

PHD PROGRAMME IN PHYSICS, ASTROPHYSICS, AND APPLIED PHYSICS
UNIVERSITÀ DEGLI STUDI DI MILANO
PhD Cicle 41 (2025-2026)

All lectures will be given in English.

Course title	Computational, simulation and machine learning methods in High Energy Physics and Beyond: Machine Learning
Teacher in charge of the course	Carrazza Stefano
List of the teachers of the course	Carrazza Stefano, University of Milan, stefano.carrazza@unimi.it
Training objectives	An introduction to machine learning techniques including model representation, parameter learning, non-linear models, hyperparameter tune, and an overview of modern deep learning strategies. The seminars will cover the theoretical and mathematical aspects of machine learning followed by practical examples of code implementation using public frameworks.
Prerequisites	Statistics, basics of programming languages.
Detailed course program	- Definition of Deep Learning, the current importance, challenges and limitations. - Non-linear models, performance metrics and training techniques. - Hyper-optimization techniques. - Regression and classification models with deep learning.
Examination modalities	Oral examination.
Preliminary schedule	1 st week of February. Course enrolment deadline: December 27, 2025.