

Advanced Biochemistry and Molecular Medicine					
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration
MN-B-B 1	180 h	6 CP	1 <sup>st</sup> or higher term of studying	Winter term	15 weeks
1	Type of lessons Lectures		Contact times 49 h	Self-study times 131 h	Intended group size* approx. 50-70
2	<b>Aims of the module and acquired skills</b> Students who successfully completed this module ... <ul style="list-style-type: none"> <li>• have acquired an understanding of advanced concepts and technologies related to the molecular basis of biochemical principles.</li> <li>• possess the ability to develop hypotheses through problem analysis and will be able to develop experiments to test these hypotheses.</li> <li>• have acquired a knowledge of important concepts in biochemistry such as reaction mechanisms, molecular basis of diseases, development and use of model systems and key technologies</li> </ul>				
3	<b>Contents of the module</b> <ul style="list-style-type: none"> <li>• Regulation of protein translation, maturation, and degradation in health and disease</li> <li>• Structural dynamics of soluble and membrane-bound proteins</li> <li>• Structure and function of proteins of the immune system and receptor-like kinases</li> <li>• Synthesis, modifications and therapeutic applications of synthetic peptides</li> <li>• Mitochondrial biogenesis, proteostasis and cellular redox signaling</li> <li>• Structure and function of metalloenzymes-enzymes in inborn errors of metabolism</li> <li>• Structural basis of eukaryotic protein kinase regulation and function</li> <li>• Cellular mechanobiology, novel tools in optogenetics and high density cell tracking</li> <li>• Tumour necrosis factor-based signaling in health and disease</li> <li>• Molecular mechanisms of membrane protein trafficking in eukaryotic cells</li> <li>• Autophagy and proteostasis in neurodegenerative disorders</li> <li>• Complex I and mitochondrial disorders</li> <li>• Proteases controlling mitochondrial fission and fusion in aging and disease</li> <li>• Mapping phosphorylation-based signaling in eukaryotic cells</li> <li>• Molecular architecture of histone-based control of gene expression</li> <li>• Extracellular matrix-based signaling in proliferation, differentiation, and apoptosis</li> <li>• MicroRNAs, extracellular matrix and mitochondria in pediatric disorders</li> <li>• Chemical biology of nucleotide-based diagnosis and treatment of disease</li> <li>• Peptido-mimetics control and dissect cellular signaling mechanisms in cancer</li> <li>• Mechanism and treatment of spinal muscular atrophy and related disorders</li> </ul>				
4	<b>Teaching/Learning methods</b> <ul style="list-style-type: none"> <li>• Research-oriented, interactive lectures (incl. <i>e.g.</i> audience response systems and concept mapping)</li> </ul>				

5	<p><b>Requirements for participation</b></p> <p>Enrollment in the Master´s degree course "Biochemistry" or in the Master´s degree course "Biological Sciences"</p> <p><b>Additional academic requirements</b></p> <p>The knowledge of basic and specific biochemistry, cell biology and genetics on the level of general biochemistry/biology text books (<i>e.g.</i> Voet-Voet/Streyer/Lehninger, Alberts and Lewin) is required.</p>
6	<p><b>Type of module examinations</b></p> <p>Two hours written examination about topics of the lectures (100 % of the total module mark)</p>
7	<p><b>Requisites for the allocation of credits</b></p> <p>Written examination at least "sufficient"</p>
8	<p><b>Compatibility with other Curricula*</b></p> <p>Master´s degree course "Biochemistry"</p>
9	<p><b>Significance of the module mark for the overall grade</b></p> <p>7.5 % of the overall grade</p>
10	<p><b>Module coordinator</b></p> <p>Prof. Dr. Günter Schwarz, phone 470 6440, e-mail: gschwarz@uni-koeln.de</p>
11	<p><b>Additional information</b></p> <p><b>Participating faculty:</b> Prof. Dr. U. Baumann, Prof. Dr. E. Behrmann, Prof. Dr. U. Brandt, Prof. Dr. B. Brachvogel, Prof. Dr. J. Chai, Prof. Dr. M. Gather, apl. Prof. Dr. K. Niefind, Prof. Dr. S. Kath-Schorr, Prof. Dr. N. Kononenko, Prof. Dr. M. Krüger, Prof. Dr. T. Langer, Prof. Dr. I. Neundorf, Prof. Dr. J. Riemer, Prof. Dr. H.-G. Schmalz, Prof. Dr. G. Schwarz, Prof. Dr. H. Walczak, Prof. Dr. B. Wirth</p> <p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>• Information about textbooks and other reading material will be given on the ILIAS representation of the course (<a href="https://www.ilias.uni-koeln.de/ilias/goto_uk_crs_3516844.html">https://www.ilias.uni-koeln.de/ilias/goto_uk_crs_3516844.html</a>)</li> </ul> <p><b>General time schedule:</b> Weeks 1-14: Tue. and Fri. from 9:00 to 10:30 a.m.; Week 15 (Mon.-Fri). Preparation for the written examination</p> <p><b>Introduction to the module:</b> November 03, 2020 at 9:00 a.m., online (further information/link will be sent to your Smail-Account), for preparation to the module before this introduction see ILIAS link under literature.</p> <p><b>Written examination:</b> March 02, 2021, second/supplementary examination March 30, 2021; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

\* Depending on how many students from other subject areas (and if indicated also from other master´s degree courses, see 5) choose this module.