.
Basis for	-

Clinical Neuroscience Seminar

Modules referring to Compulsory Elective Modules to the Introduction in Molecular and Translational Neuroscience

Code	8830075009
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Winter Semester
Coordinator	apl. Prof. Dr. Dr. Francesco Roselli
Instructor(s)	apl. Prof. Dr. Dr. Francesco Roselli
Allocation of study programmes	Biology MSc., Compulsory Elective Module 3104 Medizinische Neurowissenschaften, Compulsory elective area Research focus Medicine Molecular and Translational Neuroscience MSc., Compulsory Elective Modules to Introduction in Molecular and Translational Neuroscience
Recommended prerequisites	None
Learning objectives	The learning objectives of the course include: • ability to read and interpret a scientific article, including the selection of core and accessory datasets and to evaluate the overall quality of the article • ability to effectively present a seminar, including the preparation of the presentation (formal aspects) and the techniques to professionally deliver a talk • acquire the most updated knowledge on models and concepts in clinical neuroscience, including advanced techniques
Syllabus	During the seminar series, each student will be asked to present one scientific paper published in top neuroscience journals. The papers are selected by the coordinator in order to cover the most advanced technical approaches in neuroscience and pathogenesis concepts about the most common neurological conditions. Papers will be selected so to converge on a number ”common themes” including neuroinflammation, cell biology of neurodegeneration, disturbances of neuronal circuits, innovate therapeutic strategies.

Literature	Literature will be provided at the beginning of the semester.
Teaching and learning methods	Seminar (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of completing an assignement on a given topic and the graded oral presentation of the results and participation in the discussion.
Grading procedure	The module grade is equal to the examination grade.
Basis for	in Biology MSc. basis for the Clinical Neuroscience practical training in MTN MSc.: -

Applied Statistics for Medical Sciences

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830075451
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Thomas Friedl / Prof. Medhanie Mulaw
Instructor(s)	Prof. Thomas Friedl, Head of Clinical Study Development Ulm University Hospital, Dept. Gynecology Prittwitzstraße 43, 89075 Ulm Prof. Medhanie A. Mulaw Unit for Single-cell Genomics (Head) Medical Faculty, Ulm University Meyerhofstr. N27, Room 4.013 89081 Ulm
Allocation of study programmes	Molecular and Translational Neuroscience, MSc.
Recommended prerequisites	Friedl, part I: Some basic statistical knowledge preferable but not mandatory Mulaw, part II: Basic statistical background required; basic computer literacy is necessary; basic knowledge of the R programming language is desired (but not required).
Learning objectives	Friedl, part I: Refresh, review, and understand the fundamentals of statistics Develop the ability to perform basic statistical tests on your own data using SPSS Research skills: Be able to understand and critically evaluate statistical results published in the scientific literature Mulaw, part II: Students will gain the technical capability to analyze basic biological data using relevant R and Bioconductor packages including data preparation, exploratory graphical approaches, test of distribution fitness, selection of appropriate inferential analysis, and result presentation.

Syllabus

Friedl, part I:

- Introduction to Descriptive Statistics
- Probabilities and Estimates
- Basic Statistical Tests and Their Applications
- Correlation and Regression
- Introduction to the SPSS Statistical Software Package

Mulaw, part II:

- Probability distributions, the central limit theorem, and inferential statistics
- Low-level analyses such as correlation, regression, and comparative analyses (e.g., t-tests, Wilcoxon tests)
- Introduction to basic multivariate analyses.

Literature

Friedl, part I:

Field A: Discovering Statistics Using IBM SPSS. SAGE Publications

Walters SJ/Campbell MJ/Manchin D: Medical Statistics. A textbook for the health sciences. Wiley Blackwell

Pallant J: SPSS Survival Manual. McGraw-Hill

Deutsches Ärzteblatt International: Series on Evaluation of Scientific Publications

Mulaw, part II:

Applied Multivariate Statistical Analysis. Second Edition. Härdle and Simar (Springer 2007)

Using R With Multivariate Statistics. Randall E. Schumacker. (SAGE 2015).

