

ENV-540

Image processing for Earth observation

Tuia Devis

Cursus	Sem.	Type
Civil & Environmental Engineering		Opt.
Digital Humanities	MA1, MA3	Opt.
Environmental Sciences and Engineering	MA1, MA3	Opt.
Minor in Imaging	H	Opt.
Space technologies minor	H	Opt.
Territories in transformation and climate minor	H	Opt.
Urban Planning and Territorial Development minor	H	Opt.

Language of teaching	English
Credits	4
Session	Winter
Semester	Fall
Exam	During the semester
Workload	120h
Weeks	14
Hours	4 weekly
Courses	2 weekly
Exercises	1 weekly
Project	1 weekly
Number of positions	

Summary

This course covers optical remote sensing from satellites and airborne platforms. The different systems are presented. The students will acquire skills in image processing and machine/deep learning to extract end-products from the images such as land cover or risk maps.

Content

Courses content:

1. Basic concepts of remote sensing and digital imaging
2. Platforms and sensors
3. Information extraction, filtering, visual information
4. Image classification, with machine and deep learning algorithms
5. Project: study a real world problem using remote sensing and image processing techniques.

Learning Prerequisites**Recommended courses**

Machine learning **CS-433**

Important concepts to start the course

Intermediate skills in Python programming are considered a pre-requisite. All the exercises will be in Python. Basic knowledge in Pytorch is an advantage.

Learning Outcomes

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

- Design an appropriate image processing pipeline to address a geospatial problem
- Analyze the results of a machine learning methods
- Implement an end to end machine learning pipeline
- Discuss the pros and cons of different remote sensing sensors

Transversal skills

- Collect data.

- Access and evaluate appropriate sources of information.
- Summarize an article or a technical report.
- Write a scientific or technical report.
- Use both general and domain specific IT resources and tools

Expected student activities

- Following classes
- exercises (individual or in small groups)
- preparing presentations
- reading club or research papers
- final projects in small groups

Assessment methods

- Mid-term written test (50% of the final mark)

- Project report (50% of the final mark)

Resources

Ressources en bibliothèque

- [Précis de télédétection. Vol. 3 / Caloz, Collet](#)
- [Remote sensing image processing / Camps-Valls](#)
-

Moodle Link

- <https://go.epfl.ch/ENV-540>