

Advanced Bioinformatics						
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration	
MN-B-SM (CG 4)	360 h	12 CP	1 st or 2 nd term of studying	Summer term, 2 nd half	7 weeks	
1	Type of lessons		Contact times	Self-study times	Intended group size*	
	a) Lectures		18 h	36 h	max. 8	
	b) Practical/Lab		99 h	159 h	max. 8	
	c) Seminar		12 h	36 h	max. 8	
2	Aims of the module and acquired skills					
	Students who successfully completed this module ...					
	<ul style="list-style-type: none"> • have acquired detailed knowledge about the experimental background of advanced methods in Bioinformatics and Computational Biology. • have gained insight into contemporary topics of bioinformatic and biostatistical research and application to high-throughput data analysis. • are able to use the above mentioned systems to analyse genome-scale data, conduct downstream analyses, and to interpret and document their research. • 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"> • Modern bioinformatic methods for genome, transcriptome and proteome data analysis • Multi-variate and high-dimensional data analysis • Advanced regression methods, such as regularized linear models • Application of these methods to molecular biology and for understanding disease mechanisms • Handling of Unix based computer systems • Scientific programming 					
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	Requirements for participation					
	Enrollment in the Master´s degree course "Biological Sciences" or in the Master´s degree course "Biochemistry"					
	Additionally recommended: Successful completion of the module "Introduction to Bioinformatics (MN-B-SM [CG 1])" or documented comparable skills. In cases of doubt, please contact the module coordinator (see 10) before choosing this subject module.					

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 written 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>Biological subject module in the Master´s degree course "Biochemistry"</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. Andreas Beyer, phone 478-84429, e-mail: andreas.beyer@uni-koeln.de</p>
11	<p>Additional information</p> <p>Subject module of the Master´s degree course "Biological Sciences", Focus of research: (C) Computational Biology; (G) Genetics and Cell Biology Participating faculty: Prof. Dr. A. Beyer, Prof. Dr. A. Tresch, Prof. Dr. T. Wiehe Literature:</p> <ul style="list-style-type: none"> • Lynch, M. (2007) The Origins of Genome Architecture. Palgrave Macmillan • Davidson, E.H. (2006) The Regulatory Genome. Academic Press • Hastie, T., Tibshirani, R., Friedman, J. (2009) The Elements of Statistical Learning. 2nd edition, Springer • Additional reviews and original papers will be handed out during the module <p>General time schedule: Week 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>Note: The module does not contain hands-on laboratory work. The module contains computer-based practicals/research as a main component.</p> <p>Introduction to the module: May 25, 2020 at 9:15 a.m., Institute for Genetics / Molekulare Biowissenschaften, Computer pool (ground floor)</p> <p>Written examination: July 17, 2020, second/supplementary examination August 28, 2020; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

* 7 students from the Master´s degree course "Biological Sciences" and 1 student from the Master´s degree course "Biochemistry".