

## The Hebrew University of Jerusalem

Syllabus

## From Molecules to Circuits - 76900

*Last update 13-02-2022* 

<u>HU Credits:</u> 3

Degree/Cycle: 2nd degree (Master)

<u>Responsible Department:</u> Brain Science: Computation & Information Proc.

<u>Academic year:</u> 0

Semester: 2nd Semester

Teaching Languages: English

<u>Campus:</u> E. Safra

<u>Course/Module Coordinator:</u> Dr. Yoav Adam

Coordinator Email: yoav.adam@mail.huji.ac.il

Coordinator Office Hours: by appointment

Teaching Staff:

Dr. Yoav Adam, Dr. Eran Lotem, Dr. Noami Habib

Course/Module description:

The course will deal with advanced topics in molecular, cellular, and circuit neurophysiology.

## Course/Module aims:

The course will provide advanced knowledge of molecular, cellular, and circuit neurophysiology, focusing on recent, state-of-the-art literature.

Learning outcomes - On successful completion of this module, students should be able to:

Critically read and present state of the art papers on molecular, cellular, and microcircuit neuroscience

Attendance requirements(%):

*Teaching arrangement and method of instruction: Frontal lectures Reading chores* 

## Course/Module Content:

Part 1 - Yoav Adam: Advanced topics in synaptic-cellular neurophysiology. (a) Basic and advanced topics in synaptic plasticity and its involvement in hippocampal place cell formation. (b) other modes of neuronal plasticity - plasticity of excitability, homeostatic plasticity, adult neurogenesis. (c) Dendritic computations Parts 2 - Naomi Habib: Cellular and molecular processes underlying brain functions and diseases, and the advanced new technologies to measure and manipulate cells on the genetic and epigenetic level. The processes covered will include brain plasticity and addiction; development; psychiatric disorders (Major depression disorder); Aging and neurodegeneration (Alzheimer's disease); neuroimmunology. Part 3 - Eran Lottem: We will explore the structure and function of cortical microcircuits, focusing primarily on the primary visual cortex as an exemplar for how interactions among different types of neurons give rise to sophisticated computations. Part 4 – Introduction to neuroanatomy including hands-on brain dissections

<u>Required Reading:</u> Two research papers every week

Additional Reading Material:

<u>Course/Module evaluation:</u> End of year written/oral examination 0 % Presentation 30 % Participation in Tutorials 0 % Project work 55 % Assignments 10 % Reports 0 % Research project 0 % Quizzes 0 % Other 5 % Participation in class

Additional information: