

# UNIVERSITÀ DEGLI STUDI DI MILANO-BICOCCA

## **COURSE SYLLABUS**

## **Deep Learning for Physicists**

2425-1-113R-03

#### **Title**

Introduction to Deep Learning for Physicists

## Teacher(s)

Stefano Giagu

#### Language

English

## **Short description**

## **Monday June 16**

- Lecture 1: Artificial Neural Networks 101
- Exercise session 1: introduction to the pytorch framework and implementation of a simple ANN

#### **Tuesday June 17**

• Lecture 2: Regularization and Training of an ANNs

• Exercise session 2: end-to-end design and training of an MLP to learn the dynamic of a mechanical system, Hamiltonian NNs

#### Wednesday June 18

- Lecture 3: Neural Network Models for Sparse Interactions: CNNs and Graph Neural Networks
- Exercise session 3: training a CNN to identify phase transitions on a 2D Ising Model

#### **Thursday June 19**

- Lecture 4: Unsupervised learning and Anomaly Detection with Auto Encoders
- Exercise session 4: representation of the latent space learnt by an AE, anomaly detection in high-energy physics

#### Friday June 20

- Lecture+exercise 5: Uncertainty quantification in ANNs, Bayesian NNs or recent trends in deep dearning
- Hackathon/final exam

#### **CFU / Hours**

## **Teaching period**

#### **Sustainable Development Goals**

QUALITY EDUCATION | INDUSTRY, INNOVATION AND INFRASTRUCTURE