**Introduction to Systems Biology - 76555 - מבוא לביולוגיה מערכתית**

Prof. Nir Friedman

Guest Lecturer - Dr. Tommy Kaplan

A new course, intended to CS students (MSc or 3rd year BSc), and CS/LS students.

**In the course, we will discuss various aspects of High-Throughput Biological data and its analysis.**

We will begin by introducing the historic background and recent updates to the field ofSystems Biology.

**Understanding Networks** -  We will consider several types of biological networks, including Transcriptional Networks, Protein-Protein Interaction networks, Metabolic networks, and Genetic networks. We will analyze the structure of the network and its characteristics vs. Random Graphs, and analyze the basic structural motifs that underly it (e.g. FFL).

**Dynamics** - We will develop mathematical models to describe and analyze the temporal behavior of populations and biological mechanisms.

**Stochasticity in Biology** - We will learn how complex biological networks filter internal noise or even harness it to survival during stress.

**High-throughput biology** - Finally, we will discuss the data-driven aspects of SystemsBiology, and consider Machine Learning techniques are used to integrate and prune biological data from High-Throughput technologies (such as Next-Generation DNA sequencing methods), how such data are integrated with parallel data (Transcription, Evolution, Genomic annotations, etc.) and how we distill it into causal and mechanistic biological insights.

4 credit points. 4-5 assignments, and a final project or test.