# The Hebrew University of Jerusalem

## Syllabus

# Introduction to systems biology of the cell - 94691

*Last update 01-08-2023*

*HU Credits:* 2

*Degree/Cycle:* 2nd degree (Master)

*Responsible Department:* Bio-Medical Sciences

*Academic year:* 0

*Semester:* 2nd Semester

*Teaching Languages:* Hebrew

*Campus:* Ein Karem

*Course/Module Coordinator:* Danny Ben-Zvi

*Coordinator Email:* dannyb@ekmd.huji.ac.il

*Coordinator Office Hours:*

*Teaching Staff:*

*Prof Dan Ben Zvi*

*Course/Module description:*

*This course is aimed to biology and medical students that would like to understand how can math be useful in understanding biological and medical phenomena. Math and Computer Science courses are not a prerequisite for this course, but a positive attitude to math is expected.*

*We will discuss biological regulation principles such as negative feedback, and describe common biological regulation topologies. We will then try to use mathematical modeling to answer central questions in specific fields such as trascription, translation, cell division and microbiology. Finally, we will perform back of the envelope calculations to estimate e.g. how many cells to we have, or how long does it take to translate a gene.*

*Course/Module aims:*

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

*the students to be able to write (but usually not solve) equations describing biological processes, and draw plots describing these phenomena*

*Attendance requirements(%):*

*Teaching arrangement and method of instruction: lectures on the whiteboard*

*Course/Module Content:*

*Introduction*
*Biological Regulation: negative and positive feedback, stability, time scales, models for transcription, translation, chemotaxis, quorum sensing, sociobiology.*
*Basic "back of the envelope" calculations in Biology*
*SIR model for Covid19*

*Required Reading:*

*none*

*Additional Reading Material:*

*An Introduction to Systems Biology: Design Principles of Biological Circuits/Uri Alon*

*cell biology by the numbers/Ron Milo, Rob Philips*

*Grading Scheme:*

*Additional information:*

*MSc and PhD students are welcome to join the course.*