



# Full Syllabus



<b>Course Title</b>	<b>Organization and motion of receptors in cell membranes</b>
<b>Lecturer</b>	<b>Prof. Yoav Henis</b>
<b>Semester</b>	<b>Second (bet)</b>
<b>Course requirements</b>	<b>Participation in at least 70% of the lectures, final exam</b>
<b>Final grade components</b>	<b>Final exam</b>
<b>Course schedule</b>	
<b>Class no. / Date</b>	<b>Subject and Requirements (assignments, reading materials, tasks, etc.)</b>
1 /18.03.25	Properties and function of biological membranes – importance of the motion of lipids and proteins in the plane of the membrane for cellular functions
2 /25.03.25	Types of membrane proteins – differences in structure and function
3 /01.04.25	Motion types of membrane receptors (lateral, rotational, vertical) – biological relevance and methods of measurement
4 /08.04.25	Motion types of membrane receptors (lateral, rotational, vertical) – biological relevance and methods of measurement
5 /22.04.25	Factors regulating receptor motion – theories and experimental evidence (principles of measurement by different methods of Fluorescence Recovery After Photobleaching)
6 /29.04.25	Factors regulating receptor motion – theories and experimental evidence (principles of measurement by different methods of Fluorescence Recovery After Photobleaching)
7 /06.05.25	Factors regulating receptor motion – principles of measuring rotation in membranes
8 /13.05.25	Factors regulating receptor motion – principles of measuring rotation in membranes
9 /20.05.25	Factors regulating receptor motion – principles of measuring rotation in membranes
10 /27.05.25	Effects of interactions between receptors to the membrane-underlying cytoskeleton and the extracellular matrix on their motion – principles and examples from biological systems
11 /03.06.25	Effects of interactions between receptors to the membrane-underlying cytoskeleton and the extracellular matrix on their motion – principles and examples from biological systems
12 /10.06.25	Interactions of membrane proteins with the endocytosis apparatus – mutual dependence on receptor motion in the membrane
13 /17.06.25	Motion of signaling proteins embedded in the internal membrane monolayer (Ras and Src proteins)



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14 /24.06.25

Motion of signaling proteins embedded in the internal membrane monolayer (Ras and Src proteins)

15 /01.07.25

Measurement of complex formation and aggregation of receptors by FRAP variations

## Required course reading

## Optional course reading

- (1) Basic information about cell membranes, membrane proteins and lipids, and cytoskeletal organization can be found in the book: Molecular Cell Biology (Lodish, H., Baltimore, D., Berk. A., Zipursky, S.L., Matsudaira, P. and Darnell, J.), Third Edition, W.H. Freeman, New York (1995). Later editions of this book are fine, and other books of basic cell biology can also cover the same material and are fine (for example, the book by Bruce Alberts).
- (2) Henis, Y.I., Rotblat, B. and Kloog, Y. (2006) FRAP beam-size analysis to measure palmitoylation-dependent membrane association dynamics and microdomain partitioning of Ras proteins. *Methods* 40:183-190.
- (3) Kusumi, A. Hiroshi, I., Nakada, C., Murase, K. and Fujiwara, T. (2005) Single-molecule tracking of membrane molecules: plasma membrane compartmentalization and dynamic assembly of raft-philic signaling molecules. *Semin. Immunol.* 17:3-21.
- (4) Hancock, J.F. (2006) Lipid rafts: contentious only from simplistic standpoints. *Nat. Rev. Mol. Cell Biol.* 7: 456-462.

## Comments