האוניברסיטה העברית בירושלים
THE HEBREW UNIVERSITY OF JERUSALEM

The Hebrew University of Jerusalem

Syllabus

Analysis of Boolean functions - 80585

Last update 12-08-2023

HU Credits: *2*

Degree/Cycle: *1st degree (Bachelor)*

Responsible Department: *Mathematics*

Academic year: *0*

Semester: *1st Semester*

Teaching Languages: *English*

Campus: *E. Safra*

Course/Module Coordinator: *Noam Lifshitz*

Coordinator Email: *noamlifshitz@gmail.com*

Coordinator Office Hours:

Teaching Staff:

Dr. Noam Lifshitz

Course/Module description:

Analysis of Boolean functions is a deep field of study with applications in probability, theoretical computer science, economics, group theory, and representation theory.

Throughout the course we will understand the basic tools in the study of Boolean functions and learn how to apply them.

Course/Module aims:

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

apply the technique that translates hypercontractive statement to anti-concentration of measures of sparse {0,1}-valued functions.

transform results about anti-concentration to combinatorial counting statements

Attendance requirements(%):

Teaching arrangement and method of instruction:

Course/Module Content:

Fourier-Walsh and Linearity testing
The noise operator and social choice theory
Hypercontractivity
Analysis in Gaussian space
The invariance principle
Hypercontractivity for global functions
Applications to extremal combinatorica and group theory

Required Reading:

Analysis of Boolean functions of Ryan O'Donnell

Additional Reading Material:

Grading Scheme:

Essay / Project / Final Assignment / Home Exam / Referat 70 %

Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 30 %

Additional information: