

# Deep Learning

Course syllabus, Spring 2020

Prof. Gilles Louppe  
[g.louppe@uliege.be](mailto:g.louppe@uliege.be)

# AI at ULiège

This course is part of the many other courses available at ULiège and related to AI, including:

- INFO8006: Introduction to Artificial Intelligence
- ELEN0062: Introduction to Machine Learning
- **INFO8010: Deep Learning** ← you are there
- INFO8003: Optimal decision making for complex problems
- INFO8004: Advanced Machine Learning
- INFO0948: Introduction to Intelligent Robotics
- INFO0049: Knowledge representation
- ELEN0016: Computer vision
- DROI8031: Introduction to the law of robots

# Logistics

This course is given by:

- Theory: Prof. Gilles Louppe ([g.louppe@uliege.be](mailto:g.louppe@uliege.be))
- Projects and guidance:
  - Matthia Sabatelli ([m.sabatelli@uliege.be](mailto:m.sabatelli@uliege.be))
  - Antoine Wehenkel ([antoine.wehenkel@uliege.be](mailto:antoine.wehenkel@uliege.be))

Feel free to contact us for help!



# Lectures

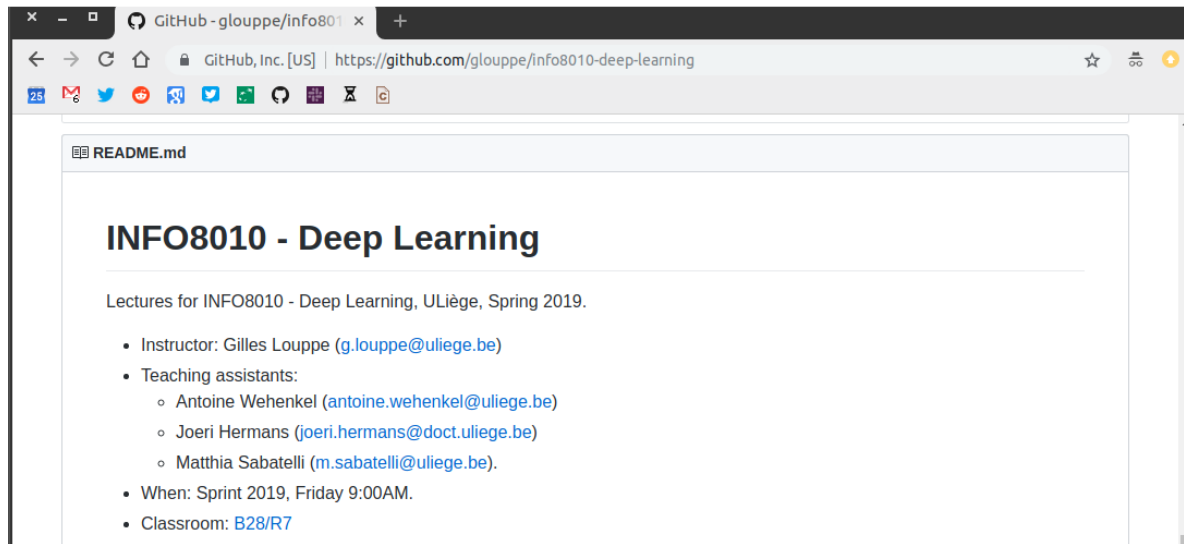
- Theoretical lectures
- Programming tutorials
- (No exercise sessions)

# Materials

Slides are available at [github.com/glouppe/info8010-deep-learning](https://github.com/glouppe/info8010-deep-learning).

- In HTML and in PDFs.
- Posted online the day before the lesson (hopefully).

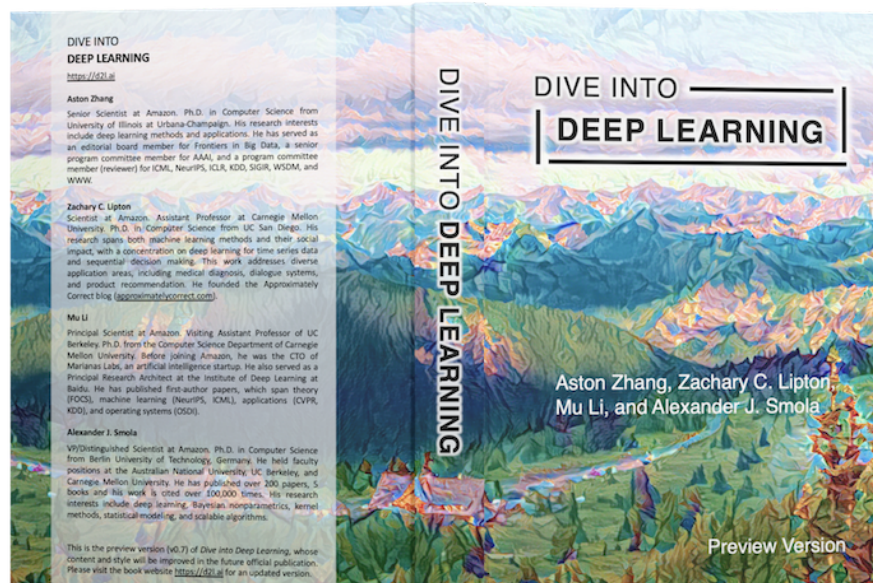
Some lessons are partially adapted from "[EE-559 Deep Learning](#)" by Francois Fleuret at EPFL.



# Textbook

None!

But we would recommend "Dive into Deep Learning" ([d2l.ai](https://d2l.ai)) for a comprehensive and practical introduction to the field.



# Philosophy

## Thorough and detailed

- Understand the foundations and the landscape of deep learning.
- Be able to write from scratch, debug and run (some) deep learning algorithms.

## State-of-the-art

- Introduction to materials new from research ( $\leq$  5 years old).
- Understand some of the open questions and challenges in the field.

## Practical

- Fun and challenging course project.

# Outline

- Lecture 0: Introduction
- Lecture 1: Fundamentals of machine learning
- Lecture 2: Neural networks
- Lecture 3: Convolutional neural networks
- Lecture 4: Computer vision
- Lecture 5: Training neural networks
- Lecture 6: Recurrent neural networks
- Lecture 7: Attention and transformer networks
- Lecture 8: Auto-encoders and generative models
- Lecture 9: Generative adversarial networks
- Lecture 10: Uncertainty
- Lecture 11: Theory of deep learning
- Lecture 12: Deep reinforcement learning



# Projects

## Reading assignment

Read, summarize and criticize a major scientific paper in deep learning.

Pick one of the following three papers:

- J. Redmon, A. Farhadi, "YOLO9000: Better, Faster, Stronger", 2017. [[pdf](#)]
- A. Vaswani et al, "Attention is all you need", 2017. [[pdf](#)]
- M. Geiger et al, "Scaling description of generalization with number of parameters in deep learning", 2019. [[pdf](#)]

Deadline: April 3, 2020 at 23:59.

## **Project**

Project of your choosing. Details to be announced soon.

# Evaluation

- Exam (50%)
- Reading assignment (10%)
- Project (40%)

The reading assignment and the project are **mandatory** for presenting the exam.

