COURSE

Design experiment with examples from microscopy and omics

March 16 - 17, 2026

- organized by the Institute of Physiology CAS (IPHYS BIF – Czech-BioImaging)
- suitable for Bc, MS or PhD students who want to extend their practical knowledge in design of experiments for microscopy or omics

Venue:

Institute of Physiology CAS, Laboratory of Biomathematics,
Krč CAS campus, building DaI, room 011,
Vídeňská 1083, Prague 4, 14220

Short description of the course:

The two-day course consists of lectures and hands-on sessions which will demonstrate basics in design of experiments, for instance hypothesizing, sampling, data dependency, statistical power or hypothesis testing in biology. The examples will be provided in the field of light microscopy and omics. The participants will learn the ways to correctly acquire data using high-end microscopes using a wide pallet of methods such as FLIM, SHG or Brillouin microscopy or proteomic approaches. In addition to that the participants will process and analyse the data using traditional approaches, stereology or AI tools or VR in Fiji or Python. Finally, the participants will be taught the data interpretation and presentation.

Emphasis is put on:

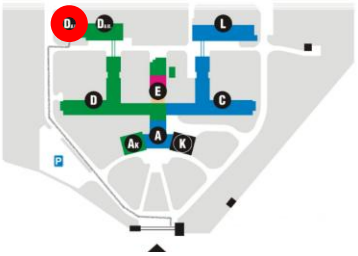
- experimental design and basic biostatistics
- sample preparation and correct sample handling
- proper system set-up and hypnosis relevant data acquisition
- unbiased data processing and analysis
- result presentation

The course fee is 40 EUR.

Course coordinator: Ing. Mgr. Daniel Hadraba, PhD.
daniel.hadraba@fgu.cas.cz
https://bioimaging.fgu.cas.cz/

List of instructors:

Ing. Mgr. Daniel Hadraba, PhD., RNDr. Jiří Janáček, PhD., RNDr. Barbora Radochová, PhD., Ing. Martin Čapek, Ph.D., Mgr. Šimon Vrana, Ph.D., Mgr. Davide Basello, Ph.D.



Location of Da I. building in the Krč CAS campus

Program

Monday – 16 March 2026

9:10 – 9:15 Welcome (Hadraba, IPHYS BIF)
Lecture (meeting room DaI)

9:15 – 9:45 Dos and don'ts when planning a scientific experiment in biology (Hadraba, IPHYS BIF)
Lecture (meeting room DaI)

9:45 – 10:15 Misuse of statistics in a scientific experiment in biology. (Janacek, IPHYS BIF)
Opening Lecture (meeting room DaI)

10:15 – 10:30 Coffee break

10:30 – 11:00 Population, sample group and sampling strategies. (Radochova, IPHYS BIF)
Opening Lecture (meeting room DaI)

11:00 – 11:30 Sample preparation in light microscopy (Basselo, IPHYS BIF)
Lecture (meeting room DaI)

11:30 – 12:00 Sample preparation in proteomics (Vrbacky, IPHYS)
Lecture (meeting room DaI)

12:00 – 12:30 Samples preparation in metabolomics (Cajka, IPHYS)
Lecture (meeting room DaI)

12:30 – 13:30 Lunch

13:30 – 14:00 Data processing and analysis in metabolomics (Cajka, IPHYS)
Hands-on (meeting room DaI)

14:00 – 14:30 Proteomics and the possibilities of data acquisition in a biological experiment (Vrbacky, IPHYS)
Lecture (meeting room DaI)

Three parallel sessions

14:30 – 15:30 Label-free data acquisition on a light microscope – SHG, THG, CARS, FLIM, etc. (Vrana, IPHYS BIF)
Hands-on (DaI – lab. 009) group I/II/III

15:30 – 15:45 Coffee break

15:45 – 17:00 Spinning disk with label-free mechanical probing – Nikon SoRa and Brilloiun (Basello, IPHYS BIF)
Hands-on (DaI – lab. 002) group I/II/III

Tuesday – 17 March 2026

9:00 – 10:00 Light-sheet data acquisition – Zebrafish (Radochova, IPHYS BIF)
Hands-on (DaI - lab.001) group I/II/III

10:00 – 10:15 Coffee break

10:15 – 11:15 Data processing and analysis in light microscopy using Fiji (Capek, IPHYS BIF)
Hands-on (meeting room DaI)

11:15 – 12:15 Data analysis and processing in proteomics – Perseus software (Vrbacky, IPHYS)
Hands-on (meeting room DaI)

12:15 – 13:00 Lunch

13:00 – 14:00 Light microscopes and the pitfalls in a biological experiment (Basello, IPHYS BIF)
Hands-on, case-studies (meeting room DaI)

14:00 – 14:30 Data interpretation and presentation (Hadraba, IPHYS BIF)
Hands-on (meeting room DaI)

14:30 – 14:45 Coffee break

14:45 – 17:00 Mock-up result presentation and open discussion (Hadraba, IPHYS BIF, participants)
Discussion and networking (meeting room DaI)