

## **Preliminary overview of the contents of the Summer School “From Tissues to the Organelles: State of the Art in Morphological Studies by Optical and Transmission Electron Microscopy”**

The course will be composed by:

1. **A theoretical part**, organized in lectures covering basic techniques in cell cultures, light microscopy (LM), and transmission electron microscopy (TEM). This will include:
  - Lectures dedicated to the basic principles of LM and sample processing for LM analysis.
  - Lectures dedicated to the basic principles of TEM and of sample processing for TEM observations
  - Basics on cell cultures with examples of types and applications, and how they are processed for LM or TEM analysis.
  - Basics of Confocal Microscopy

There will be also lectures dedicated to basic morphological analysis in specific tissues and diseases, such as, for instance: a) the use of molecular markers to identify specific neurons; b) morphological approaches to neurodegeneration; c) markers of neuroinflammation and Blood-Brain Barrier integrity; d) kidney: morphology and pathology of the glomerular filtration barrier; e) storage diseases; f) morphological approaches to paleopathology.

2. **A practical part**, in which participants will be hosted in laboratories and exposed to technical protocols related to the main topics of the course. These will include:
  - Detailed sample processing for TEM (fixation, dehydration, and embedding in epoxy resin).
  - Cut of ultrathin sections with the ultramicrotome and staining of these sections.
  - Basics of Cell Culture preparation for LM and TEM analysis.
  - Sample observation at TEM.
  - Basics of sample preparation for LM: paraffin embedding, microtome cut, and slice collection.
  - Observation of slices at LM.

3. **An overview of some tools used for the systematic analysis of images for research purposes**, such as examples of quantitative histological imaging analysis by Open-Source softwares, and principles and examples of applications of Unbiased stereology.