

# Deep Learning I

**Course level:** Master MLDM

**Course code:** MLDM DL1

**ECTS Credits:** 4.00

**Course instructor:** Rémi EMONET (UJM, Saint-Étienne)



**Education period (Dates):** 2<sup>nd</sup> semester

**Language of instruction:** English

**Expected prior-knowledge:** Data Analysis, Introduction to Machine Learning

## Aim and learning outcomes:

This course introduces the principles of deep representation learning with the goal of giving a good understanding of the involved mechanisms and the complex interplay between data, architectures and optimization. This course covers the main principles of deep learning, including gradient descent and typical deep learning layers. After completing this course, learners should be familiar with building deep learning frameworks, possess practical knowledge in utilizing existing frameworks, and have a good overview of the many choices that need to be made while designing a deep learning architecture for some common types of data.

## Topics to be taught (may be modified) ~20h:

- Introduction, representation learning, learning as optimization
- Perceptron, linear layers, activation functions
- Gradient Descent, losses and computation graphs
- Composite functions, the chain rule and “back-propagation”
- Typical layers (linear, convolution, ...)
- Implementing a deep learning framework from scratch (using numpy)
- Deep learning frameworks (pytorch, tensorflow, ...)
- (Some) nitty gritty details on optimizers
- (Some) nitty gritty details on activation functions
- (Some) nitty gritty details on layers (incl. for images, sequences, etc)
- (Some) nitty gritty details on data and supervision

**Teaching methods:** Lectures and Practical Sessions.

**Form(s) of Assessment:** exam

## Additional information:

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