



UNIVERSITÀ  
DEGLI STUDI DI MILANO-BICOCCA

## COURSE SYLLABUS

### Advanced Computational Techniques for Big Imaging and Signal Data

2223-1-F9102Q015

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#### Aims

The aim of the course is to provide practical notions of deep learning through hands-on laboratories. In particular, the student will learn several frameworks related to deep learning that cover all the aspects from the design to the deployment of the neural system.

#### Contents

The course consists of a set of practical laboratories. The course aims to get in touch with the bleeding-edge technologies related to deep learning. Four main parts will be covered: the design, the training of the neural architecture, the parameter search, the distributed training and the deployment of the system. During the laboratory several case-studies will be analyzed.

#### Detailed program

- Hardware accelerators (CPU, GPU, FPGA and TPU).
- Machine learning frameworks: tensorflow, pytorch, Jax, etc..
- Hyper-optimization frameworks: hyperopt, optuna, ray, etc..
- Deployment of the system: Onnx
- Cloud infrastructure for software as a service SAAS: RESTful APIs, streamlit, etc..
- Analysis of signals and temporal sequences
- Analysis of big images for remote sensing
- Analysis of big images for health

- Explainability and interpretability: usecases

## **Prerequisites**

Programming basics, machine learning basics, linear algebra

## **Teaching form**

The course will be delivered through face-to-face lectures. Lectures will be recorded and uploaded to the course page for those who cannot attend but still want to take the course on a delayed basis. It is still highly recommended to attend the lectures.

## **Textbook and teaching resource**

Slides and material will be published on the course page.

## **Semester**

Second

## **Assessment method**

Written test with open and closed questions on the main tematics relative to the course.

## **Office hours**

After the lesson and on appointment. The meeting can be done online or in my office, room 1048 building U-14.

## **Sustainable Development Goals**

QUALITY EDUCATION

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