Educational Resources and Tools

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Resources for beginners

For understanding digital images, image formation, and basic image processing and analysis, my all-time favorite resource has to be Pete Bankhead's Introduction to Bioimage Analysis.

For more details about fluorescence microscopy, MyScope (Microscopy Austrailia) is a good resource–especially if you go through their simulators for confocal/STED microscopy.

Table 1: Collection of online beginner resources with content category indicated by the icons and .

Name	Sample Prep	Microscopy	Analysis[1]
Introduction to Bioimage Analysis			
MyScope (Microscopy Austrailia)			
Microcourses			

Name	Sample Prep	Microscopy	Analysis
MicroscopyU (Nikon) Designing a rigorous microscopy experiment: Validating methods and avoiding bias Tutorial: guidance for quantitative confocal Fiji Training Notes (Cameron Nowell) Lecture BioImage Analysis 2020 (Robert Haase)			

Colocalization

Colocalization is a frequent analysis request, but avoid the common pitfalls!

[1]Due to space limitations, "Analysis" refers to both image analysis and processing.

Table 2: Collection of colocalization resources

Name	Sample Prep	Microscopy	Analysis
Colocalization Analysis (ImageJ)			
A practical guide to evaluating colocalization in biological microscopy			
Image colocalization–cooccurrence versus correlation			
A localization tale			
Deconstructing colocalisation workflows: A journey into the black boxes			

Light-sheet

Table 3: Collection of light-sheet resources with content category indicated by the icons and .

Name	Sample Prep	Microscopy	Analysis
Tutorial: practical considerations for tissue clearing and imaging			
Practical considerations for quantitative light sheet fluorescence microscopy			

Analysis software downloads and resources

While the free viewers from microscope companies can be helpful for inspecting metadata in an easy-to-parse way[2], knowing how to use Fiji (or ImageJ with Bio-Formats) will be more beneficial for beginners. Most likely, you'll need to use microscopes from different companies and also use Fiji for some processing/analysis.

Name	Brief Description	Resources
Fiji	A "batteries-included" distribution of ImageJ	link
NIS-Elements Viewer	Nikon's free standalone program for .nd2 files	
Imaris Viewer	Free 3D/4D image viewer (limited!)	Imaris Homeschool
Leica LAS X Office	Free software for viewing Leica files	
SVI Huygens	Deconvolution, Visualization, Analysis	Deconvolution video

[2]Another benefit of looking at .nd2 files using NIS-Elements Viewer (as opposed to Bio-Formats) is the faster loading which is especially helpful if inspecting metadata is the sole goal.

Fiji Plugins and Macros

Exporting a .lif file to individual .tifs can be done through Fiji. One macro that does the trick can be found here. See my video instructions.

Setting colors and adjusting brightness & contrast for multi-channel datasets can be done through BIOP Channel Tools.

Acquisition (scope-specific)

My documentation for a Nikon Ti2-E with a Yokogawa CSU-X1 spinning disk unit and 405nm photostimulation capabilities can be found online.

My video tutorials for the Advanced Light Microscopy Core's Leica SP8 FALCON and Leica SP8 STED 3X are on YouTube