

Statistical Genetics and Epidemiology						
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration	
MN-B-SM (CG 2)	360 h	12 CP	1 <sup>st</sup> or 2 <sup>nd</sup> term of studying	Winter term, 2 <sup>nd</sup> half	7 weeks	
1	<b>Type of lessons</b>		<b>Contact times</b>	<b>Self-study times</b>	<b>Intended group size</b>	
	a) Lectures		37 h	74 h	max. 12	
	b) Practical/Lab		48 h	171 h	max. 6	
	c) Seminar		6 h	24 h	max. 12	
2	<b>Aims of the module and acquired skills</b> Students who successfully completed this module ... <ul style="list-style-type: none"> <li>• have acquired detailed knowledge on advanced techniques for obtaining data on genetic variation, concepts of epidemiology (with a particular focus on human genetic epidemiology), and statistical approaches to analyze these data in epidemiological studies.</li> <li>• are able to conduct standard genetic epidemiological analyses, to address potential problems in these studies as well as to interpret their results and can independently carry out small scientific projects related to the topic of the module.</li> <li>• 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.</li> <li>• are able to transfer skills acquired in this module to other fields of biology.</li> </ul>					
3	<b>Contents of the module</b> <ul style="list-style-type: none"> <li>• Forms of genetic variation used in genetic epidemiology; technologies for obtaining genetic data</li> <li>• Epidemiological study designs, effect measures, genetic risk models</li> <li>• Linkage and association analysis methods for genetic data</li> <li>• Obtaining, imputing, analyzing and annotating next-generation sequencing (NGS) data, including rare variants and structural variation</li> <li>• Analysis of methylation data</li> </ul>					
4	<b>Teaching/Learning methods</b> <ul style="list-style-type: none"> <li>• Lectures; Practical/Lab (Project work); Seminar; Computer exercises; Guidance to independent research; Training on presentation techniques in oral and written form</li> </ul>					
5	<b>Requirements for participation</b> Enrollment in the Master´s degree course "Biological Sciences" <b>Additionally recommended:</b> Good knowledge of quantitative methods is indispensable to participate in this module. Good mathematical skills are necessary. Basic knowledge of Linux and R is advantageous, but not mandatory.					
6	<b>Type of module examinations</b> The final examination consists of three parts: Two hours written examination about topics of the lectures (50 % of the total module mark), oral presentation (25 % of the total module mark) and written seminar paper (weekly, aggregate to 25 % of the total module mark)					

*Statistical Genetics and Epidemiology (MN-B-SM [CG 2]) continued*

7	<p><b>Requisites for the allocation of credits</b></p> <p>Regular and active participation; Each examination part at least “sufficient” (see appendix of the examination regulations for details)</p>
8	<p><b>Compatibility with other Curricula</b></p> <p>None</p>
9	<p><b>Significance of the module mark for the overall grade</b></p> <p>15 % of the overall grade (see also appendix of the examination regulations)</p>
10	<p><b>Module coordinator</b></p> <p>Prof. Dr. Michael Nothnagel, phone 478-96847, e-mail: michael.nothnagel@uni-koeln.de</p>
11	<p><b>Additional information</b></p> <p><b>Subject module</b> of the Master’s degree course “Biological Sciences”, <b>Focus of research:</b> (C) Computational Biology; (G) Genetics and Cell Biology</p> <p><b>Participating faculty:</b> Dr. B. Budde, Prof. Dr. M. Nothnagel, Prof. Dr. P. Nürnberg, Prof. Dr. M. Ruth-Schweiger</p> <p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>• Laird, N.M., Lange, C. (2011) The Fundamentals of Modern Statistical Genetics. Springer</li> <li>• Bickeböller, H., Fischer, C. (2007) Einführung in die Genetische Epidemiologie. Springer</li> <li>• Further original papers will be handed out during the module</li> </ul> <p><b>General time schedule:</b> Weeks 1-6: Lectures (Mon., Tue., Thu. 2 h each), practical/lab (Mon., Tue., 2 h each, Thu. 4 h), writing seminar paper and preparation for the seminar talk (held in week 6); Week 7 (Mon.-Fri.): Preparation for the written examination. Dates for lectures and exercises may be shifted if agreed on during the module.</p> <p><b>Note:</b> The module contains hand-on laboratory work conducted individually and is taught in course rooms and research laboratories. The module contains computer-based practicals/research as a main component.</p> <p><b>Introduction to the module:</b> December 02, 2019 at 9:15 a.m., Regional Computing Center Cologne (RRZK), Weyertal 121, room 0.13 (basement floor)</p> <p><b>Written examination:</b> January 31, 2020, second/supplementary examination March 20, 2020; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>