

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	Start summer term only	Duration 7 weeks
1	Course Types a) Lectures b) Practical/Lab c) Seminar		Contact Time 20 h 154 h 6 h	Private Study 30 h 126 h 24 h	Planned Group Size* max. 10 max. 1 max. 2	
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 methods in cell biology and molecular biology (see contents of the module) and are able to independently design and perform small scientific projects related to topics 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 • Protein analysis and protein-interaction methods (Western blotting, co-immunoprecipitation of proteins, pull-down, etc.) • Analysis of knock-out and transgenic mice • <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. 					

4	<p>Teaching Methods Lectures; Practical/Lab (Project work); Seminar; Guidance to independent research; Training on presentation techniques in oral and written form</p>
5	<p>Prerequisites (for the Module) Enrollment in the Master's degree course "Biological Sciences" Additional academic requirements For Students of Master "Biological Sciences": Previous attendance of the lecture module "Principles of Molecular Genetics, Development and Aging (A/D/G)".</p>
6	<p>Type of Examination The final examination consists of two parts: written examination on topics of lectures and seminars (1 hour; 50 % of the total module mark), oral presentation of the research performed in the lab in a poster session with questions (20-30 min; 50 % of the total module mark)</p>
7	<p>Credits Awarded 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 Biochemical subject module in the Master's degree course "Biochemistry"</p>
9	<p>Proportion of Final Grade In the Master's degree course "Biological Sciences": 12 % of the overall grade (see also appendix of the examination regulations)</p>
10	<p>Module Coordinator Prof. Dr. Elena Rugarli, phone 478-84244, e-mail: elena.rugarli@uni-koeln.de</p>
11	<p>Further Information Subject module of the Master's degree course "Biological Sciences", Specialization: (A) Mechanisms of Aging and Aging Associated Diseases Participating faculty: Prof. Dr. M. Bergami, Dr. M. Corrado, Dr. M. Escobar, Prof. Dr. A. Garcia, Prof. Dr. T. Langer, Dr. D. Pla-Martin, Prof. Dr. J. Riemer, Prof. Dr. E. Rugarli, Prof. Dr. A. Trifunovic. Literature: Information about textbooks and other reading material will be given on the ILIAS representation of the course (https://www.ilias.uni-koeln.de/ilias/goto_uk_cat_2815610.html) General time schedule: Week 1-5 (Mon.-Fri.): Lectures, practical/lab and preparation for the poster presentation (topic and date will be arranged individually); Week 6 (Mon.-Fri.): Scientific poster presentation of individual research results; Week 7 (Mon.-Fri): Preparation for the written examination Note: The module contains hand-on laboratory work conducted individually and is taught in research laboratories. The module does not contain computer-based practicals/research as a main component. Introduction to the module: March 31, 2023 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. Oral examination: May 29, 2023, second/supplementary examination August 04, 2023; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

* 8 students from the Master's degree course "Biological Sciences" and 2 students from the Master's degree course "Biochemistry".