BIO-695

Image Processing for Life Science

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Cursus	Sem.	Type
Molecular Life Sciences		Obl.

Language of teaching	English
Credits	2
Session	
Exam	Multiple
Workload	60h
Hours	**42**
Courses	14
Exercises	28
Number of positions	

Frequency

Every year

Remark

Every year / November to February. This course is open to max. 16 students. To register, contact the EDMS program administrator.

Summary

This course intends to teach image processing with a strong emphasis of applications in life sciences. The idea is to enable the participants to solve image processing questions via workflows independently.

Content

Over the last decades, the images arising from microscopes in Life Sciences went from being a qualitative support of scientific evidence to a quantitative resource. To obtain good quality data from digital images, be it from a photograph of a Western blot, a TEM slice or a multi-channel confocal time-lapse stack, scientists must understand the underlying processes leading to the extracted information. Of similar importance is the software used to obtain the data.
This course makes use of the ImageJ (FIJI package) as well as other open-source tools to ensure maximum reproducibility and protocol transfer of the analysis pipelines.
The course will span 14 weeks with 1h30 of lecture per week, as well as exercises to complete outside of the course and will enable to students to establish image analysis workflows autonomously.

Note

This course is open to max. 16 students selected by the organizer.
This 14-week course aims to introduce students to digital image analysis in the context of life sciences. We will cover the following topics:
- Digital image data representations, formats, metadata
- Image manipulation
- Macro and script creation
- Filtering, linear, non-linear, morphological
- Segmentation
- Regions of interest
- Image stitching
- Image visualisation
- Data extraction and representation
- Image deconvolution and denoising
- Machine learning

Each topic will have a strong emphasis on good practices and will be followed by exercises to be handed out at the next session. Exercises will involve the creation of macros or scripts to reach a defined goal. The exercises are to be completed as autonomous homework, outside of lecture hours.

Keywords

Biology, Image Processing, Microscopy, ImageJ, FIJI, Macros, Data, Segmentation, Filtering Visualisation Open so

Assessment methods

Continuous
Multiple

Resources

Websites

- http://phd.epfl.ch/edms/coursebook