

Information on the Bachelor's Programme of the Chair Neurobiology V 1.1 (January 2014)

Neurobiology is a modern and current research field. Studies with a focus on neurobiology qualifies you for a wide professional field in research and industry.

Here you can find a selection of possible professions that some of our former are practising:

- Academic research in Neurobiology at universities, Max-Planck-institutes etc.
- Biomedical research in pharmaceutical industry – many drugs target the nervous system (i. e. antidepressants etc.
- Leading positions in pharmaceutical and Biotech companies
- Research in agriculture industry (insecticides, biological pest control)
- Application of neurobiological knowledge in industry (i. e. robotic, neuroprotheses)
- Consultants in pharmaceutical industry
- Coordination of medical studies

In the broadest sense neurobiology tries to understand the principles of function and the evolution of nervous systems, the most complicated systems on our planet. Of course one aim is to use these knowledge i.a. for medical and technical applications. However, the focus at our chair lies on basic research.

Neurobiology guarantees an exciting but also complex and very challenging research field. Because the methods neurobiological research uses are as varied as the different levels of the nervous system (from molecule to behavior). At our chair we have established i. a. the following methods that you can learn to use:

Molecular genetic methods:

- quantitative PCR
- RT-PCR
- Luciferase-Assay of the gene expression
- Cloning and manufacture of different gene constructs for producing transgenic flies
- Classical *drosophila*-genetics (crossings, re-combinations, etc)

Biochemical methods:

- Western Blot
- nano/cap-High Pressure liquid chromatography (HPLC)
- semi-quantitative mass spectrometry (Peptidomic)
- mass spectrometrical Imaging
- *in silico* analysis of insect genomes

Cell biological and microscopical methods:

- immuno stainings (cuttings, whole-mount)
- stainings on genetic marker molecules (GFP, RFP, etc)
- confocal laser-scan microscopy
- electron microscopy (in collaboration with Prof. Krohne/Prof. Stigloher)
- 3D-reconstruction of brains
- Calcium imaging
- cAMP imaging
- electrophysiological ablations

Behavior assays:

- computer-aided recording of locomotor activity
- video-aided recordings of behavior
- computer-aided recordings of eclosion
- different assays for examination of learning behaviour in adult and larval drosophila
- quantification assays of food intake and metabolism

Typical study progress

There is no such thing as a typical study progress and the crucial thing in our thesis at our chair is your thematic and methodical interest. But it is of course an advantage if you took relevant modules in your studies. Here we present an "ideal" - proposal from the chair's point of view:

In the field of compulsory events you took "Einführung in die Neurobiologie (Förster)", "Einführung in die Genetik (Wegener)" and "Verhalten (Roces)" in the module "Genetik-Neurobiologie- Verhalten" in the second semester. "Spezielle Genetik (Wegener)" follows in the module "Gene-Moleküle- Organismen" im 3. Semester.

We recommend the following events of the compulsory optional subjects:

- Neurobiologie für Fortgeschrittene: In this practical course with the main topic "Sex, Drugs und Rock'n'roll" we busy ourselves with the neuronal basis of different behaviors, especially of humans, and flies. Lecturers: Förster, Pauls, Rieger, Wegener

- Spezielle Neurobiologie I: This practical course gives an introduction to the basic molecular methods we work with at our chair such as PCR, cloning, etc. Lecturers: Menegazzi, Rieger, Senthilan.

- Spezielle Neurobiologie II: In the first three weeks the focus lies on neuroanatomy and neurogenetic methods. The lectures give a wide overview of structure and molecular/neurochemical functioning of the brain (with the main focus on brains of mammals and flies). In the fourth week you choose your own small research project that will be executed in small groups at our chair. During this practical training you will gain a sound introduction in different current neurobiological/neurogenetical techniques used to make single neurons in the nervous system visible, examinable and manipulable. Lecturers: Förster, Pauls, Rieger, Wegener

If you already know in advance that you want to do your bachelor thesis in the research field of neurobiology we recommend to at least take 2 of these 3 courses that are interlocked and promote each other.

Also the lectures of the department Zoology II deal with important basics of neurobiology and behavior. This is why we also recommend those.

In the 6th semester we offer the cours: "Spezielle Neurobiologie III". This will be a individual research practical course in one of our research groups at our chair that you chose yourself. This practical course serves to prepare methods and experiments of the following bachelor thesis.