



LABORATORY OF MACHINE LEARNING APPLIED TO PHYSICAL SYSTEMS

Anno immatricolazione	2021/2022
Anno offerta	2023/2024
Normativa	DM270
SSD	NN (INDEFINITO/INTERDISCIPLINARE)
Dipartimento	DIPARTIMENTO DI MATEMATICA 'FELICE CASORATI'
Corso di studio	ARTIFICIAL INTELLIGENCE
Curriculum	PERCORSO COMUNE
Anno di corso	3°
Periodo didattico	Secondo Semestre (04/03/2024 - 18/06/2024)
Crediti	3
Ore	36 ore di attività frontale
Lingua insegnamento	INGLESE
Tipo esame	ORALE
Docente	GEROSA DAVIDE (titolare) - 3 CFU
Prerequisiti	Introduction to physics as provided in the relevant first- and second-year classes. Basic knowledge of the Python programming language.
Obiettivi formativi	- Describe physical systems using the appropriate mathematical formulation. - Apply machine-learning algorithms to the resulting problem. - Understand the advantages and limitations of machine learning algorithms given the specific problem at hand.
Programma e contenuti	- Intro: Computing and machine-learning in physics and astronomy. - Intro: The typical tasks of a computational physicist. - Example: A prototypical physical system. - Task: The "classical" computational solution. - Task: The machine-learning solution. - Project development and reporting.

Each class will pair traditional lectures (to introduce the relevant problems) with hands-on exercises and demonstrations (to tackle the relevant problem). These computational activities are the key content of the course.

- Statistics, Data Mining, and Machine Learning in Astronomy: A Practical Python Guide for the Analysis of Survey Data. Željko Ivezić, Andrew J. Connolly, Jacob T. VanderPlas, and Alexander Gray. Princeton University Press
- Machine Learning for Physics and Astronomy. Viviana Acquaviva. Princeton University Press.

Students will develop a computational project. This will be started during the lectures and completed asynchronously. The project report and associated code, likely in the form of a Jupyter notebook, will then be submitted for evaluation.

Lectures will take place at Milano-Bicocca.

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