



The Hebrew University of Jerusalem

Syllabus

PROBABILITY AND RANDOM PROCESSES - 52817

Last update 19-10-2019

HU Credits: 6

Degree/Cycle: 2nd degree (Master)

Responsible Department: Statistics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Offer Kella

Coordinator Email: offer.kella@gmail.com

Coordinator Office Hours: By appointment (Sun., Tue., Wed., after 14:00)

Teaching Staff:

Prof Pavel Chigansky,
Ms. Rachel Buchuk

Course/Module description:

In this course we will learn important concepts in modern probability theory and stochastic processes.

The topics that we will learn will include: axioms, independence, Borel-Cantelli Lemma, various modes of convergence, expected value and convergence theorems, Holder's and Minkowski's inequalities, monotone class theorem, pseudo-inverse function of a cumulative distribution function, stochastic order, Tonelli-Fubini Theorem, characteristic functions, conditional expectation, stopping times and discrete time martingales, discrete time Markov Chains.

Course/Module aims:

The main goal of the course is to introduce to the students basic tools in modern probability and (certain) stochastic processes.

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

1. To quote and apply the definitions and results that were presented in the course.
2. To restore independently some of the proofs of the claims that were stated in the course.
3. To describe at least one example in the context of any claim.
4. To prove independently simple variants of claims that were stated in class.

Attendance requirements(%):

No attendance requirement

Teaching arrangement and method of instruction: Four teaching units will consist of theoretical material and examples and two teaching units will be for the purpose of problem solving (homework and otherwise).

Course/Module Content:

Definition of Probability space. Random variables, Fatou's Lemma. Fubini's Theorem, the lemma of Borel-Cantelli. Different concepts of convergence. Central limit theorem, stochastic processes, Markov chains, Poisson process, martingales, stopping times, Wald's lemma, if time permits: Brownian motion.

Required Reading:

There is no required reading material. It is warmly recommended to read the material that will be advertised in the course website.

Additional Reading Material:

J. Jacod & P. Protter, Probability Essentials. 2nd edition.

P. Billingsley, Probability and Measure.

R. Durrett, Probability: Theory and Examples.

S.M. Ross and E.A. Pekoz A Second Course in Probability.

D. Williams, Probability with Martingales.

Course/Module evaluation:

End of year written/oral examination 100 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 0 %

Other 0 %

Additional information: