

MICRO-573 **Deep learning for optical imaging**

Cursus	Sem.	Type
Electrical and Electronical Engineering	MA2, MA4	Opt.
Microtechnics	MA2, MA4	Opt.
Minor in Imaging	E	Opt.
Photonics		Opt.
Robotics	MA2, MA4	Opt.

Language of teaching	English
Credits	3
Withdrawal Session	Unauthorized Summer
Semester Exam	Spring During the semester
Workload	90h
Weeks	14
<b>Hours</b>	<b>3 weekly</b>
Courses	2 weekly
Exercises	1 weekly

**Number of positions**

**Il n'est pas autorisé de se retirer de cette matière après le délai d'inscription.**

**Remark**

Pas donné en 2024-25

**Summary**

This course will focus on the practical implementation of artificial neural networks (ANN) using the open-source TensorFlow machine learning library developed by Google for Python.

**Content**

After a brief introduction to deep neural networks, the course will focus on the use and functionality of TensorFlow, and how it can be used to build models of different complexity for different types of optical imaging applications. Models will range from simple linear regression to convolutional neural networks (CNN) for image classification and mapping. The course will be assessed through coursework and group projects where the students will apply TensorFlow to specific machine learning applications.

**Keywords**

Deep learning, TensorFlow, Artificial neural networks, Imaging

**Learning Prerequisites****Required courses**

Proficiency in Python, basic optics

**Recommended courses**

MICRO-421 Imaging Optics

**Important concepts to start the course**

Python familiarity, linear systems, basic optics

**Learning Outcomes**

By the end of the course, the student must be able to:

- Implement

- Choose
- Demonstrate
- Apply

### Teaching methods

2 hours/week lecture

1 hour/week interactive artificial neural network development for selected problems

### Resources

#### Websites

- [http://Tensor Flow](http://TensorFlow)

#### Moodle Link

- <https://go.epfl.ch/MICRO-573>