



Syllabus

Introduction to models and simulations in life sciences - 71256

Last update 06-09-2022

HU Credits: 3

Responsible Department: agro informatics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Rehovot

Course/Module Coordinator: Dr. Tamar Friedlander

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Coordinator Office Hours: Sunday 14:00-15:00

Teaching Staff:

Dr. Tamar Friedlander

Course/Module description:

A mathematical model capturing experimental data is a valuable tool. It allows insights into the data dependence on the various parameters and enables predictions. In this course the students will gain basic theoretical and practical tools to construct mathematical models, simulate them and fit parameters to experimental data.

Course/Module aims:

Acquaintance with basic population dynamics models. Learn how to write computer simulations of these models.

Learn how to fit model parameters to measurement data.

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

The students will be familiar with basic population dynamics models.

The students will know how to write computer simulations of basic mathematical models.

The students will know how to fit model parameters to data.

Attendance requirements(%):

80%

Teaching arrangement and method of instruction: lectures, hands-on tutorials in computer class, home assignments

Course/Module Content:

Fitting model parameters to data: least squares, maximum likelihood, polynomial fit, fitting error.

Dynamical models in 1 variable: population logistic growth.

Stable vs. unstable fixed points.

Dynamical models in 2 variables: SIR model of epidemics spread.

Models exhibiting periodic behavior: Lotka-Volterra equations (interactions between species in ecology, e.g. predator-prey).

Different approaches to handle models: analytical solution/ numerical solution / stochastic simulation □ when should we pursue each?

Parameter estimation using Least Squares, Maximum Likelihood approaches.

Required Reading:

None.

Additional Reading Material:

A biologist's guide to mathematical modeling/ Otto & Day

Grading Scheme:

Additional information:

*Lectures will be recorded and available for watching.
Tuition classes will not be recorded.*