Workshop – "Scientific Image Processing and Analysis"

Content:
The workshop – "Scientific Image Processing and Analysis" aims to teach scientists from different areas how to handle and process digital images starting from image acquisition on until the incorporation into the final publication figure. This includes some important theory about high quality digital images in general as well as a broad spectrum of methods for image processing and specific analytical purposes according to high scientific standards. You will learn how to extract most information from your images and how to quantify your regions of interest. Additionally, the workshop includes a lot of hands-on sessions and explains how to save time during repetitive image processing steps and while building your publication figures in a way that preserves image quality and stores processing data. You will be able to revisit the learned material using the provided exercises and script also later on. The workshop content is generally of interest for all scientists working with digital images and the topics will be adjusted to meet the participants needs as good as possible.
Furthermore, specific participant question regarding image processing and solutions for analysis issues can be personally discussed if communicated beforehand.

Specific Topics (among others):
- Basics about correct image acquisition
    - Resolution and sampling - avoiding imaging artifacts
    - Image formats - which formats serve scientific images and which should be avoided
    - Metadata - information about the image data
    - Information content of images - bit-depth, color spaces and different image types
- Correct image adjustments avoiding alterations - contrast, rotation, size changes, background subtractions
- Use of image filters to improve visibility and preparation for feature analysis
- Image Segmentation - extraction of specific objects of interest
- Automated feature counting and tracking of moving objects (optional)
- Basic 3D reconstructions
- Image Quantifications (selected topics depending on participants field of interest):
    - Measurements of area, length, volume, surface,…
    - 3D object analysis
    - Image scale and intensity calibration
    - Intensity quantification (e.g. fluorescence)
- Labeling of images and time series/movies (scale bars, calibration bars,…)
- Ethics in image handling and processing
- Efficient publication figure preparation

Aim:
The workshop should give scientists a better understanding about the Do's and Don't's during digital image processing and insight in the methodology of extracting a multiplicity of information from their images. The participants will gain extensive knowledge about the possibilities they have to analyze their imaging data.

Target Group:
Undergraduate students, PhD Students and PostDocs which are working or plan to work with digital images. No previous software knowledge required.

Methodology
During the practical parts of the workshop we mainly use the professional software Fiji. All necessary software will be provided. PLEASE BRING YOUR OWN LAPTOP!

Trainer:
Dr. rer. nat. Jan Brocher (www.biovoxxel.de)