

Deep Learning

*LM Computer Science, Data Science, Cybersecurity
2nd semester - 6 CFU*

Luca Pasa, Nicolò Navarin & Alessandro Sperduti

*(If your student id number is even, you are in the right
class, otherwise...)*

Course Logistics

- Classes: Monday 16:30 – 18:30, Thursday 16:30 - 18:30 (Lum250)
- Consultancy hours:
 - Nicolò Navarin: Friday afternoon after 16.30
 - Alessandro Sperduti: Friday afternoon after 16.30
 - Luca Pasa: Thursday afternoon 14.30 - 16.30
- **Exam**:
 - Homeworks (**necessary condition to take the exam**)
 - 6 assignments during the semester (Jupiter notebooks)
 - **Written exam** at the end of the semester
- Resources (available online):
 - [Deep Learning Book](#) (course book)
 - [Mathematics for Machine Learning](#) (math concepts)
 - [Mitchell](#) (supplementary machine learning book)
 - [Bishop](#) (supplementary machine learning book)
 - Other resources on **Moodle**: slides, lecture notes, cheat sheets

Homeworks

- HWs can be submitted:
 - During the course and
 - Before each exam
- Each HW will be graded:
 - Score < 80 -> HW failed
 - If failed, it must be resubmitted
- Homeworks will **not** influence the final exam score
- **You should have passed all the homeworks in order to take the exam**

Course Outline

- Introduction to Deep Learning/Basic concepts;
- Deep Feedforward Networks; HW1
- Regularization for Deep Learning;
- Optimization for training Deep Models; HW2
- Convolutional Neural Networks; HW3
- Graph Convolutional Networks
- Models for Sequential Domains; HW4
 - Recurrent Neural Networks
 - Transformers
- Autoencoders; HW5
- Deep Generative Models; HW6
- pyTorch (homeworks).

What this course is **NOT**

- Easy 6 credits to add to your study plan
 - Deep learning requires many different skills: Linear Algebra, vector Calculus, Probability, Programming
 - We will briefly review the basics you need
 - you may have to put some additional effort in parts of the course for which you lack (or forgot) some basic concepts
- Applied Deep Learning
 - We will cover the principles of deep learning
- Machine learning
 - This course assumes familiarity with machine learning concepts
 - Again, we will have a class covering the basic concepts
 - And again, some additional effort may be required if you didn't follow a ML course

Google Cloud Platform Credits

- We [applied] for support from Google
 - Credits to run programs on the Google cloud
 - Powerful machines with GPUs to run deep learning models
 - Possible to connect the machines to Google Colab