

EE-805

**Fundamentals of Image Analysis**

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Cursus	Sem.	Type
Computational and Quantitative Biology		Opt.
Electrical Engineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Written
Workload	60h
<b>Hours</b>	<b>41</b>
Courses	22
Exercises	9
TP	10
<b>Number of positions</b>	<b>25</b>

**Frequency**

Every year

**Remark**

23-27 June 2025 in Caux - Information: <https://imaging.epfl.ch/summer-school> - Registrations: <https://forms.gle/ztdspZpBWn2ZsuzB6> - Application deadline: 16 March 2025

**Summary**

This summer school is an hands-on introduction on the fundamentals of image analysis for scientists. A series of lectures provide students with the key concepts in the field, and are followed by practical sessions with popular software on the participants' own image-analysis software.

**Content**

The summer school is structured around **7 sessions**, each covering a specific imaging topic (see below). There will be one to two sessions per day, each consisting of lectures and interactive practical works on the current thematic:

**Fundamentals of Scientific Images**

Key concepts in digital imaging (pixel level, contrast, histogram, file format, etc.), multidimensional data (visualisation)

**Image Acquisition**

Optics of image formation (light sources, PSF/MTF, etc.), noise, SNR, resolution, 3D scenes, stereo imaging

**Operations on Digital Images**

Digital filters, morphological operators, segmentation

**Motion Tracking**

Optical flow and registration, measuring a displacement field (local, global, discrete), representing and quantifying deformations, tracking of particles (detection and linking)

**Machine Learning for Image Analysis**

Key terminology, data preparation, existing ML software for image analysis

**Deep Learning for Image Analysis**

Building and training of models, running of pre-trained models, fine-tuning of pre-trained models

**Good Practice for Open Imaging**

Ethics of image publication, the do's and don't of figure preparation, storage, formats, licenses, open access, confidentiality

**Note**

This course is a transversal initiative from the EPFL Center for Imaging.

More information, as well as the schedule are available in this link <https://imaging.epfl.ch/summer-school>

**Keywords**

Image analysis, digital images, image acquisition, deep learning, open imagine.

**Assessment methods**

Written exam.