Module Name
Computational Biology II

Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MN-BC-GSM06	360 h	12 CP	2nd or 3rd term of studying	Summer term	summer term only	7 weeks

1	Course Types	Contact Time	Private Study	Planned Group Size*
	a) Lectures	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 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 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 Methods

Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques.

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

Previous attendance of the lecture module “Computational Biology (C)”.
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 two parts Written examination on topics of lectures, seminars and the practical/lab part (2 hours; 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** 10 % of the overall grade (see also appendix of the examination regulations)
10	**Module Coordinator** Prof. Dr. Andreas Beyer, phone 478-84429, e-mail: andreas.beyer@uni-koeln.de
11	**Further Information** **Participating faculty**: Prof. Dr. Andreas Beyer, phone 478-84429, e-mail: andreas.beyer@uni-koeln.de Prof. Dr. T. Wiehe, Prof. Dr. A. Tresch, Prof. Dr. K. Bozek, Dr. P. Antczak **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 1-6 (Mon.-Fri.): Lectures, practical/lab, preparation for the seminar talk (topic and date will be arranged individually); 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. **Introduction to the module:** May 22nd, 2023 at 9:15 a.m., Center for Molecular Biosciences (COMB), Computer pool (ground floor); for preparation to the module before this introduction see ILIAS link under literature. **Oral or written examination:** July 14th, 2023, second/supplementary examination August 25th, 2023; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.

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