

Course 0116.592601

Molecular Neurobiology: Mechanisms of Information Transfer in the Brain

Class coordinator: Yoni Haitin	room: 937	time: Monday, 12-14	semester 1
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The course will be given in English at the request of at least one student. Otherwise, it will be delivered in Hebrew.

Time Table

#	date	topic	lecturer
1	1.1.24	The molecular machinery of information transfer. An overview of ion channel families and specialization mechanisms, along with the molecular toolbox for structural investigation and an X-ray crystallography primer. (Yoni)	Yoni Haitin
2	8.1.24	The 'resolution revolution' of Cryogenic Electron Microscopy (cryo-EM). Emphasis on recent structural breakthroughs in ion channel structural research. (Yoni) Student presentations and discussion. (Yoni)	Yoni Haitin
3	15.1.24	Integration of synaptic potentials by a neuron. Electrical signaling in dendrites. Passive conduction and summation, asymmetry of synapses in dendritic compartments, active conductances in dendrites. (Nathan)	Nathan Dascal
4	22.1.24	Synaptic integration and ion channels in health and disease: Migraine and epilepsy as ion channel diseases. Student presentations and discussion. (Nathan)	Nathan Dascal
5	29.1.24	Activity dependent biochemical signaling. Activity dependent genes and transcription factors, synapse-nucleus information transfer.	Tal Laviv
6	5.2.24	Activity dependent biochemical signaling (Cont.). Student presentations and discussion. (Tal)	Tal Laviv
7	12.2.24	Neural coding. Rate coding, time-dependent firing rate, spike-count rate, temporal coding, sparse coding, and correlation coding. (Moshe)	Moshe Parnas
8	19.2.24	Information processing in neural networks and sensory pathways. (Moshe) Student presentations and discussion (Moshe)	Moshe Parnas
9	26.2.24	Information transfer within neurons. Synapse to nucleus: Neurotrophic factors and signaling endosomes. (Eran)	Eran Perlson
10	4.3.24	Retrograde signaling from the axon to the soma in health and disease. (Eran) Student presentations and discussion. (Eran)	Eran Perlson
11	11.3.24	Student presentations - residuals	All

Reading material: Each lecturer will provide five seminal papers in the field, which will be mandatory reading material for all participants. In every last teaching block (for each lecturer), students who choose relevant papers are required to present them in front of the class (one paper per student) in a flash-talk format (a 5-minute presentation). In addition, the presenting students must submit a two-page summary of the paper to be presented to the relevant lecturer before their class presentation. Every student will present a paper once throughout the course.

Course final evaluation and exams: The Paper presentation is worth 25% of the final grade. The exam (75%) will consist of ten open questions, with a choice of one out of two in each field.