The Hebrew University of Jerusalem

Syllabus

Connections between machine learning and model theory - 80660

Last update 01-05-2024

<u>*HU Credits:*</u> *3*

<u>*Degree/Cycle:*</u> *2nd degree (Master)*

<u>*Responsible Department:*</u> *Mathematics*

<u>*Academic year:*</u> *0*

<u>*Semester:*</u> *2nd Semester*

<u>*Teaching Languages:*</u> *Hebrew*

<u>*Campus:*</u> *E. Safra*

<u>*Course/Module Coordinator:*</u> *Prof. Itay Kaplan*

<u>*Coordinator Email:*</u> [*kaplan@math.huji.ac.il*](mailto:kaplan@math.huji.ac.il)

<u>*Coordinator Office Hours:*</u> *By appointment*

Teaching Staff:
  Prof Itay Kaplan

Course/Module description:
  We will give an overview of some connections between certain concepts in the theory of machine learning and notions in model theory. These connections were discovered and studied by many people in recent years, and lead to ideas and surprising results going in both directions (from model theory to machine learning and vice-versa).
In the following link you may find a presentation on the subject. The aim of the course is to get into the details and more.
https://lc2023.unimi.it/wp-content/uploads/2023/06/slides-Kaplan.pdf

Course/Module aims:
  To be familiar with the relevant classes in model theory and machine learning and their connections.

Learning outcomes - On successful completion of this module, students should be able to:
  Understand the material of the course.

Attendance requirements(%):
  0

Teaching arrangement and method of instruction: Frontal teaching

Course/Module Content:
  Model theory:
Stability, NIP.
Machine learning:
PAC and online learning.

Required Reading:
 none

 Additional Reading Material:
  Understanding Machine Learning

From Theory to Algorithms
Shai Shalev-Shwartz, Shai Ben-David

A guide to NIP theories
Pierre Simon

<u>*Grading Scheme:*</u>
Presentation / Poster Presentation / Lecture/ Seminar / Pro-seminar / Research proposal 95 %
Attendance / Participation in Field Excursion 5 %

<u>*Additional information:*</u>