

Module Name Molecular Mechanisms of Human Diseases						
Type of Module ○ Advanced Module				Module Code Human Diseases		
Identification Number MN-B-SM (A 2)	Workload 360 h	Credit Points 12 CP	Term 2 nd term of studying	Offered Every Summer term, 1 st half	Start Summer term only	Duration 7 weeks
1	Course Types a) Lectures b) Practical/Lab c) Journal Club		Contact Time 15 h 150 h 12 h		Private Study 30 h 112 h 24 h	
2	Module Objectives and Skills to be Acquired Students who successfully completed this module <ul style="list-style-type: none"> • have acquired detailed knowledge on important concepts in modern biomedical research with a focus on key disease mechanisms. • have acquired experimental skills in state-of-the art methodologies in cell biology and molecular biology and 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 <ul style="list-style-type: none"> • Mechanisms of human diseases • Model systems for human diseases, genetics in model organisms of human disease • Genetic control of tissue regeneration and tumor growth • Basic cell biology – signal transduction in health and disease and molecular mechanisms of pathogenesis • Aging clocks • Gene Therapy for human diseases • Eukaryotic cell culture • DNA analysis by polymerase chain reaction (PCR), quantification of gene expression • Molecular cloning, gel electrophoresis (agarose and PAGE) and western blotting • Staining methods, immunohistochemistry, microscopy • Principles of high throughput drug discovery 					
4	Teaching Methods <ul style="list-style-type: none"> • Lectures; Practical/Lab; Training on critical reading of papers and presentation skills 					

5	<p>Prerequisites (for the Module)</p> <p>Enrollment in the Master's of Science degree course "Genetics and Biology of Aging and Regeneration"</p> <p>Additional academic requirements</p> <p>Previous attendance of the lecture module Principles of Molecular Genetics, Development and Aging</p>
6	<p>Type of Examination</p> <p>The final examination consists of two parts: One hour written examination on topics of lectures (50 % of the total module mark), oral presentation (20-30 min; 50 % of the total module mark)</p>
7	<p>Credits Awarded</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>None</p>
9	<p>Proportion of Final Grade</p> <p>12.0 %</p>
10	<p>Module Coordinator</p> <p>Prof. Dr. Björn Schumacher, phone 478 84202, e-mail: bjorn.schumacher@uni-koeln.de</p>
11	<p>Further Information</p> <p>Participating faculty: Prof. Dr. Dr. M. Alejandre Alcazar, PD Dr. F. Bock, Prof. Dr. P. Schermer, Dr. S. Panier, Prof. Dr. B. Schumacher, Dr. S. Theobald, Prof. Dr. D. Vilchez, Prof. Dr. H. Winkels, Dr. Siyao Wang, Prof. Dr. R. Rachimowicz, Prof. Dr. H. Schlößer, Dr. Thanh Vuong-Brender, Prof. Dr. C. Niessen.</p> <p>Literature:</p> <ul style="list-style-type: none"> Information on recommended textbooks and other reading material will be given on the ILIAS representation of the course (see https://www.ilias.uni-koeln.de/ilias/goto_uk_cat_2815610.html) <p>General time schedule: Week 1-6 (Mon.-Fri.): Lectures, practical/lab and preparation for the oral presentation (held at the end of week 6); Week 7 (Mon.-Fri.): Preparation for the written examination</p> <p>Note: The module contains hands-on laboratory work conducted individually and is taught in research laboratories. The module does not contain computer-based practicals/research as a main component.</p> <p>Introduction to the module: April 10, 2026 at 9:00 a.m. (CECAD Research Center, Joseph-Stelzmann Str.26, Seminar Room 1.034 (first floor)).</p> <p>Written examination: June 05, 2026 at 1:30 p.m., 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>