The Hebrew University of Jerusalem

Syllabus

INFORMATION THEORY AND STATISTICAL INFERENCE - 67548

Last update 07-04-2024

HU Credits: 3

Degree/Cycle: 2nd degree (Master)

Responsible Department: Computer Sciences

Academic year: 0

Semester: 2nd Semester

Teaching Languages: English and Hebrew

Campus: E. Safra

Course/Module Coordinator: Yuval Kochman

Coordinator Email: yuvalko@cs.huji.ac.il

Coordinator Office Hours: by appointment

Teaching Staff:
Prof Yuval Kochman

Course/Module description:
A basic course in Information Theory: compression, communication, and the role of information measures in statistical inference.

Course/Module aims:
Knowledge of basic terms in Information theory, main theorems, and most importantly: how to approach and analyze informational settings.

Learning outcomes - On successful completion of this module, students should be able to:
Formulate an information-related setting using appropriate terms. Understand what are the relevant informational quantities. Be able to solve simple problems.

Attendance requirements(%):
none

Teaching arrangement and method of instruction: Frontal.

Course/Module Content:
1. Review of topics from the basic class, with extensions such as continuous distributions.

2. Lossy source coding and joint source-channel coding.

3. Statistical inference: Bounds on hypothesis testing, estimation and learning using information-theoretic quantities.

4. Introduction to multi-terminal information theory: side information and multi-terminal problems.

5. Time permitting, extensions: Polar codes, linear codes and lattices, secrecy and more.

Required Reading:
Cover and Thomas: Elements of Information Theory (relevant chapters)

Additional Reading Material:
Gallager: Information theory and reliable communication

Polyanskiy and Wu: Lecture notes on information theory

Shannon: A Mathematical Theory of Communication

Grading Scheme:
Essay / Project / Final Assignment / Home Exam / Referat 50 %
Submission assignments during the semester: Exercises / Essays / Audits / Reports / Forum / Simulation / others 25 %
Mid-terms exams 25 %

Additional information: