

Module Name Posttranslational Regulation of Proteins						
Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MN-BC-BSM10	360 h	12 CP	1 st or 2 nd term of studying	Summer term	summer term only	7 weeks
1	Course Types		Contact Time	Private Study	Planned Group Size*	
	a) Lectures		20 h	30 h	max. 14	
	b) Practical/Lab		150 h	126 h	max. 2	
	c) Seminar		10 h	24 h	max. 2	
2	Module Objectives and Skills to be Acquired					
	Students who successfully completed this module					
	<ul style="list-style-type: none"> • have gained in-depth knowledge in protein research and the role of posttranslational regulation of protein activity, localization, stability and interaction properties. • 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. • 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. • are able to transfer skills acquired in this module to other fields of biology. 					
3	Module Content					
	<ul style="list-style-type: none"> • Principles of posttranslational regulation, and how they impact protein activity, localization, stability and interaction pattern • Enzymes involved in protein modification ('writers'), and de-modification ('erasers') • Recognition factors for posttranslational modifications ('readers') • Structural biology of protein modifications • Role of protein modifications in the regulation of the cell cycle, DNA integrity, vesicular trafficking, and other processes in cell biology • Protein modification pathways as drug targets • Major protein modification systems: phosphorylation, ubiquitination, SUMOylation, acetylation, lipidation, glycosylation and others • 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) • Bioinformatical methods for predicting and understanding modification sites and components of the modification system. Understanding and working with databases of protein modification sites and patterns • The role of Mass Spectroscopy in the large-scale identification of protein modifications • Protein analysis and protein-interaction methods (Western blotting, co-immunoprecipitation of proteins, pull-down, etc.) 					

	<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.
4	Teaching Methods Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form
5	Prerequisites (for the Module) Enrollment in the Master's degree course "Biological Sciences" or in the Master's degree course "Biochemistry". Additional academic requirements For Students of Master "Biological Sciences": Previous attendance of the lecture module "Principles of Molecular Genetics, Development and Aging (A/D/G)". Solid skills concerning laboratory work are indispensable for participation in this module.
6	Type of Examination The final examination consists of two parts Written examination on topics of lectures, seminars and the practical/lab part (1 hour; 50 % of the total module mark), oral presentation (20-30 min; 50 % of the total module mark)
7	Credits Awarded Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)
8	Compatibility with other Curricula* Biological subject module in the Master's degree course "Biological Sciences"
9	Proportion of Final Grade In the Master's degree course "Biochemistry": 10 % of the overall grade (see also appendix of the examination regulations)
10	Module Coordinator Prof. Dr. Kay Hofmann, phone 470-1701, e-mail: kay.hofmann@uni-koeln.de
11	Further Information Participating faculty: Prof. Dr. J. Dohmen, Prof. Dr. K. Hofmann, Dr. K. Klopffleisch, Prof. Dr. M. Krüger Literature: Information about textbooks and other reading material will be given on the ILIAS representation of the course (https://www.ilias.uni-koeln.de/ilias/goto_uk_cat_2815610.html) General time schedule: 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; Week 7 (Mon.-Fri.): Preparation for the written examination Note: 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. Introduction to the module: April 3, 2023 at 10:15 a.m., Center for Molecular Biosciences (COMB), Praktikum B (ground floor). For preparation to the module before this introduction see ILIAS link under literature. Oral or written examination: May 19, 2023, second/supplementary examination June 19, 2023; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.

* 12 students from the Master's degree course "Biological Sciences" and 2 students from the Master's degree course "Biochemistry".