Module title			Abbreviation
Macromolecular Crystallography			08-MBC-MK-152-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)**	
10	numerical grade	--	
Duration	**Module level**	**Other prerequisites**	
1 semester	graduate	--	

Contents

This module comprises a lecture, exercises and a lab course. The lecture will discuss the following topics: biophysical characterisation of protein samples prior to crystallisation; manual and high-throughput methods for protein crystallisation; X-ray generators and synchrotrons, properties of X-rays; data collection using different detector systems; symmetry properties of molecules, point groups and space groups; the phase problem and solution of that problem using multiple isomorphous replacement, anomalous diffraction and molecular replacement; improvement of experimental phases by solvent flattening and molecular averaging; manual and automated model building; refinement procedures and analysis of the experimentally determined structures. The exercises will give students the opportunity to explore the topics discussed in the lecture in more depth. In the lab course, students will carry out all of the steps involved in protein structure analysis that were discussed in the lecture. They will use lysozyme as an example enzyme and will carry out the following steps autonomously: crystallisation of the purified protein, data collection on the Institute's diffractometer, solution of the phase problem using the anomalous signal from intrinsic sulphur atoms, model building, structure refinement, analysis of the refined structure.

Intended learning outcomes

Students will develop a thorough knowledge of modern macromolecular crystallographic methods. The lecture will provide an in-depth exploration of those methods, the exercise will give students the opportunity to engage with the most intellectually challenging aspects in more detail, and the lab course will give them practice in using the methods. At the end of the module, students will be able to perform crystallographic structure analyses for their Master's or doctoral thesis.

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

V (2) + Ü (1) + P (5)
Module taught in: German or English

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 (20 to 30 pages) or
c) oral examination of one candidate each (20 to 30 minutes) or
d) oral examination in groups of up to 3 candidates (15 to 30 minutes per candidate) or
e) presentation (20 to 40 minutes)
Language of assessment: German and/or English
Assessment offered: Once a year, summer semester

Allocation of places

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Additional information

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Workload

300 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

Master's degree (1 major) Biochemistry (2015)
Master's degree (1 major) Biochemistry (2017)
Master's degree (1 major) Biochemistry (2019)
Master's degree (1 major) Biochemistry (2026)