The Hebrew University of Jerusalem

Syllabus

CHIMERA Synthetic Biology Made Simple - 49678

Last update 31-07-2023

HU Credits: 2

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Enrichment Program for High School students

Academic year: 0

Semester: Yearly

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Shir Bahiri-Elitzur

Coordinator Email: Shirbaelitzur@gmail.com

Coordinator Office Hours:

Teaching Staff:

Ms. Shir Bahiri-Elitzur,
Ms. Larissa Fine

Course/Module description:
Introduction to synthetic biology - a link between the world of biology and the worlds of mathematics, engineering, computer science and bioinformatics

Course/Module aims:
Exposure and accessibility of topics at the forefront of research in the field of synthetic biology for the younger generation

Learning outcomes - On successful completion of this module, students should be able to:
Recognizing, analyzing, researching and solving problems in the biological world using biophysical and programming tools.
Emphasis on intracellular processes, diseases related to DNA

Attendance requirements(%):
90% Mandatory attendance (up to 3 sessions can be omitted)

Teaching arrangement and method of instruction: In class

Course/Module Content:
Biological contents - enzymes, cellular theory, mitochondrion and energy transduction, the cell membrane and transfer of materials, DNA structure and its replication process, the cell cycle, and genetics, the central dogma of biology- transcription and translation processes.
Molecular methods - restriction enzymes, PCR, gel electrophoresis, plasmids, primer design, transformation, DNA sequencing
Computational biology methods - sequence alignment global and local, PSSM, Fitch algorithm (phylogenetic trees), codon usage bias indices (CAI, ENC), ribosome flow model
Advanced topics in synthetic biology - CRISPR, organs on a chip, synthetic genetic circuits, biosensors, bio-physical model of translation process, phages and ethics, vaccine research (Covid as a case study), Synthetic biology in the food industry, chosen topic of innovative research in the field
Labs - Enzymatic kinetics, genetic engineering, biosensors
Computational tools - Python workshop
Tours and guest lectures

Required Reading:
Non

Additional Reading Material:

Grading Scheme:
Essay / Project / Final Assignment / Home Exam / Referat 45 %
Presentation / Poster Presentation / Lecture/ Seminar / Pro-seminar / Research proposal 10 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 40 %
Attendance / Participation in Field Excursion 5 %

Additional information: