

# From Membranes to Brains

*Ad Aertsen, Carola Haas, Friedrich Metzger*  
Winter Semester 2013/14

**9-11 h, KS 00.023, Biologie II/III**

The lectures provides an introduction to the structure and functional principles underlying brain function. This includes the basic electrical properties of biological membranes, the structure and function of single neurons (dendrites, axons, synapses) and neuronal networks, the generation and exchange of action potentials, the interactions of neurons within and between neuronal networks, functional aspects of neural information processing, neural coding and neural computation, the physiology and molecular biology of synaptic plasticity and learning, and general principles underlying learning and behavior.

<b>Topics</b>		
Introduction	AA	28 Jan 2014
Signaling in the nervous system	AA	29 Jan 2014
Ion channels and signaling, current and membrane potential, action potential generation	AA	30 Jan 2014
Action potential propagation, synapses	AA	31 Jan 2014
Neuroanatomy I	CH	3 Feb 2014
Neuroanatomy II	CH	4 Feb 2014
Neuroanatomy III	CH	5 Feb 2014
Synaptic plasticity – Learning and memory	FM	6 Feb 2014
Synaptic plasticity – Synaptogenesis and molecular mechanisms	FM	7 Feb 2014
Synaptic plasticity – Rules of plasticity and learning	FM	10 Feb 2014
Networks in the Brain	AA	11 Feb 2014
Neural Coding	AA	12 Feb 2014
Cortical dynamics – Variability and precision	AA	13 Feb 2014
Neural coding and decoding – Towards Brain-Machine Interfaces	AA	14 Feb 2014