Module Name
Neural Function I: Neural Basis of Motor Behavior in Animals

Type of Module	**Module Code**
o Advanced Module	Neural Function I

Identification Number	**Workload**	**Credit Points**	**Term**	**Offered Every**	**Start**	**Duration**
MN-B-SM (N 1)	360 h	12 CP	2nd term of studying	Summer term	summer term only	7 weeks

1	**Course Types**	**Contact Time**	**Private Study**	**Planned Group Size***
	a) Lectures	20 h	40 h	max. 13
	b) Practical/Lab	100 h	160 h	max. 2 (x 5) u 1x3
	c) Seminar	10 h	30 h	max. 13

2 Module Objectives and Skills to be Acquired

Students who successfully completed this module

- have acquired an understanding of how the nervous system generates motor behavior and locomotion in vertebrates and invertebrates
- have acquired an understanding about the role descending signals from the brain play for initiation, maintenance, tuning and stopping of motor activity, especially for locomotion
- have acquired the role intersegmental information exchange between neural networks in the ventral nerve cord (invertebrates) and spinal cord (vertebrates) play for coordinating motor activity
- have acquired the role sensory signals play in shaping motor activity in a task-specific fashion.
- are able to apply electromyographic, extracellular (and intracellular) recording techniques used in neurobiology
- are able to independently design and perform small scientific projects related to topics of the module.
- have acquired knowledge on the operation of instrumentation for electrophysiological recordings, incl. amplification, role of filter settings and AD/DA-conversion
- have acquired basic programming skills with the high level programming language Matlab.
- are able to analyze electrophysiological data using Matlab and the Spike 2 software package.
- have learned how to present research results in oral and written form and to critically discuss scientific publications related to the topic of the module on a professional level.
- are able to transfer skills acquired in this module to other fields of biology.

3	**Module Content** Motor behavior of arthropods and vertebrates results from a close interaction between neural circuits in an animals brain initiating, maintaining, tuning and stopping motor behavior and downstream neural circuits residing in the spinal cord or ventral nerve cord. The latter are in charge of generating the specifics of the motor activity to be generated and will be in focus of this module. Still, for understanding their contribution the link between the role of intrinsic properties of neurons of these networks and the networks topologies, which contribute to the generation of rhythmic motor activity in animal behavior, e.g. locomotion, has to be made. With a combined use of lectures, seminars and experimental work students will be introduced into this field and as well learn the belonging conceptual and methodological. • Basic properties of neuronal and excitable membranes contributing to rhythmic activity • Identification of building blocks of neural circuits generating rhythmic or patterned motor output for behavior • Recording techniques for monitoring motor activity in invertebrates and vertebrates • Pharmacological induction of neural network activity • Staining techniques and fluorescence microscopy • Analysis of electrophysiological data with Spike2, Matlab
4	**Teaching Methods** Lectures; Practical/Lab (Project work); Seminar; Computer exercises with Spike2, Matlab; Guidance to independent research; Training on presentation techniques in oral and written form
5	**Prerequisites (for the Module)** Enrollment in the Master´s degree course “Biological Sciences” or in the Master´s degree course “Experimental and Clinical Neurosciences” **Additional academic requirements** Previous attendance of the lecture module “Neurobiology: Genes, Circuits, and Behavior (N)”. The knowledge of neurobiology on the level of a general biology text book (Campbell or Purves) is absolutely required.
6	**Type of Examination** The final examination consists of two parts: oral examination (20-30 min; 50 % of the total module mark), written report (50 % of the total module mark)
7	**Credits Awarded** Regular and active participation Each examination part at least “sufficient” (see appendix of the examination regulations for details)
8	**Compatibility with other Curricula*** Elective module in the Master´s degree course “Clinical and Experimental Neurosciences”
9	**Proportion of Final Grade** 15 % of the overall grade in the Master’s degree course “Biological Sciences” (see also appendix of the examination regulations)
10	**Module Coordinator** Prof. Dr. Ansgar Büschges, phone 470-2607, e-mail: ansgar.bueschges@uni-koeln.de

11	**Further Information** **Subject module** of the Master´s degree course "Biological Sciences", **Specialization:** (N) Neurobiology: Genes, Circuits, and Behavior **Participating faculty**: Prof. Dr. A. Büschges, Dr. T. Bockemühl, Dr. M. Gruhn, Dr. G. Gatto (MedF), Dr. S. Valtecha (MedF), Prof. Dr. T. Korotkova (MedF), Prof. Dr. M Wright (guest) **Literature:** Information about textbooks and other reading material will be given during the course **General time schedule:** Week 1-6 (Mon.-Fri.): Lectures, practical/lab and preparation for the seminar talk (held at the end of week 6); Week 7 (Mon.-Fri): Preparation for the oral examination and the written report. The written report shall be handed in 3 weeks after end of the summer term teaching. **Note:** The module contains hands-on laboratory work conducted individually and is taught in course rooms. The module contains computer-based practicals as a complementary component. The teaching language of the course is English. **Introduction to the module: tba**., Cologne Biocenter, room 1.007 (first floor); for preparation to the module before this introduction see advice(s) under literature **Oral or written examination:** tba, second/supplementary examination tba; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.

***** 8 students from the Master 's degree course "Biological Sciences" and 4 students from the Master 's degree course "Experimental and Clinical Neurosciences" and 1 student from "Sonstige"