Bioinformatics and Computational Biology Solutions Using R and Bioconductor / R. Gentleman, V.J. Carey, W. Huber, R.A. Irizarry, S. Dudoit (Eds.). (Springer 2005)

Teaching and learning methods

Seminar, devided in two equal parts:

part I, by Prof. Friedl: Sessions 1 - 3 (block event 3,5 hours each)
part II, by Prof. Mulaw: Sessions 4 - 6 (block event 3,5 hours each)

Workload

Attendance time: 21 h
Private Study: 69 h
Sum: 90 h

Assessment

The module examination consists of an ungraded active participation in all phases of the seminar.

Grading procedure	The module is not graded.
Basis for	-

Basics of Stress Physiology

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830074128
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. rer. nat. Stefan Reber
Instructor(s)	Prof. Dr. rer. nat. Stefan Reber Dr. Dominik Langgartner
Allocation of study programmes	Molecular and Translational Neuroscience MSc, compulsory elective module
Recommended prerequisites	Basic knowledge in physiology, endocrinology and immunology.
Learning objectives	After successful completion of this module, students know: • at least the milestones in the history in stress research • the difference between stressor, stress perception, stress response and what happens during those procedures on a neuronal, neuroendocrine, physiological and behavioral level • what the hypothalamus-pituitary-adrenal (HPA) axis and sympathetic nervous system (SNS) is, how those systems are anatomically located within an organism, and what happens during activation of these systems • the difference between physical, psychological, social, acute, repeated and chronic stressors • what is happening on a physiological level during stress adaptation • why a lack of adaptation can be detrimental and how this is mediated • what stress resilience and vulnerability is and how these are mediated/ influenced • that stress not only changes physiology but also affect the immune system • that stress-induced changes in the immune system are involved in development of stress-related somatic and affective disorders and how this is mediated • how to read and present a scientific paper in front of an audience

Syllabus	This module covers the following subject-specific topics: see learning objectives
Literature	Literature will be given at the beginning of the lecture.
Teaching and learning methods	Combination of lecture and seminar (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Brain Imaging and Neuroanatomy

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830074129
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. rer. nat. Volker Rasche
Instructor(s)	various lecturers (see course catalogue)
Allocation of study programmes	Molecular and Translational Neuroscience MSc, compulsory elective module
Recommended prerequisites	-
Learning objectives	Different methods of brain imaging -PET -fMRI -MRT To understand physiology, pathology and morphology of the brain
Syllabus	This module covers the following subject-specific topics: see learning objectives
Literature	-

Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Clinical Trials for Molecular and Translational Neuroscience - Lecture

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830075094
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	PD Dr. Joachim Schuster
Instructor(s)	PD Dr. Joachim Schuster
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	Students who have successfully completed the lecture: • have a comprehensive overview on clinical trials • understand the life cycle of pharmaceutical drugs • have a thorough insight in steps needed to come from pre-clinical research to a marketing authorization
Syllabus	• History of standards in clinical trials • Development cycle of pharmaceutical drugs and medicinal products • Individual steps from first in human to marketing authorization • Parties involved in clinical trials and their roles and responsibilities • Regulatory requirements in clinical trials • Safety and Pharmacovigilance
Literature	subject specific literature to clinical trials

Teaching and learning methods	Lecture (2 hours per semester week, 3 CP)
Workload	Attandance time: 28 h Private Study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-

Clinical Trials for Molecular and Translational Neuroscience - Practical Training

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830075095
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	PD Dr. Joachim Schuster
Instructor(s)	PD Dr. Joachim Schuster
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	The practical training is intended to convey the essential steps in the planning and organization of clinical trials. For this purpose, the structure of a start-up company is simulated and the participants take on the various roles in planning a trial. Training location: seminar room Students who would like to learn how a clinical trial is carried out on patients have the opportunity to spend a day with a study team. Location: clinical trial center dept. of Neurology
Syllabus	• Setup and management of clinical trials • Roles and responsibilities • Source documents and filing • Informed consent process • Investigational medicinal product (IMP) supply chain
Literature	Subject specific standard literature to Clinical Trials (e.g. Herschel, Michael: Praxisbuch Klinische Forschung)

Teaching and learning methods	Practical Training
Workload	Attendance practical training plus private study, Sum: 90 h
Assessment	The module examination consists of an ungraded participation in all phases of the laboratory course.
Grading procedure	The module is not graded.
Basis for	-

