

Computational Neuroscience Course

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1 Syllabus

Course contains 15 lectures, 8 homeworks and a final exam.

1. Lectures

- LECTURE 1. Introduction
- LECTURE 2. Basic computational unit
- LECTURE 3. Neuronal biophysics
- LECTURE 4. Voltage-Dependent models
- LECTURE 5. Morphology of a neuron
- LECTURE 6. Synapses and receptors
- LECTURE 7. Neuronal encoding
- LECTURE 8. Plasticity and learning
- LECTURE 9. Neuronal decoding
- LECTURE 10. Spiking networks
- LECTURE 11. Large-scale electrophysiology
- LECTURE 12. Nervous system and human body
- LECTURE 13. Developmental biology and neurogenesis
- LECTURE 14. Axon guidance and synaptogenesis
- LECTURE 15. ML meets Neuroscience

2. Home works

- HOMEWORK 1. Integrate-and-Fire model
- HOMEWORK 2. Hodgkin–Huxley model
- HOMEWORK 3. Connor-Stevens model
- HOMEWORK 4. Synapse + channels model
- HOMEWORK 5. IF with synapses
- HOMEWORK 6. Large-scale electrophysiology
- HOMEWORK 7. SNN with IF unit
- HOMEWORK 8. SNN + Learning (2-3 STDP rules)

2 Assessment criteria

In this course students can get a maximum of 10 points in total. Each task is graded based on a scale from 1 to 10, where 1-3 is unsatisfactory, 4-5 is satisfactory, 6-7 is good, 8-10 is excellent.

Home works and the final quiz do not block each other. That means a student can complete some home works and the final exam to get a passing grade (how many of each exactly - calculate yourself)

Task	Max points
Homework 1: Integrate-and-Fire model	0.8
Homework 2: Hodgkin–Huxley model	0.8
Homework 3: Connor-Stevens model	0.8
Homework 4: Synapse + channels model	0.8
Homework 5: IF with synapses	0.8
Homework 6: Large-scale electrophysiology	0.8
Homework 7: SNN with IF unit	0.8
Homework 8: SNN + Learning (2-3 STDP rules)	0.8
Final quiz (mandatory)	3.6
	10