COURSE

Design experiment with examples from microscopy and proteomics

February 11 - 12, 2025

- 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 proteomics

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 proteomics. 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 CARS 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.
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List of instructors:

Ing. Mgr. Daniel Hadraba, PhD.
RNDr. Jiří Janáček, PhD.
RNDr. Barbora Radochová, PhD.; Ing. Martin Čapek, Ph.D.
Mgr. David Vondrášek, PhD.; Mgr. Davide Basello
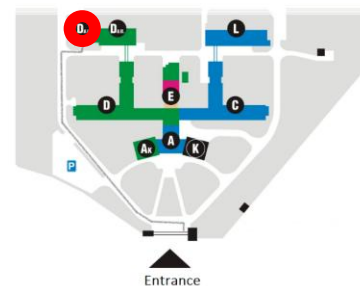
Location of Da I. building in the Krč CAS campus

Program

Tuesday – 11 February 2025

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 – 12:45   *Lunch*

12:45 – 13:15   Light microscopes and the pitfalls in a biological experiment (Vondrasek, IPHYS BIF)
          Lecture (meeting room DaI)

13:15 – 13:45   Proteomics and the possibilities of data acquisition in a biological experiment (Vrbacky, IPHYS)
          Lecture (meeting room DaI)

Three parallel sessions

13:45 – 15:15   Label-free data acquisition on a light microscope – SHG, THG, CARS, etc. (Vondrasek, IPHYS BIF)
          Hands-on (DaI – lab. 009) group I/II/III

15:15 – 15:30   *Coffee break*

15:30 – 17:00   Lifetime data acquisition on a light microscope – FLIM, PLIM. (Basello, IPHYS BIF)
          Hands-on (DaI – lab. 010) group I/II/III

Wednesday – 12 February 2025

9:00 – 10:30   Light-sheet data acquisition – Zebrafish (Radochova, IPHYS BIF)
          Hands-on (DaI - lab.001) group I/II/III

10:30 – 10:45   *Coffee break*

10:45 – 12:15   Data processing and analysis in light microscopy – Fiji and Python (Capek, IPHYS BIF)
          Hands-on (meeting room DaI) group I/II/III

12:15 – 13:45   *Lunch*

13:45 – 15:15   Data analysis and processing in proteomics – Perseus software (Vrbacky, IPHYS)
          Hands-on (meeting room D.) group I/II/III

15:15 – 15:45   Data interpretation and presentation (Hadraba, IPHYS BIF)
          Hands-on (meeting room DaI)

15:45 – 17:00   Mock-up result presentation and open discussion (participants)
          Discussion and networking (meeting room DaI)