

<b>Module Name</b> Statistical Genetics in Research and Practical Applications						
<b>Type of Module</b> ○ Advanced Module				<b>Module Code</b> Statistical Genetics		
<b>Identification Number</b> MN-B-SM (C 3)	<b>Workload</b> 360 h	<b>Credit Points</b> 12 CP	<b>Term</b> 2 <sup>nd</sup> term of studying	<b>Offered Every</b> Summer term, 2 <sup>nd</sup> half	<b>Start</b> Summer term only	<b>Duration</b> 7 weeks
<b>1</b>	<b>Course Types</b> a) Lectures b) Practical/Lab c) Seminar		<b>Contact Time</b> 37 h 48 h 6 h		<b>Private Study</b> 74 h 171 h 24 h	
<b>2</b>	<b>Module Objectives and Skills to be Acquired</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 genetic epidemiology, and statistical and bioinformatic approaches to analyze these data in epidemiological studies and forensic settings.</li> <li>• are able to conduct selected genetic epidemiological, epigenetic and forensic genetic 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>					
<b>3</b>	<b>Module Content</b> <ul style="list-style-type: none"> <li>• Forms of genetic variation used in genetic epidemiology, epigenetics and forensic genetics</li> <li>• Obtaining and analyzing genetic data, also including next-generation sequencing (NGS) data</li> <li>• Study designs and measures, linkage and association methods in genetic epidemiology</li> <li>• Processing and analyzing NGS data</li> <li>• Analysis of DNA-methylation data</li> <li>• Analysis of forensic genetic marker data and interpretation of results</li> </ul>					
<b>4</b>	<b>Teaching 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	<p><b>Prerequisites (for the Module)</b></p> <p>Enrollment in the Master's of Science degree course "Computational Biology"</p> <p><b>Additional academic requirements</b></p> <p>Previous attendance of the lecture module Computational Biology; Good knowledge of quantitative methods and good mathematical skills are indispensable to participate in this module. Basic knowledge of Linux or R is required.</p>
6	<p><b>Type of Examination</b></p> <p>The final examination consists of two parts: Two hour written examination about topics of the lectures (50 % of the total module mark), oral presentation (50 % of the total module mark)</p>
7	<p><b>Credits Awarded</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>Proportion of Final Grade</b></p> <p>12.0 %</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>Further Information</b></p> <p><b>Participating faculty:</b> Dr. K. Becker, Dr. M. Bogus, Dr. B. Budde, A. Gosch, Prof. Dr. C. Courts, Dr. C. Grimm., Prof. Dr. M. Nothnagel, Dr. A. Pacholewska, Prof. Dr. M. Schweiger, Dr. H. Thiele</p> <p><b>Literature:</b></p> <ul style="list-style-type: none"> <li>• Further information on textbooks and reading material will be listed in ILIAS</li> <li>• Additional original papers will be handed out during the module</li> </ul> <p><b>General time schedule:</b> Weeks 1-6 (Mon., Wed., Fri 9-13 approx. 4 hours contact time per day) Lectures practical/lab and preparation for the seminar talk (held on July 02, 2025); Week 7 (Mon.-Fri.): Preparation for the written examination.</p> <p><b>Note:</b> The module contains hands-on computer work conducted individually and is taught in course rooms. The module contains computer-based practicals/research as a main component. The module will mostly take place at the Cologne Center for Genomics (CCG), Weyertal 115b; the forensic genetics part will be taught at the Institute of Legal Medicine, Melatengürtel 60/62.</p> <p><b>Introduction to the module:</b> June 08, 2026, at 9:15 a.m., Cologne Center for Genomics (CCG), Weyertal 115b, seminar room (1.012, 1<sup>st</sup> floor); information on changing locations will be sent to your smail account.</p> <p><b>Written examination:</b> July 24, 2026, second/supplementary examination August 28, 2026; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>