Introduction to cellular and systems neurophysiology

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Course number: 27-5016

Lecturer: Prof. Hamutal Slovin, Dr. Dana Cohen

First semester

Hours: 4 h/w – 2 credit points

Course goals

The goal of the course is to provide fundamental knowledge in biological processes taking place in the brain. The course covers two primary subjects: cellular neurophysiology and systems neurophysiology.

Course topics

Cellular neurophysiology: membrane permeability and ion transport, cable theory, action potentials, synaptic transmission, learning and memory, dendrites, neuronal computation, optogenetics and its uses.

Systems neurophysiology: sensory and motor systems, receptors in sensory systems and signal transduction, neuronal coding, neuronal processing of sensory information and

motor output

Classes schedule

Topics	Classes
Neuronal membrane: electric properties and ion transport	1-2
Structure and properties of dendrites	3-4
Axonal structure and signal propagation	5-6
Structure and analysis of ion channels	7-8
Pre- and post-synaptic transmission	9-10
Intra-cellular recordings and optogenetics	11-12
Chemical senses	13-14
Visual system	15-16
Auditory and vestibular systems	17-18
Somatosensory system	19-20
Motor system in the spinal cord	21-22
Motor cortex	23-24

Final grade

Exam

Reading

. "Foundations of Cellular Neurophysiology" by Daniel Johnston, Samuel Miao-Sin Wu
. "Principles of Neural Science", 5th edition by Eric R. Kandel, James H. Schwartz, Thomas M. Jessell
. "Exploring Neuroscience", 4th Edition by Bear an Paradiso

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972.3.5317755 | Fax :
972.3.7384173 | **Contact Us**