

# Fun with Fiji/ImageJ

*Introduction to Image Analysis*

supported by the PhD specialization Cutting Edge Microscopy, [www.mic.unibe.ch](http://www.mic.unibe.ch)

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**BIOS<sup>+</sup>, via Francesco Chiesa 5, Bellinzona – Room 1<sup>st</sup> floor South West**

## Summary

Scientific images are used today not only for supporting qualitative observations but for quantitative analysis. Extracting good quality data from scientific images requires a good understanding of the concepts of image analysis. This course explores the main concepts of modern image analysis with a combination of tutorials and hands-on exercises. Fiji/ImageJ is a powerful (and often underestimated) platform for image analysis, thanks to its long-standing development and big community. Throughout the course we will also draw parallels to other open-source and proprietary image analysis software.

Some knowledge of microscopy acquisition and instrumentation is recommended but not required. Participation is limited to 10 people. **Please bring your own laptop.** There will be time to work on your data during the last hands-on session. To sign up, please contact [diego.morone@irb.usi.ch](mailto:diego.morone@irb.usi.ch).

## Program outline

Monday April 13<sup>th</sup> – 9:00-12:30 (30 min break)

What is image analysis? Outline of open-source and commercial software, advantages and disadvantages of each. Image analysis in the age of AI. Troubleshooting of installation of Fiji/ImageJ.

Monday April 13<sup>th</sup> – 14:00-17:30 (15 min break)

Different types of microscopy data. Fluorescence microscopy. PSF. Image noise types. Microscopes & detectors. Images and pixels. Types and bit depths. Channels and colors. Pixel size and dimensions. Files and file formats. Metadata.

*Hands-on session.* A standard image preparation pipeline. Digital image ethics.

Tuesday April 14<sup>th</sup> – 9:00-12:30 (30 min break)

Point operations. Thresholding. Filters. Morphological operations. Image transformation. Types of measurements.

*Hands-on session.* A standard pipeline: preprocessing, thresholding, segmentation, feature extraction and measurement.

Multidimensional images: tracking, 3D images. Colocalization. Spectral unmixing.

Tuesday April 14<sup>th</sup> – 14:00-18:00

*Scientific flash talk (15 min) – Marco Fabbro, IRB Lab Molinari*

Five examples of advanced applications. 1. Single cell and spatial analysis. 2. Automating analysis. 3. High-content imaging. 4. Label-free imaging. 5. Feedback microscopy.

*Hands-on session.* Practicing with your own or demo images.

Written Exam – 1 ECTS