The Hebrew University of Jerusalem

Syllabus

Information theory and applications in statistics - 52010

Last update 08-08-2019

HU Credits: 2

Degree/Cycle: 2nd degree (Master)

Responsible Department: Statistics

Academic year: 0

Semester: 1st Semester

Teaching Languages: Hebrew

Campus: Mt. Scopus

Course/Module Coordinator: Yosef Rinott

Coordinator Email: yosef.rinott@mail.huji.ac.il

Coordinator Office Hours: Monday 11-12

Teaching Staff:
Prof Yosef Rinott

Course/Module description:
Information Theory and applications in Statistics, Coding and related areas.

Course/Module aims:
Understand basic notions of information, information transfer, and related notions in statistics.

Learning outcomes - On successful completion of this module, students should be able to:
Know basic ideas in information. Understand the relation to statistical notions such as sample size, sufficiency, testint hypotheses, power of tests, etc.

Attendance requirements(%):
100%

Teaching arrangement and method of instruction: Lecture and homework exercises.

Course/Module Content:
Entropy, Kullback-Leibler divergence, Data-Processing Inequality, Sufficiency and related inequalities and their relation to statistics: power of tests, data compression etc.

Asymptotic Equipartition Property, Data Compression and entropy

Entropy Rates of a Stochastic Process

Concentration inequalities – Large Deviation theory with applications to information and statistics

Data compression and coding.

Information Theory and Statistics: estimation, Hypothesis Testing, Bahadur efficiency, Fisher information.

Data Privacy.

Required Reading:
Elements of Information Theory, 2nd Edition
Thomas M. Cover, Joy A. Thomas

Lecture Notes for Statistics 311/Electrical Engineering 377
John Duchi
March 13, 2019

Additional Reading Material:
Information Theory and
Statistics: A Tutorial
Imre Csisz´ar and Paul C. Shields

Course/Module evaluation:
End of year written/oral examination 85 %
Presentation 0 %
Participation in Tutorials 5 %
Project work 0 %
Assignments 10 %
Reports 0 %
Research project 0 %
Quizzes 0 %
Other 0 %

Additional information:
All reading material can be downloaded legally.

The first lecture will take place on November 4.