



# *The Hebrew University of Jerusalem*

## *Syllabus*

### *PROBABILITY THEORY (2) - 80421*

*Last update 24-09-2024*

*HU Credits: 4*

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

*Responsible Department: Mathematics*

*Academic year: 0*

*Semester: 2nd Semester*

*Teaching Languages: Hebrew*

*Campus: E. Safra*

*Course/Module Coordinator: Ohad Noy Feldheim*

*Coordinator Email: [ohad.feldheim@mail.huji.ac.il](mailto:ohad.feldheim@mail.huji.ac.il)*

*Coordinator Office Hours: By appointment*

*Teaching Staff:*

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Prof. Feldheim Ohad

Course/Module description:

A second course in probability theory, from the standpoint of measure theory. The course revolves around stochastic processes, their invariants and convergence. These topics are studied via classical tools such as characteristic function, and modern tools such as martingales.

Course/Module aims:

Same as in learning outcomes.

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

Establishing probability theory on the shoulders of measure theory.

Ability to prove the fundamental theorems in that theory in a general form.

Relating probability theory and harmonic analysis via characteristic functions.

Understanding discrete stochastic processes through the notion of a martingale.

familiarity with the Wiener process (Brownian motion), and deriving its basic properties from simple random walks.

Attendance requirements(%):

0

Teaching arrangement and method of instruction: Lecture

Course/Module Content:

Convergence of random variables  
Law of large numbers  
Characteristic functions  
Central limit theorem  
Martingales  
Other or different topic may be taught

Required Reading:

Lecture notes

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Additional Reading Material:

Hebrew Notes

*Probability with martingales / Williams*

*Probability: Theory and Examples Rick Durrett*

Grading Scheme:

*Written / Oral / Practical Exam 100 %*

Additional information:

*none*