EPFL

MATH-631 **Mathematical foundations of neural networks**

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Cursus	Sem.	Type
Mathematics		Opt.

Language of teaching	English
Credits	3
Session	
Exam	Oral presentation
Workload	90h
Hours	**68**
Courses	16
TP	52
Number of positions	**24**

Frequency

Only this year

Remark

This course addresses to students in mathematics and related fields, with a strong background and interest in mathematical aspects. Fall semester - Fridays from 18.09.2020

Summary

This course is in the form of a reading course / working group. We will focus on some mathematical aspects of the theory of neural networks, including universal approximation theorems, connections to ODEs and PDEs, optimiza-tion algorithms for NN training and their convergence.

Content

Goal:
Understanding the efficiency of deep neural networks in approximating functions in large dimensions and related problems
Content:
- Introduction to DNN
- Numerical experiments with available software
- Universal approximation theorems
- Connections to ODEs and PDEs
- Training of DNN

Note

A list of relevant research papers will be selected at the beginning of the course. Students will alternate in giving presentations on the selected papers.

Resources

Notes/Handbook

The list of scientific papers that will be studied during the course will be communicated on the first week.