

Module Name Lecture Principles of Molecular Genetics, Development and Aging						
Type of Module ○ Basic Module				Module Code Aging Lecture		
Identification Number MN-B-GA 1	Workload 180 h	Credit Points 6 CP	Term 1 st term of studying	Offered Every Winter term	Start Winter term only	Duration 1 term
1	Course Types Lecture		Contact Time 49 h		Private Study 131 h	
2	Module Objectives and Skills to be Acquired Students who successfully completed this module <ul style="list-style-type: none"> • have acquired an understanding of principles and mechanisms of molecular and cellular biology and key concepts in modern genetics and aging research. • have acquired in-depth knowledge of molecular, cellular and systemic mechanisms that orchestrate development and organismal homeostasis and how their malfunctions contribute to aging and aging-associated diseases. • can solve problems and develop strategies to answer questions related to molecular genetics and mechanisms underlying organismal development and aging. 					
3	Module Content <ul style="list-style-type: none"> • Hallmarks of Aging • DNA stability, damage and repair, DNA replication and recombination • Regulation of gene expression, transcription, RNA processing • Epigenetics • Regulation of translation, protein folding and posttranslational modification of proteins • Proteostasis and ER stress • Mitochondria biology and function • Cell cycle and its regulation • Cellular senescence • Immunity and defense mechanisms • Organization and function of the cytoskeleton, cellular mechanics • Microbiome in physiology, aging and disease • Autophagy – principles and role in health and disease • Stem cell biology and regeneration • Signal transduction, inter- and intra-cellular communication 					
4	Teaching Methods <ul style="list-style-type: none"> • Lecture 					

5	<p>Prerequisites (for the Module)</p> <p>Enrollment in one of the Master's of Science degree courses of the Department of Biology</p> <p>Additional academic requirements</p> <p>The knowledge of cell, molecular and developmental biology as well as genetics on the level of general biology text books (e.g. Alberts, Lodish or Watson) is required.</p>
6	<p>Type of Examination</p> <p>Two hours written examination about topics of the lectures (100 % of the total module mark)</p>
7	<p>Credits Awarded</p> <p>Written examination at least "sufficient"</p>
8	<p>Compatibility with other Curricula*</p> <p>Obligatory lecture module in the Master's Degree course Computational Biology, Optional module for the second (or third) obligatory lecture module in the other Master's of Science degree courses of the Department of Biology</p>
9	<p>Proportion of Final Grade</p> <p>7.5 %</p>
10	<p>Module Coordinator</p> <p>Prof. Dr. Mirka Uhlirova, phone 478 84334, e-mail: mirka.uhlirova@uni-koeln.de</p>
11	<p>Further Information</p> <p>Participating faculty: Professors of the Institute for Genetics and Cologne Excellence Cluster on Cellular Stress Responses in Aging-Associated Diseases (CECAD) as well as the Institute for Zoology</p> <p>Literature:</p> <ul style="list-style-type: none"> • Information about 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: Weeks 1-14: Mon. from 11:15 to 12:30 a.m. and Thur. from 10:00 to 11:45 a.m.; Week 15 (Mon.-Fri.): Preparation for the written examination.</p> <p>Introduction to the module: October 13, 2025 at 11:00 a.m., in-person; Lecture Hall – Max Planck Institute for Biology of Ageing (Joseph-Stelzmann-Str. 9b, 50931 Cologne); for preparation to the module before this introduction see ILIAS link under literature.</p> <p>Written examination: February 06, 2026, second/supplementary examination March 06, 2026; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>