# Information processing in neuronal networks

# Module 8c

Institute of Developmental Biology and Neurobiology

## Module description

The processing and storage of information is a primary purpose of the brain. This is achieved through communication between individual neurons and functional neuronal ensembles embedded into a complex hierarchical neuronal network. The main interface for transfer of signals between neurons is a chemical synapse, which can undergo bidirectional plastic changes and thereby serves as a neurophysiological substrate for the processes of learning and memory. Thus, the computational performance of the brain can be considered as a product of network connectivity that evolves and matures in an experience-dependent manner.

In this course, students will gain theoretical background in mechanisms of the transfer, processing and storage of information in mammalian brain. Lectures will cover main aspects of the encoding and decoding of signals at different levels, from synaptic transmission between individual neurons to large-scale population activity and network oscillations. Main emphasis will be made on existing experimental and computational approaches to evaluate the formation and dynamic use-dependent modification of connectivity in spiking neuronal networks. The content of this module is structurally connected to modules on the computational neuroscience and artificial neural networks.

## Requirements

Bachelor degree in Biology, Molecular Biology or related disciplines

## Eligible participants

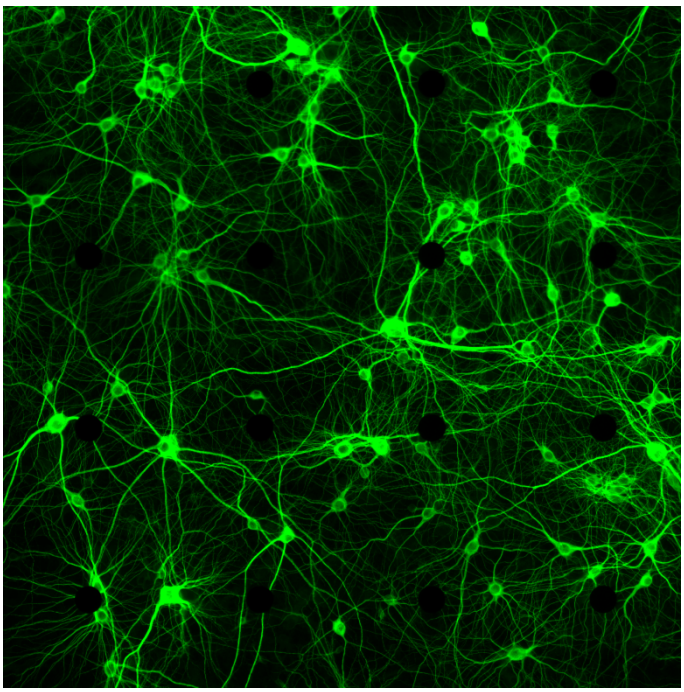
Master students of the 1st and 2nd semester

## Availability

Summer semester, max. 12 students

## Responsible Persons

Dr. Artur Bikbaev



Immunostaining of MAP2 in mouse hippocampal neurons (35 DIV) grown on a microelectrode array.