

Mitochondria and Neurodegeneration					
Identification number	Workload	Credit points	Term of studying	Frequency of occurrence	Duration
MN-B-SM (A 1)	360 h	12 CP	1 st or 2 nd term of studying	Summer term, 1 st half	7 weeks
1	Type of lessons		Contact times	Self-study times	Intended group size*
	a) Lectures		20 h	30 h	max. 8
	b) Practical/Lab		154 h	126 h	max. 1
	c) Seminar		6 h	24 h	max. 2
2	Aims of the module and acquired skills 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	Contents of the module <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 <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/Learning 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>Requirements for participation</p> <p>Enrollment in the Master´s degree course "Biological Sciences" or in the Master´s degree course "Biochemistry".</p> <p>Previous attendance of the theory module "Principles of Molecular Genetics, Development and Aging (A/D/G)" is highly recommended.</p>
6	<p>Type of module examinations</p> <p>The final examination consists of three parts: Two hours written examination about topics of the lectures and the practical/lab part (50 % of the total module mark), oral presentation (25 % of the total module mark) and seminar paper (25 % of the total module mark)</p>
7	<p>Requisites for the allocation of credits</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>Biological subject module in the Master´s degree course "Biochemistry"</p>
9	<p>Significance of the module mark for the overall grade</p> <p>In the Master´s degree course "Biological Sciences": 15 % of the overall grade (see also appendix of the examination regulations)</p>
10	<p>Module coordinator</p> <p>Prof. Dr. Elena Rugarli, phone 478-84244, e-mail: elena.rugarli@uni-koeln.de</p>
11	<p>Additional information</p> <p>Subject module of the Master´s degree course "Biological Sciences", Specialization: (A) Mechanisms of Aging and Aging Associated Diseases</p> <p>Participating faculty: Prof. Dr. M. Bergami, Dr. M. Escobar, Prof. Dr. A. Garcia, Prof. Dr. T. Langer, Prof. Dr. J. Riemer, Prof. Dr. E. Rugarli, Prof. Dr. A. Trifunovic, Prof. Dr. R. Wiesner</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 (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 seminar talk (topic and date will be arranged individually); Week 6 (Mon.-Fri.): Scientific poster (= seminar paper) presentation of individual research results; Week 7 (Mon.-Fri): Preparation for the written examination</p> <p>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.</p> <p>Introduction to the module: April 12, 2021 at 9:00 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>

Written examination: May 31, 2021, second/supplementary examination August 06, 2021; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.

* 7 students from the Master's degree course "Biological Sciences" and 1 student from the Master's degree course "Biochemistry".

Corona note! Depending on the Corona situation during the summer term, practical work may be skipped either totally or in part. In this case, some or all practical parts will be replaced by adequate alternatives so that (i) the workload and (ii) the principle content of the modules remained unchanged.