

Module Name Mitochondria and Neurodegeneration						
Type of Module ○ Advanced Module				Module Code Mitochondria and Neurodegeneration		
Identification Number MN-B-SM (A 1)	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) Seminar		Contact Time 24 h 150 h 6 h		Private Study 80 h 80 h 20 h	
2	Module Objectives and Skills to be Acquired Students who successfully completed this module <ul style="list-style-type: none"> • have gained in-depth knowledge in mitochondrial research and the role of mitochondrial dysfunction in neurodegeneration and aging. • 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"> • Principles of mitochondrial biology including protein and membrane biogenesis, mitochondrial dynamics and inheritance, and mitochondrial genetics • The role of mitochondrial dysfunction for aging and disease • Mechanisms of mitochondrial quality control including autophagy and apoptosis • The role of mitochondria for neuronal activities and survival • Mitochondrial DNA mutations and human disease • Mitochondria and neurodegenerative diseases including Parkinson disease, amyotrophic lateral sclerosis, hereditary spastic paraplegia, spinocerebellar ataxia, and peripheral neuropathies • Analysis of subcellular localization of proteins using fluorescence microscopy and cellular fractionation • Molecular cloning (cloning of PCR fragments into plasmids, transfections, etc.) • Cell culture technology (working with human and murine cell lines) • Immunohistochemistry 					

3	<p>Module Content (continued)</p> <ul style="list-style-type: none"> Protein analysis and protein-interaction methods (Western blotting, co-immunoprecipitation of proteins, pull-down, etc.) Analysis of knock-out and transgenic mice <p><i>Explanatory note:</i> The list above comprises techniques that are commonly used in the participating groups. Thus, every student will be confronted with a large subset of it. The exact content, however, will depend on the tutor and the research project the student will work on.</p>
4	<p>Teaching Methods</p> <ul style="list-style-type: none"> Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form
5	<p>Prerequisites (for the Module)</p> <p>Enrollment in the Master's of Science degree course "Genetics and Biology of Aging and Regeneration" or in the Master's degree course "Biochemistry and Molecular Medicine"</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 and seminars (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>Optional compulsory module in the Master's degree course "Biochemistry"</p>
9	<p>Proportion of Final Grade</p> <p>12.0 %</p>
10	<p>Module Coordinator</p> <p>Prof. Dr. Elena Rugarli, phone 478 84244, e-mail: elena.rugarli@uni-koeln.de</p>
11	<p>Further Information</p> <p>Participating faculty: Prof. Dr. M. Bergami, Dr. M. Corrado, Dr. M. Escobar, Prof. Dr. A. Garcia, Prof. Dr. T. Langer, Dr. E. Motori, Prof. Dr. J. Riemer, Prof. Dr. E. Rugarli, Prof. Dr. A. Trifunovic.</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 1-5 (Mon.-Fri.): Lectures, practical/lab and preparation for the oral presentation (topic and date will be arranged individually); Week 6 (Mon.-Fri.): Oral presentation of individual research results; Week 7 (Mon.-Fri.): Preparation for the written examination</p>

11	<p>Further Information (continued)</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 5, 2024 at 14:00 a.m. (CECAD Research Center, room will be communicated on the ILIAS link) or online (in this case, further information/link will be sent to your Smail-Account); for preparation to the module before this introduction see ILIAS link under literature.</p> <p>Written examination: May 31, 2024, second/supplementary examination August 02, 2024; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>
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