



The Hebrew University of Jerusalem

Syllabus

Advanced Mathematical Tools for data science - 52000

Last update 23-09-2024

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Statistics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Prof. Offer Kella

Coordinator Email: offer.kella@gmail.com

Coordinator Office Hours: By appointment

Teaching Staff:

Prof. Offer Kella

Course/Module description:

The course deals with mathematical tools in various fields which are necessary for the understanding and application of algorithms and various methods in the analysis of multivariate data or complex data.

Course/Module aims:

The study of mathematical tools for the statistical analysis of complex data.

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

On successful completion of this module, students should be able to employ mathematical results in the areas of calculus, linear algebra and probability theory in order to apply them in the context of data analysis.

Attendance requirements(%):

None.

Teaching arrangement and method of instruction: In class lectures and in class and homework exercises.

Course/Module Content:

Topics from probability:
Modes of convergence of a sequence of random variables and distributions, limit theorems, moment generating functions, characteristic functions, generating functions, multivariate distribution, multivariate normal distribution (including Schur decomposition of a matrix and idempotent matrix) Markov chains.

Topics from linear algebra:

Projections, singular value decomposition, exponent of a matrix and, if time will allow: matrix norms.

Topics from calculus:

Chain rule for differentiating multivariate functions, the inverse function theorem, complex numbers, introduction to harmonic analysis.

Required Reading:

None.

Additional Reading Material:

If the need arises, will be given during the course.

Grading Scheme:

Written / Oral / Practical Exam 100 %

Additional information: