

**Ankündigung
Vorlesung
Sommersemester
2020**

Neural Networks from the perspective of Neuroscience

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Brief Course Description: In this course we study some mathematical models that describe how the brain encodes information and how does it create representations of the external world. In theoretical neuroscience this can be described via neural networks and their dynamics. The course will have four parts:

- Brief introduction to neurons and the brain,
- Neuron modelling: we look at the Hodgkin-Huxley model of a neuron (which is a system of ordinary differential equations) and use it to describe its activity via dynamical systems.
- Neural network theory: this is used to model the connections between neurons. The neurons are nodes in a neural network and we want to understand how the activity of neurons emerges from properties of the network.
- Neural coding theory: we want to understand the relationship between neural activity and external stimuli. For example, one of the big questions here is to understand the basic principles by which neural activity represents sensory inputs.

The areas of mathematics needed for this course are Analysis, Linear Algebra, ODEs and Dynamical Systems, Probability Theory, and Topology.



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