Module variant to: Trends in Neurobiology and Behavior

Module: The Development and Structure of the Nervous System Alternative I	
University/Department/Teaching Unit: Freie Universität Berlin/Biology, Chemistry, Pharmacy/Biology	
Module coordinator: Prof. Dr. Mathias Wernet	
Prerequisites: none	
Learning objectives: Upon completion of this module, students will have acquired basic knowledge covering the most important methods in modern Neurobiology in genetic model organisms. Successful students will acquire skills covering several synergistic areas: (i) in modern neuroanatomy supported by molecular-genetic methods (including fluorescent and confocal microscopy), (ii) in the visualization of neuronal development in vivo, and (iii) in performing behavior experiments in combination with molecular genetic tools for manipulating specific neurons in the living aninmal. Students will be able to perform basic neuroanatomica dissections and basic methods of immuno histochemistry. Students will possess basic skills in the comutzer-assisted image processing using the software IMARIS.	
Content: During the 3-week practical course, the students will learn cutting-edge techniques for the investigation of key concepts in the synergistic field of neurodevelopment (from molecules to dynamic processes in the establishment of robust circuitry) and structure (neuroanatomy using modern tools). The experiments will utilize the genetic model organism Drosophila melanogaster. Sophisticated genetic tools involving fluorescent proteins for labeling development of neurons, as well as their adult morphology and connectivity, will be used in combination with advanced live imaging in intact brains. The relevance of these cell types will be tested in behavior experiments using molecular genetic tools to inactivate said cell types in the living animal. Students will be introduced to using confocal and multiphoton microscopy to obtain data. In addition, high-end computer- based analysis tools for visualization and quantification of such data will be performed. A lecture series is part of the practical course, covering current topics relating to neurodevelopment, neuroanatomy and behavior (embryology, pattern formation in neural circuits, axon pathfinding, synaptogenesis, connectomics, neuroethology). Specific papers will be discussed. Every student will present one research publication in form of an oral presentation (Referat).	

Modes of instruction	**Contact hours** (hours per week during the semester)	**Types of active participation**	**Workload** (in hours)	
Lecture (V)	2	–	Class attendance (lecture) Preparation, before and after (lecture)	30 30
Seminar (S)	1	Oral presentation	Class attendance (seminar) Preparation, before and after (seminar)	15 80
Safety lab (sP)	8	Carrying out and documenting lab experiments	Class attendance (safety lab) Preparation, before and after (safety lab) Exam preparation and exam	120 75 100

Module assessment	Written exam (60 minutes), wholly or partially in multiple-choice format; can also be carried out electronically or written report on research results (approx. 10 pages) or examination colloquium (approx. 20 minutes)	
Language	English	
Regular attendance required	Seminar and safety lab: yes, lecture: attendance recommended	
Total workload	450 hours	15 credit points
Duration	one semester	
Frequency	irregular	
Applicability	Master's degree program M.Sc. Biology	

Utilization in the following specializations (decision by the examining board):

Biodiversity, Evolution and Ecology	
Genetics and Genomics	

Microbiology	
Molecular- and Cellular Biology	x
Molecular Plant Sciences	
Neurobiology	x
Biology	x