

Structural Biology I: Introduction to Protein Crystallography						
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration	
MN-B-SM (B 3)	360 h	12 CP	1 <sup>st</sup> or 2 <sup>nd</sup> term of studying	Winter term, 2 <sup>nd</sup> half	7 weeks	
<b>1</b>	<b>Type of lessons</b>		<b>Contact times</b>	<b>Self-study times</b>	<b>Intended group size*</b>	
	a) Lectures		24 h	48 h	max. 16	
	b) Practical/Lab		151 h	108 h	max. 16	
	c) Seminar		5 h	24 h	max. 16	
<b>2</b>	<b>Aims of the module and acquired skills</b>					
	Students who successfully completed this module ...					
	<ul style="list-style-type: none"> <li>• have acquired a thorough knowledge of the principles of macromolecular crystallography as one of the most important methods in structural biology, including the theoretical foundations of crystallography and X-ray diffraction.</li> <li>• are able to set up crystallization screens, analyse crystals by X-ray diffraction and determine crystal structures by the application of the relevant computer programs.</li> <li>• are familiar with different methods for 3D structure determination and can compare them with respect to their results and limits.</li> <li>• can independently carry out small scientific projects related to the topic of the module.</li> <li>• have learned how to present research results in oral and written form and to critically discuss scientific publications related to the topic of the module on a professional level.</li> <li>• are able to transfer skills acquired in this module to other fields of biology.</li> </ul>					
<b>3</b>	<b>Contents of the module</b>					
	<ul style="list-style-type: none"> <li>• Crystallographic foundations: crystal geometry, symmetries</li> <li>• Theory of X-ray diffraction</li> <li>• Crystallization experiments on biological macromolecules</li> <li>• Crystallographic data collection and analysis</li> <li>• Approaches for solving the phase problem</li> <li>• Structure building and refinement</li> <li>• Validation and quality assessment</li> </ul>					
<b>4</b>	<b>Teaching/Learning methods</b>					
	<ul style="list-style-type: none"> <li>• Lectures; Practical/Lab (Project work); Seminar; Computer exercises; Guidance to independent research; Training on presentation techniques in oral and written form</li> </ul>					
<b>5</b>	<b>Requirements for participation</b>					
	Enrollment in the Master's degree course "Biological Sciences", in the Master's degree course "Biochemistry" or in the Master's degree course "Chemistry"					
	<b>Additionally recommended:</b> Participation in an advanced Biochemistry module during the Bachelor's degree course (e.g. MN-B-WP I [BC 2] for Cologne students) or similar skills (after consultation). In cases of doubt, please contact the module coordinator (see 10) before choosing this subject module.					

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6	<p><b>Type of module examinations</b></p> <p>The final examination consists of two parts: Two hours written examination about topics of the lectures and the practical/lab part (70 % of the total module mark) and oral presentation (30 % of the total module mark)</p>
7	<p><b>Requisites for the allocation of credits</b></p> <p>Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)</p>
8	<p><b>Compatibility with other Curricula*</b></p> <p>Biochemical subject module in the Master's degree course "Biochemistry", elective module in the Master's degree course "Chemistry"</p>
9	<p><b>Significance of the module mark for the overall grade</b></p> <p>In the Master's degree course "Biological Sciences": 15 % of the overall grade (see also appendix of the examination regulations)</p>
10	<p><b>Module coordinator</b></p> <p>Prof. Dr. Ulrich Baumann, phone 470-3208, e-mail: ubaumann@uni-koeln.de</p>
11	<p><b>Additional information</b></p> <p><b>Subject module</b> of the Master's degree course "Biological Sciences", <b>Focus of research:</b> (B) Biochemistry, Biotechnology and Biophysics</p> <p><b>Participating faculty:</b> Prof. Dr. U. Baumann, Dr. J. Gebauer</p> <p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>• Rupp, B. (2010) Biomolecular Crystallography. Garland Science</li> <li>• Blow, D. (2002) Outline of Protein Crystallography for Biologists. Oxford University Press</li> <li>• Branden, C.I., Tooze, J. (1998) Introduction to Protein Structure. 2<sup>nd</sup> edition, Taylor and Francis</li> <li>• Liljas, A., Liljas, L., Piskur, J., Lindblom, G., Nissen, P., Kjeldgaard, M. (2009) Textbook on Structural Biology. World Scientific</li> <li>• Additional material and subject specific literature will be provided <i>ad hoc</i></li> </ul> <p><b>General time schedule:</b> Week 1-5 (Mon.-Fri.): Lectures at 8:30-10:00 a.m. (three times a week), following experimental/computational work till 5 p.m. (including lunch break, the exact times of lectures and practical work can vary according to the laboratory needs); Week 6 (Mon.-Fri.): Preparation and presentation of seminar talk; Week 7 (Mon.-Fri.): Preparation for the written examination</p> <p><b>Note:</b> The module contains hand-on laboratory work conducted by small groups of students and is taught in course rooms and research laboratories. The module contains computer-based practicals/research as a main component.</p> <p><b>Introduction to the module:</b> November 25, 2019 at 11:00 a.m., Institute for Biochemistry (Building 300), seminar room 465 (fourth floor)</p> <p><b>Written examination:</b> January 31, 2020, second/supplementary examination March 20, 2020; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

\* 4 students from the Master's degree course "Biological Sciences", 10 students from the Master's degree course "Biochemistry" and 2 students from the Master's degree course "Chemistry".