

COURSE

Technical aspects of experiments using advanced light microscopy

November 3–4, 2020

organized by the Institute of Physiology CAS (IPhys) (Czech-BioImaging) suitable for under- and post-graduate students of biological and technical universities and engineers

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 course will provide students with an overview of steps they have to consider during planning and conducting experiments involving microscopic image acquisition and measurements of biological structures.

Emphasis is put on:

- experimental design
- measurement of errors connected with image acquisition and analysis (in theory and in practice)
- 3D image acquisition, processing and analysis

Course coordinator: Ing. Mgr. Daniel Hadraba, PhD.

List of instructors:

Ing. Mgr. Daniel Hadraba, PhD.

RNDr. Jiří Janáček, PhD.

RNDr. Barbora Radochová, PhD.

Mgr. David Vondrášek

Mgr. Zuzana Kubínová, PhD.

3rd November 2020

9:00 – 10:00 Introduction to experiment design concepts in light microscopy (**Hadraba**)
Lecture (meeting room DaI)

First group

10:00 – 10:45 Preparation phase of biological experiments with respect to the imaging methods (**Vondrášek**) **Demonstration and hands-on** (SP8 lab and meeting room DaI)

10:45 – 10:55 *Coffee break*

10:55 – 12:10 Conducting the experiment on volumetric sample according to the preparation phase (OPT) (**Radochová**) **Demonstration and hands-on** (meeting room DaI and OPT)

12:10 – 12:15 *Break*

12:15 – 13:15 Conducting the experiment on volumetric sample according to the preparation phase (confocal vs. 2P) (**Vondrášek**) **Demonstration and hands-on** (SP8 lab)

13:15 – 14:00 *Lunch*

14:00 – 14:45 Introduction to experimental errors specific to light microscopy (**Hadraba**)
Demonstration and hands-on (Bruker and meeting room DaI)

14:45 – 14:55 *Coffee break*

14:55 – 16:10 Estimating systematic error of chromatic aberration for correlative measurements. (**Hadraba**) **Demonstration and hands-on** (SP8 lab)

16:10 – 16:15 *Break*

16:15 – 17:15 Analysis of the present chromatic aberration and performing corrections – theoretical and practical approaches. (**Hadraba**) **Demonstration and hands-on** (meeting room Da I)

Second group

10:00 – 10:45 Introduction to experimental errors specific to light microscopy (**Hadraba**)
Demonstration and hands-on (Bruker and meeting room DaI)

10:45 – 10:55 *Coffee break*

10:55 – 12:10 Estimating systematic error of chromatic aberration for correlative measurements. (**Hadraba**) **Demonstration and hands-on** (SP8 lab)

12:10 – 12:15 *Break*

12:15 – 13:15 Analysis of the present chromatic aberration and performing corrections – theoretical and practical approaches. (**Hadraba**) **Demonstration and hands-on** (meeting room Da I)

13:15 – 14:00 *Lunch*

14:00 – 14:45 Preparation phase of biological experiments with respect to the imaging methods (**Vondrášek**) **Demonstration and hands-on** (SP8 lab and meeting room DaI)

14:45 – 14:55 *Coffee break*

14:55 – 16:10 Conducting the experiment on volumetric sample according to the preparation phase (OPT) (**Radochová**) **Demonstration and hands-on** (meeting room DaI and OPT)

16:10 – 16:15 *Break*

16:15 – 17:15 Conducting the experiment on volumetric sample according to the preparation phase (confocal vs. 2P) (**Vondrášek**) **Demonstration and hands-on** (SP8 lab and meeting room DaI)

17:15 – 19:00 Discussion and excursion within Czech-BioImaging-IPhys facility, refreshments (meeting room DaI)

4th November 2020

First group

10:45 – 11:30 Volume and surface of Langerhans islet by 3D image analysis in Fiji (**Janáček**)
Demonstration and hands-on (meeting room D)

11:30 – 11:35 *Break*

11:35 – 12:20 Image analysis and visualization in 3D Slicer (**Janáček**) **Demonstration and hands-on**
(meeting room D)

12:20 – 13:05 *Lunch*

13:05 – 13:50 Image analysis and stereological measurements of length, branching, direction of fibrous structures (brain/muscle capillaries) (**Janáček**) **Demonstration and hands-on**
(meeting room D)

13:50 – 14:00 *Coffee Break*

14:00 – 14:45 Volume and surface of Langerhans islet by stereology – PG, Fakir (**Radochová**)
Demonstration and hands-on (meeting room Dal)

14:45 – 14:50 *Break*

14:50 – 15:35 Surface area measurement by stereological methods (Fakir method, plant leaf/needle) (**Kubínová**) **Demonstration and hands-on** (meeting room Dal)

15:35 – 15:45 *Coffee Break*

15:45 – 16:30 Counting particles by stereological methods (disector, stained cells) (**Radochová**)
Demonstration and hands-on (meeting room Dal)

Second group

10:45 – 11:30 Volume and surface of Langerhans islet by stereology – PG, Fakir (**Radochová**)
Demonstration and hands-on (meeting room Dal)

11:30 – 11:35 *Break*

11:35 – 12:20 Surface area measurement by stereological methods (Fakir method, plant leaf/needle) (**Kubínová**) **Demonstration and hands-on** (meeting room Dal)

12:20 – 13:05 *Lunch*

13:05 – 13:50 Counting particles by stereological methods (disector, stained cells) (**Radochová**)
Demonstration and hands-on (meeting room Dal)

13:50 – 14:00 *Coffee Break*

14:00 – 14:45 Volume and surface of Langerhans islet by 3D image analysis in Fiji (**Janáček**)
Demonstration and hands-on (meeting room D)

14:45 – 14:50 *Break*

14:50 – 15:35 Image analysis and visualization in 3D Slicer (**Janáček**) **Demonstration and hands-on**
(meeting room D)

15:35 – 15:45 *Coffee Break*

15:45 – 16:30 Image analysis and stereological measurements of length, branching, direction of fibrous structures (brain/muscle capillaries) (**Janáček**) **Demonstration and hands-on**
(meeting room D)

More information

Contact and registration:

Registration requested **until 20 October 2020**, participation will be confirmed.

For registration and administrative requests contact Pavla Chotěborská:
pavla.choteborska@fgu.cas.cz, phone: **731 123 391**

For special requests contact Daniel Hadraba: **daniel.hadraba@fgu.cas.cz**

Address of Event: Institute of Physiology CAS, meeting room, building DaI,
Václavská 1083, Prague 4, 14220

Public transport: bus 193, stop: Zelené domky, bus 138, 203 stop: Ústavy akademie věd

Car: Parking is available on campus.

Conditions:

Participant must bring **his/her own laptop** (MS Windows) with relevant SW/data downloaded – instructions will be provided in advance.

No registration fee.

Max. capacity: 16 participants.

The language of the course is English.

Refreshments and lunches are included.

