

Medical Biochemistry – Enzymes, Metabolites and Diseases					
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration
MN-B-SM (BG 1)	360 h	12 CP	1 st or 2 nd term of studying	Winter term, 1 st half	7 weeks
1	Type of lessons		Contact times	Self-study times	Intended group size*
	a) Lectures		24 h	48 h	max. 16
	b) Practical/Lab		154 h	102 h	max. 2
	c) Seminar		8 h	24 h	max. 6
2	Aims of the module and acquired skills				
	<p>Students who successfully completed this module ...</p> <ul style="list-style-type: none"> • have acquired detailed knowledge on biosynthesis of cofactors and coenzymes, their relation to basic metabolism of nucleotides and amino acids and are enabled to recognize common themes in enzymatic catalysis and metabolic networks. In particular, disorders and treatments of inborn errors in metabolism are understood and can be connected to basic biochemical problems. • can independently develop strategies for protein purification and characterization and are able to analyze enzymes on different levels, such as primary sequence, domain structure, oligomerization and three-dimensional structure. • can determine enzyme activities, describe their reaction mechanism and uncover the action of different types of inhibitors. • can independently carry out small scientific projects related to the topic 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	Contents of the module				
	<ul style="list-style-type: none"> • Native protein purification • Biophysical, biochemical and structural analysis of proteins (spectroscopy, mass spectrometry, size exclusion, electrophoresis, determination of domain structure) • Recombinant protein expression and purification • Enzyme kinetics including inhibition, regulation, electron transfer (spectroscopy, HPLC, stopped-flow) • Assembly of protein complexes and determination of protein-interaction (isothermal titration calorimetry, differential scanning calorimetry, surface plasmon resonance, cosedimentation) • HPLC analysis of metabolites in urine and blood • Maturation of enzymes, cellular localization • Screening for inhibitors • Viability of cells (neurons, fibroblast) • Biogenesis of cofactors and coenzymes • Nucleotide and amino acid metabolism • Inborn errors in metabolism • Drug development 				
4	Teaching/Learning methods				
	<ul style="list-style-type: none"> • Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form 				

5	<p>Requirements for participation</p> <p>Enrollment in the Master’s degree course “Biological Sciences”, in the Master’s degree course “Biochemistry” or in the Master’s degree course “Chemistry”</p> <p>Additionally: Successful participation in an advanced Biochemistry module during the Bachelor’s degree course (e.g. MN-B-WP I [BC 1] for Cologne students) or similar skills. In cases of doubt, please contact the module coordinator (see 10) before choosing this subject module.</p>
6	<p>Type of module examinations</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>Requisites for the allocation of credits</p> <p>Regular and active participation; Each examination part at least “sufficient” (see appendix of the examination regulations for details)</p>
8	<p>Compatibility with other Curricula*</p> <p>Biochemical subject module in the Master’s degree course “Biochemistry”, elective module in the Master’s degree course “Chemistry”</p>
9	<p>Significance of the module mark for the overall grade</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>Module coordinator</p> <p>Prof. Dr. Günter Schwarz, phone 470-6440, e-mail: gschwarz@uni-koeln.de</p>
11	<p>Additional information</p> <p>Subject module of the Master’s degree course “Biological Sciences”, Focus of research: (B) Biochemistry, Biotechnology and Biophysics; (G) Genetics and Cell Biology</p> <p>Participating faculty: Dr. K. Schrader, Prof. Dr. G. Schwarz</p> <p>Literature:</p> <ul style="list-style-type: none"> • Berg, J.M., Tymoczko, J.L., Stryer, L. (2012) Biochemistry. 7th edition, Springer Spektrum • Voet, D., Voet, J.G. (2011) Biochemistry. 4th edition, Wiley & Sons • Frey, P.A., Hegemann, A.D. (2007) Enzymatic Reaction Mechanisms. Oxford University Press • Additional subject-specific literature will be provided at the beginning of the module <p>Note: The module contains hand-on laboratory work conducted by small groups of students and is taught in course rooms and research laboratories. The module does not contain computer-based practicals/research as a main component.</p> <p>General time schedule: Weeks 1-5 (Mon.-Fri.): Lectures, practical/lab, preparation for the seminar talk (topic and date will be arranged individually); Week 6 (Mon.-Fri.): Writing seminar paper; Week 7 (Mon.-Fri.): Preparation for the written examination</p> <p>Introduction to the module: October 02, 2019 at 1 p.m., Institute for Biochemistry, room 170 (lecture room, first floor)</p> <p>Written examination: November 22, 2019, second/supplementary examination February 14, 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”.