

Discovering microscopy and imaging: from molecule to tissue

- ✓ **Target audience:** all PhD students
- ✓ **Prerequisites:** none
- ✓ **Teachers:** biologists, experts in scientific imaging
- ✓ **Duration:** 4 days (20 h)
- ✓ **Time period :** 2-5 July 2023
- ✓ **Maximum number of participants:** 20
- ✓ **Validation:** attendance at the entire course.
- ✓ **For more information:** V. Legué (Valerie.legue@uca.fr) and Sophie Desset (sophie.desset@uca.fr)

OBJECTIVES

The aim of this course is to provide PhD students with training in the various fields of molecular, cellular and tissue imaging. The theory and principles of photonic microscopy and electron microscopy are presented. For each of these microscopies, the particularities, constraints and advantages as well as their complementarity are detailed. During the workshops, imaging experiments are carried out to show concrete applications of these methods in biology and the analysis of the associated data. This training is also an opportunity to identify the appropriate imaging methods to answer a scientific problem. It also allows students to become familiar with the basic concepts of image processing and analysis. This course benefits from access to microscopy systems, located on the CLIC and CICS platforms in Clermont-Ferrand.

CONTENT

Presentation of the different microscopy methods (3 h): Definition and properties of image - The different parts of a microscope - The different type of microscopy: photonic, super-resolution, electronic and chemical imaging.

Characterization of cellular structures (3 h): Preparation of samples for *in situ* observation: from fixation to obtaining sections - Types of staining.

Illustration of techniques around workshops to choose from (one day):

- Identification and localization of nucleic acids: *In situ* hybridization technique (FISH) and confocal microscopy.
- Chemical imaging: Infrared imaging techniques (FT-IR), MALDI-TOF mass spectrometry
- Dynamic imaging: Observation in *in vivo* conditions - Light sheet microscopy (SPIM)
- Multiphoton imaging ex vivo - Observation of neural networks ex vivo - 2-photon microscopy
- Preparation of samples and observation in transmission electron microscopy
- Acoustic force spectroscopy (AFS) and internal reflection fluorescence microscopy (TIRF)

MÉTHODES

- Day 1: lessons + Visit to CLIC platform
- Day 2: lessons + Visit to CICS platform
- Day 2: Discover of Fiji software
- Day 3: Practical workshops
- Day 4: Restitution of the workshops