COURSE

Mechanical characterization of biological samples using correlative methods

December 9 - 10, 2025

- organized by the Institute of Physiology CAS (IPHYS BIF – Czech-BioImaging)
- suitable for Bc, MS or PhD students who want to extend their knowledge in correlative data acquisition, label-free light microscopy and biomechanics
- AFM imaging and mechanical testing, tensile tests, indentation test and advanced light microscopy techniques such as Brillouin microscopy

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 basic mechanical testing methods such as tensile test or atomic force microscopy tests and explain their biological relevance. In addition, first Brillouin microscope will be introduced during the course. To relate these mechanical tests to the most significant biomechanical structures such as collagen fibres, elastic fibres or fat, the participants will be taught how to link these mechanical properties to label-free microscopy techniques, for instance, pSHG, THG or CARS.

Emphasis is put on:

- experimental design and basic biomechanics theories
- sample preparation for correlative experiments
- correlative data acquisition and analysis

The course fee is 40 Euros.

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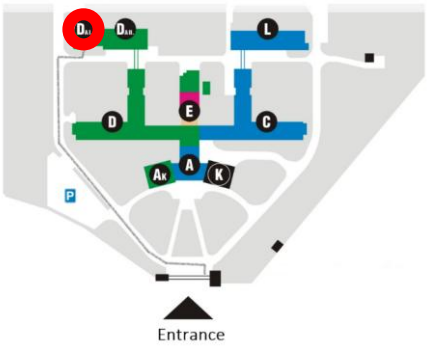
https://bioimaging.fgu.cas.cz/

List of instructors:

Ing. Mgr. Daniel Hadraba, PhD.
Mgr. Jan Přibyl, PhD.
Ing. František Lopot, PhD.
Ing. Raimund Schlüßler, PhD.
Mgr. Šimon Vrana, Ph.D.



Location of Da I. building in the Krč CAS campus

Program

Tuesday – 9 December 2025

9:10 – 9:15 Welcome (Hadraba, IPHYS BIF)
Lecture (meeting room DaI)
9:15 – 9:45 Design of experiment in correlative biomechanics (Hadraba, IPHYS BIF)
Lecture (meeting room DaI)
9:45 – 10:15 Biomechanical concepts and basic mechanics (Lopot, CVUT)
Opening Lecture (meeting room DaI)
10:15 – 10:30 Coffee break
10:30 – 11:00 Introduction to atomic force microscopy and indentation (Pribyl, CEITEC)
Lecture (meeting room DaI)
11:00 – 11:30 Label-free microscopy techniques (Hadraba, IHPYS BIF)
Lecture (meeting room DaI)
11:30 – 12:00 Brillouin microscopy in biology (Schlüßler, CellSense)
Lecture (meeting room DaI)

12:00 – 13:00 Lunch

Three parallel sessions
13:00 – 15:00 Atomic Force Microscopy – practical introduction (Pribyl, CEITEC)
Hands-on (DaI) group I/II/III
15:00 – 15:15 Coffee break
15:15 – 17:15 Brillouin microscopy for mechanical properties (Schlußler, CellSense)
Hands-on (DaI) group I/II/III

Wednesday – 10 December 2025

9:00 – 11:00 Bi-axial tensile and compression mechanical tests with label-free scanning microscopy techniques (Hadraba/Lopot, IPHYS BIF/CVUT)
Hands-on (DaI lab. 009) group I/II/III
11:00 – 11:15 Coffee break
11:15 – 12:30 Brillouin microscopy data analysis (Schlußler, CellSense)
Hands-on (meeting room DaI)

12:30 – 13:30 Lunch

13:30 – 14:45 Data analysis and processing in label-free microscopy and tensile tests (Hadraba, IPHYS BIF)
Hands-on (meeting room DaI)
14:45 – 15:00 Coffee break
15:00 – 16:30 Data analysis and processing in AFM microscopy (Vrana, CEITEC)
Hands-on (meeting room DaI)