

Module Name Advanced Light and Electron Microscopy						
Type of Module ○ Advanced Module				Module Code Advanced Microscopy		
Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MN-B-SM (GA 1)	360 h	12 CP	2 nd term of studying	Summer term, 1 st half	Summer term only	7 weeks
1	Course Types		Contact Time		Private Study	
	a) Lectures		40 h		80 h	
	b) Practical/Lab		80 h		133 h	
	c) Seminar		3 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 theoretical and experimental skills in state-of-the art light and electron microscopy methodologies. • are able to plan, carry out and evaluate a project using advanced light and electron microscopy. • are able to perform quantitative image analysis independently. • 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 transmission and scanning electron microscopy • Basic EM preparation techniques (embedding, cutting, contrasting) • Advanced EM preparation techniques (Tokuyaso with Immunogold, negative staining) • Electron Tomography • Correlative light and electron microscopy Advanced Light microscopy: • Optical principles of light microscopy • Different kinds of fluorescent microscope types and their strength • Advanced fluorescence techniques (including FCS, FRET and FLIM) • Multi Photon microscopy including other non-linear techniques (SHG, CARS) • Superresolution microscopy (STED, SIM, dSTORM and Minflux) <p><i>Explanatory note:</i> To gain insight into state-of-the art methodologies the course will start with a combination of a lecture series and hands-on experience introducing different techniques (two weeks EM, two weeks LM). Three days are dedicated to Image Analysis and Data handling. An oral presentation will be given on dedicated techniques.</p>					
4	Teaching Methods <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	Prerequisites (for the Module) 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" Additional academic requirements Previous attendance of the lecture module Principles of Molecular Genetics, Development and Aging
6	Type of Examination The final examination consists of two parts: One hour written examination on topics of lectures, seminars and the practical/lab part (50 % of the total module mark), oral presentation (20-30 min; 50 % of the total module mark)
7	Credits Awarded Regular and active participation; Each examination part at least "sufficient" (see appendix of the examination regulations for details)
8	Compatibility with other Curricula* Optional compulsory module in the Master's degree course "Biochemistry and Molecular Medicine"
9	Proportion of Final Grade 12.0 %
10	Module Coordinator Dr. Astrid Schauss, phone 478 84027, e-mail: aschauss@uni-koeln.de
11	Further Information Participating faculty: Dr. A. Schauss, Math.-Nat. faculty, CECAD Literature: <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) 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 Note: The module contains hands-on laboratory work conducted by small groups of students and is taught in research laboratories. Introduction to the module: April 4, 2025 at 1 p.m., CECAD Building (Joseph-Stelzmann-Str. 26), Room 0.037/0.038. Written examination: May 23, 2025, second/supplementary examination August 29, 2025; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.