Module title			Abbreviation
Imaging methods in life-sciences			08-BGV-171-m01
Module coordinator		**Module offered by**	
holder of the Chair of Biochemistry		Chair of Biochemistry	
ECTS	**Method of grading**	**Only after succ. compl. of module(s)**	
5	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	undergraduate	--	

Contents

The module "Imaging Techniques in the Life Sciences" contains a lecture part and a seminar part. In the lecture part basic concepts of optics will be discussed and the functionality of a light microscope will be explained. Afterwards the principles of different variants of superresolution light microscopy will be introduced. Typical applications for the study of dynamic processes in cells and the temporal and spatial resolution potential of the different methods play a special role. Subsequently, the principles of electron microscopy (transmission electron microscopy and scanning electron microscopy) will be discussed. As far as possible, parallels to light microscopy will be developed. Typical electron microscopic applications in cell biology and structural biology will be discussed including correlative methods combining light and electron microscopy. Then the principles of more specific microscopy methods such as X-ray microscopy, scanning probe microscopy and nuclear resonance microscopy will be introduced. It will be worked out how the fields of application differ from those of classical microscopy methods and what the temporal and spatial resolution capabilities of the individual methods are. Finally, selected imaging methods from the clinical field (X-ray tomography, nuclear spin tomography and ultrasound) for the imaging of entire organisms will be discussed. As far as possible, parallels are drawn to the microscopic procedures. In the seminar part some aspects of the different methods will be deepened by case studies from the literature and by applying the theoretical basics.

Intended learning outcomes

The participants learn the functionalities of different imaging techniques. They will be able to classify typical advantages and limitations of the methods and understand general principles of imaging techniques. Building on this understanding, they can easily evaluate and classify other methods. In order to apply what they have learned independently, the participants will analyse a primary publication independently and answer questions on the imaging methods in writing. The participants will acquire competences in dealing with primary literature in a foreign lan-guage. By working on the questions, the participants are trained to recognise relevant information in the primary publication and to reproduce it in a different context. Participants will have the opportunity to optimise their written expression skills in a scientific environment by working on questions relating to primary literature.

Courses (type, number of weekly contact hours, language — if other than German)

V (2) + S (1)

Method of assessment (type, scope, language — if other than German, examination offered — if not every semester, information on whether module is creditable for bonus)

a) written examination (approx. 45 to 90 minutes) or
b) log (10 to 20 pages) or
c) oral examination of one candidate each (20 to 30 minutes) or
d) oral examination in groups of up to 3 candidates (approx. 15 to 20 minutes per candidate) or
e) presentation (20 to 30 minutes) or
f) practical examination (on average approx. 2 hours; time to complete will vary according to subject area but will not exceed a maximum of 4 hours)
Language of assessment: German and/or English
Assessment offered: Once a year, winter semester

Allocation of places

Biochemie (Biochemistry) Bachelor's: 25 places.

Additional information
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Workload
150 h
Teaching cycle
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Referred to in LPO I (examination regulations for teaching-degree programmes)
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Module appears in
Bachelor's degree (1 major) Biochemistry (2015) Bachelor's degree (1 major) Biomedicine (2015) Bachelor's degree (1 major) Biochemistry (2017) Bachelor's degree (1 major) Biomedicine (2018)