



Elective Courses for PhD students 2018

An Introduction to Image Analysis with ImageJ/Fiji	
Offered by:	International Max Planck Research School for Cell, Developmental and Systems Biology (IMPRS-CellDevoSys)
Lecturer:	Benoit Lombardot & Robert Haase, MPI-CBG Scientific Computing Facility
Date:	19 – 21 Feb 2018
Time:	9:00 am – 5:00 pm
Location:	CSBD, SR1 (ground floor)
Target audience:	DIPP PhD students
No of participants:	12
Registration deadline:	31 January 2018
Pre-course work:	<p>Get your laptop ready for the course in the week before the course (you will need it to perform all the hands-on sessions and exercises):</p> <ul style="list-style-type: none">• Install a fresh version of Fiji on your laptop.• Download materials from the INDICO registration page. <p>Contact us if you have any issue with one of the above.</p>
Course requirements:	Bring your laptop as prepared above, and a power cable!

COURSE AIM:

Introduces novice users to basic concepts and techniques in quantitative image analysis. Major topics covered include the basics of filtering and segmenting images along with techniques to extract useful measures from bio image data. Participants will learn how to use the Fiji software package and perform realistic bio-image analysis through numerous exercises and interactive hands-on sessions

LERNING OUTCOME:

By the end of the course participants will be familiar with:

- Tools to open, explore (and reconstruct) multidimensional image data.
- Tools to perform manual and automated segmentation and measurements in 2d and 3D images: segmentation (threshold, watershed) skeletonization, maxima detection, denoising filter and binary filters.
- Time sequence analysis and object tracking (in 2D and 3D with trakmate and/or MaMut).
- Good practices to report measures and perform repeatable analysis, as well as tips and tricks for bio image analysis.



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COURSE CONTENT/ METHODS ENCOUNTERED DURING THE COURSE:

The following concepts will be introduced with many ImageJ/Fiji hands-on-sessions and exercises along the way:

- Basic concepts: image characteristics, visualisation, regions of interest and measurements
- Segmentation 1: thresholding, mask/region analysis, spot detection and skeletonisation
- Segmentation 2: image filters such as erosion/dilation, distance maps and the watershed algorithm
- Visualize and explore 3D images
- Spot detection and segmentation in 3D datasets
- Measurements in time sequences
- Tracking basics

COURSE STRUCTURE:

Each part of the course contains some theoretical presentations, short exercises to apply new knowledge and a long exercise to start combining the tools and tackle more real life analysis.

Day 1

- 9:00 – 10:00: Image Characteristics and visualization
- 10:00 - 12:00: Region of interest and Measures
- 13:30 - 17:00: Automatic segmentation, the standard pipeline

Day 2

- 9:00 – 12:00: Automatic segmentation, point line and scales
- 13:30 – 17:00: Tools to visualize and explore N-dimensional data

Day 3

- 9:00 - 12:00: Segmentation in 3D images
- 13:30 – 16:30: Measures in time sequence and tracking
- 16:30 – 17:00: Feedback round

BACKGROUND READING:

<https://imagej.net/Welcome>