Module Name
Advanced Bioinformatics

Type of Module	Module Code
Advanced Module	AM-B-SM (C 2)

Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MN-B-SM (C 2)	360 Hours	12 CP	1. – 3. Semester	SuSe, 2nd half	Summer Term Only	7 weeks

1	Course Types		Contact Time	Private Study	Planned Group Size
	a) Lecture		18 h	36 h	max. 12
	b) Practical/Lab		99 h	159 h	max. 12
	c) Seminar		12 h	36 h	max. 12

2	**Module Objectives and Skills to be Acquired**
	Students who successfully completed this module … • 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	**Module Content**
	• Modern bionformatic 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 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)**
	Knowledge and understanding of the content of the theory module "Computational Biology (C)" and basic programming skills in "R" are absolutely required for participation in the course. In cases of doubt, please contact the module coordinator (see 10).

6	**Type of examination**
	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)

7	**Credits Awarded**
	Regular and active participation; Each examination part at least "sufficient"

8	**Compatibility with other Curricula**
	None
9	**Proportion of Final Grade**
	12/114
10	**Module Coordinator**
	Prof. Dr. Andreas Beyer, phone 478-84429, e-mail: andreas.beyer@uni-koeln.de
11	**Further Information** **Specialization:** Prof. Dr. A. Beyer, Prof. Dr. A. Tresch, Prof. Dr. T. Wiehe **Literature:** • Information about textbooks and other reading material will be given on the ILIAS representation of the course **General time schedule:** Week 1-6 (Mon.-Fri.): Lectures, practical/lab, preparation for the seminar talk (topic and date will be arranged individually) and writing seminar paper; Week 7 (Mon.-Fri.): Preparation for the written examination **Note:** The module does not contain hands-on laboratory work. The module contains computer-based practicals/research as a main component, using RStudio Server Pro.