

Deep Learning II

Course level: Master (M2)

Track(s): MLDM

ECTS Credits: 6 (MLDM) / 5 (DSC)



Course instructors: Amaury Habrard (UJM, Saint-Etienne)

Education period: [1st] semester **Language of instruction:** English

Expected prior-knowledge: Introduction to Machine Learning, Deep Learning I.

Aim and learning outcomes: This course extends the Deep Learning I course by introducing more advanced concepts in deep learning. It covers models for processing structured and complex data. Different settings and architectures are reviewed to cover the main settings of the state of the art. Applications in Vision, NLP and physics will be also presented.

Keywords: Generative Adversarial Networks, Recurrent and residual networks, Attention, Transformers, advanced architectures and models, vision and NLP applications

Syllabus:

- Recap on basics (MLP, CNN, encoders, basic architectures)
- Generative Adversarial Networks
- Variational auto-encoders
- Recurrent and residual models
- Attention and Transformers
- Diffusion models
- Graph Neural Networks
- Advanced settings and models
- Applications in Vision, NLP, physics.

Organisation and timetable: Lectures (10h), tutorials (10h) and lab sessions (10h).

Form(s) of Assessment: 1 project with report and defense.

Literature and study materials:

- Deep Learning. Ian Goodfellow, Yoshua Bengio and Aaron Courville. MIT Press, 2016.
- Understanding Deep Learning. Simon J.D. Prince. MIT Press, 2023.

Additional information/Contacts:

amaury.habrard@univ-st-etienne.fr