



# 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 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 /22.02.22                   | Properties and function of biological membranes – importance of the motion of lipids and proteins in the plane of the membrane for cellular functions                            |
| 2 /02.03.22                   | Properties and function of biological membranes – importance of the motion of lipids and proteins in the plane of the membrane for cellular functions                            |
| 3 /08.03.22                   | Types of membrane proteins – differences in structure and function   |
| 4 /15.03.22                   | Motion types of membrane receptors (lateral, rotational, vertical) – biological relevance and methods of measurement   |
| 5 /22.03.22                   | Motion types of membrane receptors (lateral, rotational, vertical) – biological relevance and methods of measurement   |
| 6 /29.03.22                   | Factors regulation receptor motion – theories and experimental evidence (principles of measurement by different methods of Fluorescence Recovery After Photobleaching)           |
| 7 /05.04.22                   | Factors regulation receptor motion – theories and experimental evidence (principles of measurement by different methods of Fluorescence Recovery After Photobleaching)           |
| 8 /26.04.22                   | Factors regulating receptor motion – principles of measuring rotational motion in membranes  |
| 9 /03.05.22                   | Factors regulating receptor motion – principles of measuring rotational motion in membranes  |
| 10/10.05.22                   | Effects of interactions between receptors to the membrane-underlying cytoskeleton and the extracellular matrix on their motion – principles and examples from biological systems |
| 11/17.05.22                   | Effects of interactions between receptors to the membrane-underlying cytoskeleton and the extracellular matrix on their motion – principles and examples from biological systems |
| 12/24.05.22                   | Aggregation and internalization of receptors – mutual dependence on receptor motion  |



# Full Syllabus



|             |   |
|-------------|---|
|             | in the membrane   |
| 13/31.05.22 | Organization and motion of signaling proteins embedded in the internal lipid monolayer of the membrane (Ras proteins as a model system) |
| 14/07.06.22 | Organization and motion of signaling proteins embedded in the internal lipid monolayer of the membrane (Ras proteins as a model system) |

## 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