Disorders in Psychiatry

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830074331
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	apl. Prof. Dr. Thomas Kammer
Instructor(s)	apl. Prof. Dr. Thomas Kammer et. al. (see course catalogue)
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	The aim of the course is to provide an introduction to clinical psychiatry. Three groups of disorders are taught: addiction/dependence, schizophrenia/psychosis and affective disorders.
Syllabus	Four double lessons are available for each disorder group. In the first two double lessons, the clinical manifestation of the disorder (psychopathology) is presented with film material, the diagnostic procedures are explained and the therapy and course of the disorder are described. In addition, the current neuroscientific understanding of the disorder is presented. This is followed by two double lessons in which the focus is on a current or landmark paper. This is presented by a group of 3-4 students and the respective topic is discussed in depth on this basis. The paper covers one of the aspects of the respective clinical picture listed below. Addiction / dependence: - Phenomenology / psychopathology / classification of different types and stages of addiction - Non-substance-related vs. substance-related addiction - Neurobiology of the reward system and pathological changes in addiction - Detoxification / long-term treatment - psychotherapy, drug therapy Schizophrenia / psychosis

- Phenomenology / psychopathology / classification / course
- Neurobiology of psychosis
- Ethiology - neurobiology and environmental influences
- Psychopharmacological therapy

Affective disorders

- Phenomenology / psychopathology / classification / course
- Neurobiology
- Ethiology - neurobiology and environmental influences
- Psychopharmacological therapy - serotonin hypothesis, HPA axis etc
- Brain stimulation
- Psychotherapy - Principles of action

Literature	Neel Burton: Psychiatry, 3rd edition, 2016 Oxford Handbook of Psychiatry, 4th edition, 2019
Teaching and learning methods	Lecture/Seminar (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28h Private Study: 62 h Sum: 90 h
Assessment	The module examination consists of an oral and a written part. The oral part consists of working on a given topic, a graded oral presentation of the results and active participation in the seminar. The written part consists of a graded written examination. The module grade is calculated in equal parts of the grades for both components (50% oral, 50% written). If a partial performance is not passed, it must be repeated. The module can only be credited if both components have been passed.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement.
Basis for	

Good Scientific Practice

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830075464
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. Michael Kühl
Instructor(s)	Prof. Dr. Michael Kühl
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective modules, 2nd semester
Recommended prerequisites	-
Learning objectives	Students • should be able to relate fundamentals of bioethics to scientific practice • should know the principles of good scientific practice • should be aware of the processes in case of scientific misconduct.
Syllabus	Issues of scientific conduct: • Good and bad practices in collaborations/co-operations/co-authorship/ sienctificdocumentation/scientific publication/student-advisor relations • Resolution of conflicts • Fraud and deceit in science • What is scientific communication? • Analysis of the scientific publication process • Predatory Journals • Role of ombudspersons

Literature	Stephen Webster: Thinking about Biology, Cambridge University, Press 2003 Good Scientific Practice, Guidelines of the DFG, latest version Adil E. Shamoo, David B. Resnik, Responsible Conduct of Research, 3rd edition,Oxford University Press 2015
Teaching and learning methods	Seminar (Blockevent, 3 CP)
Workload	Attendance time: 10h Private study: 80 h Sum: 90 h
Assessment	The module examination consists of completing an assignment on a given topic and the graded oral presentation of the results and active participation in the discussion.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement. The exact modalities will be announced at the beginning of the course.
Basis for	-

Journal Club in Neurological Diseases

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830074310
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Prof. Dr. Leda Dimou
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	Students who have successfully completed this module, will • know how to search for good quality published papers. • know how to present scientific data in a predetermined time and on a professional way. • know how to describe the accuracy of the approaches used in the publication, the qualitative aspects, the stringency of argumentation and the validity of the conclusions drawn from it. • know how to qualitatively access and question scientific publications. • know how to discuss new scientific data.
Syllabus	• The focus of this seminar is on learning and discussion of scientific methods / techniques and new findings through presentation of recently published papers dealing with neurological and psychiatric diseases as well as associated subjects. • Latest scientific studies will be presented by students that train presentation skills

