



The Hebrew University of Jerusalem

Syllabus

INTRODUCTION TO INFORMATION THEORY - 67548

Last update 20-05-2015

HU Credits: 4

Degree/Cycle: 1st degree (Bachelor)

Responsible Department: Computer Science

Academic year: 3

Semester: 2nd Semester

Teaching Languages: Hebrew

Campus: E. Safra

Course/Module Coordinator: Yuval Kochman

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

Coordinator Office Hours: by appointment

Teaching Staff:

Dr. Yuval Kochman
Anatoly Khina

Course/Module description:

A basic course in Information Theory.

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. 3 weekly hours of lecture, 1 hour of recitation.

Course/Module Content:

- 1. Information measures and their properties.*
- 2. Lossless source coding: the fixed- and variable-length coding theorems, codes, the AEP property.*
- 3. Channel coding: the coding theorem, capacity calculations, the separation theorem.*
- 4. Continuous-alphabe information theory: differential entropy, channel coding with constraints, Gaussian channels.*
- 5. Lossy source coding.*
- 6. Extensions: error-probability bounds, sources and channels with memory, the advantage of joint source-channel coding, introduction to network information theory.*

Required Reading:

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

Additional Reading Material:

Gallager: Information theory and reliable communication

Ash: Information theory

Shannon: A Mathematical Theory of Communication

Course/Module evaluation:

End of year written/oral examination 80 %

Presentation 0 %

Participation in Tutorials 0 %

Project work 0 %

Assignments 0 %

Reports 0 %

Research project 0 %

Quizzes 20 %

Other 0 %

Additional information:

Assignment submission is mandatory. Quizzes will be taken into account only if a quiz grade is higher than the final examination grade.