

Posttranslational Regulation of Proteins					
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration
MN-B-SM (G 8)	360 h	12 CP	1 <sup>st</sup> or 2 <sup>nd</sup> term of studying	Summer term, 1 <sup>st</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		20 h	30 h	max. 12
	b) Practical/Lab		150h	126 h	max. 2
	c) Seminar		10 h	24 h	max. 2
<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 gained in-depth knowledge in protein research and the role of posttranslational regulation of protein activity, localization, stability and interaction properties.</li> <li>• have acquired experimental skills in state-of-the art methods in cell biology and molecular biology (see contents of the module) and are able to independently design and perform small scientific projects related to topics 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>• Principles of posttranslational regulation, and how they impact protein activity, localization, stability and interaction pattern.</li> <li>• Enzymes involved in protein modification ('writers'), and de-modification ('erasers').</li> <li>• Recognition factors for posttranslational modifications ('readers')</li> <li>• Structural biology of protein modifications</li> <li>• Role of protein modifications in the regulation of the cell cycle, DNA integrity, vesicular trafficking, and other processes in cell biology</li> <li>• Protein modification pathways as drug targets</li> <li>• Major protein modification systems: phosphorylation, ubiquitination, SUMOylation, acetylation, lipidation, glycosylation and others</li> <li>• Experimental techniques for studying protein modification (in vitro modification/de-modification assay, identification/isolation of modification and de-modification enzymes, identification of modification substrates, modification-dependent protein binding)</li> <li>• Bioinformatical methods for predicting and understanding modification sites and components of the modification system.</li> <li>• Understanding and working with databases of protein modification sites and patterns.</li> <li>• The role of Mass Spectroscopy in the large-scale identification of protein modifications.</li> <li>• Protein analysis and protein-interaction methods (Western blotting, co-immunoprecipitation of proteins, pull-down, etc.)</li> </ul> <p><i>Explanatory note:</i> The list above comprises techniques that are commonly used in the participating group. Thus, every student will be confronted with a large subset of it. The exact content, however, will depend on the tutor and the research project the student will work on.</p>				

4	<p><b>Teaching/Learning methods</b></p> <ul style="list-style-type: none"> <li>Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form</li> </ul>
5	<p><b>Requirements for participation</b></p> <p>Enrollment in the Master´s degree course "Biological Sciences" or in the Master´s degree course "Biochemistry"</p> <p><b>Additionally recommended:</b> Solid skills concerning laboratory work are indispensable for participation in this module. In cases of doubt, please contact the module coordinator (see 10) before choosing this subject module.</p>
6	<p><b>Type of module examinations</b></p> <p>The final examination consists of three parts: Two hours written examination about topics of the lectures and the practical/lab part (50 % of the total module mark), oral presentation (25 % of the total module mark) and seminar paper (25 % 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>Biological subject module in the Master´s degree course "Biochemistry"</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. Kay Hofmann, phone 470-1701, e-mail: kay.hofmann@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> (G) Genetics and Cell Biology</p> <p><b>Participating faculty:</b> Prof. Dr. K. Hofmann, Dr. K. Klopffleisch, Prof. Dr. M. Krüger, Prof. Dr. J. Dohmen</p> <p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>A list of literature that should be used for preparation to the module, can be obtained from "<a href="http://www.genetik.uni-koeln.de/groups/Hofmann/master_ptm/">http://www.genetik.uni-koeln.de/groups/Hofmann/master_ptm/</a>".</li> </ul> <p><b>General time schedule:</b> Week 1-5 (Mon.-Fri.): Lectures, practical/lab and preparation for the seminar talk (topic and date will be arranged individually); Week 6 (Mon.-Fri.): Seminar talks and finalization of the seminar paper; Week 7 (Mon.-Fri): Preparation for the written examination</p> <p><b>Note:</b> The module contains hand-on laboratory work conducted individually and is taught in research laboratories. The module contains computer-based practicals/research as a main component.</p> <p><b>Introduction to the module:</b> April 06, 2020 at 10:00 a.m., Institute for Genetics / Molekulare Biowissenschaften, Praktikum B (ground floor)</p> <p><b>Written examination:</b> May 22, 2020, second/supplementary examination July 31, 2020; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

\* 10 students from the Master´s degree course "Biological Sciences" and 2 students from the Master´s degree course "Biochemistry".