Literature	Literature will be searched by the students and will be discussed within the group at the beginning of the seminar.
Teaching and learning methods	Seminar (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private Study: 62 h Sum: 90 h
Assessment	The module examination consists of completing an assignment on a given topic and the graded oral presentation of the results and active participation in the discussion.
Grading procedure	The grade of the module is equal to the grade of the exam. The module grade is based on the separate achievements of the module and will be calculated by the examiner. The Transcript of Records only shows the calculated overall grade as an exam achievement. The exact modalities will be announced at the beginning of the course.
Basis for	-

Laboratory Methods II

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830074333
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	Prof. Dr. Leda Dimou
Instructor(s)	Project leader of various institutes: Institute for Anatomy and Cell Biology, Institute of Applied Physiology, Institute ofBiochemistry and Molecular Biology, Institute of Molecular and Cellular Anatomy,Institute for Physiological Chemistry, Institute for Psychology and Education,Institute of Virology, Clinic for Anaesthesiology, Clinic for Internal MedicineIII, Clinic for Neurology, Clinic for Psychiatry and Psychotherapy III, Clinic forPsychosomatic Medicine and Psychotherapy
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	None
Learning objectives	Students will get in-depth knowledge in one chosen technique and experience inworking on an actual topic of a lab.
Syllabus	This module covers a 1-week practical course in leading laboratories of neuroscientific groups. Depending on the lab, different state-of-the-art techniques will be learned like protein biochemistry, proteome and transcriptome techniques, cell type specific isolation, histology of rodent or human samples etc
Literature	subject specific literature

Teaching and learning methods	Practical training in a laboratory (1 week, 3 credit points)
Workload	Attendance practical training plus private study, Sum: 90 h
Assessment	The module examination consists of an ungraded participation in all phases of the laboratory course.
Grading procedure	The module is not graded.
Basis for	At least one of the two Lab Methods practical trainings (Laboratory Methods I and Laboratory Methods II) is the basis for the external internships in the 3rd semester (modules 74316 and 74319).

Neuronal Networks in Health and Disease

Modules referring to Compulsory Elective Modules for Advanced Molecular and Translational Neuroscience

Code	8830075705
ECTS credits	3
Attendance time	2
Language of instruction	English
Duration	1
Cycle	each Summer Semester
Coordinator	apl. Prof. Dr. Dr. Francesco Roselli
Instructor(s)	apl. Prof. Dr. Dr. Francesco Roselli
Allocation of study programmes	Molecular and Translational Neuroscience MSc., compulsory elective module
Recommended prerequisites	Basic cell biology, biochemistry, pharmacology
Learning objectives	After successful completion of this module, students will understand the basic arrangement of local and long-range microcircuitry in brain and spinal cord in physiological conditions and there will be knowledge about the basic and advanced methods for structural (viral tracing, genetic intersectional tracing) and functional (optogenetics, chemiogenetics) approaches to neuronal network investigation and manipulation. • Students will know how local microcircuitry in brain and spinal cord changes in pathological conditions such as epilepsy, chronic pain, autism, alzheimer's disease; • Students will learn how to critically evaluate the new findings in this field • Students are also taught to appreciate that there are still uncertainties in the field of neuronal networks and what kind of information is still missing.
Syllabus	The module covers the following subject-specific topics: • Basic assemblies of neuronal networks and microcircuitry; feed-back and feed-forward inhibition and excitation, basic assembly of recurrent neuronal networks • Techniques and approaches for neuronal circuitry structural analysis: viral and non-viral tracing, volumetric imaging, genetic intersectional tracing.

	• Techniques and approaches for neuronal circuitry manipulation: optogenetics, chemiogenetics, subpopulation ablation • Structure and function of sensory spinal cord networks in normal and chronic pain conditions • Structure and function of motor spinal cord networks in traumatic spinal cord injury • Structure and function of basal ganglia networks • Structure and function of dopaminergic and serotoninergic networks • Structure and function of cortical and thalamic networks in epilepsy
Literature	• Kandel-Schwarz-Jessel ”Principles of Neural Science”, current edition • Review and original articles from top neuroscience journals
Teaching and learning methods	Lecture (2 hours per semester week, 3 credit points)
Workload	Attendance time: 28 h Private study: 62 h Sum: 90 h
Assessment	The module examination consists of a graded written or oral examination, depending on the number of participants. The examination form will be announced in good time before the examination is held - at least 4 weeks before the examination date.
Grading procedure	The module grade is equal to the examination grade.
Basis for	-