

Module Name Advanced Light and Electron Microscopy						
Identification Number	Workload	Credit Points	Term	Offered Every	Start	Duration
MN-BC-GSM01	360 h	12 CP	1 st or 2 nd term of studying	Summer term	summer term only	7 weeks
1	Course Types		Contact Time	Private Study	Planned Group Size*	
	a) Lectures		40 h	80 h	max. 6	
	b) Practical/Lab		80 h	133 h	max. 2-3	
	c) Seminar		3 h	24 h	max. 2	
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					
	<u>Advanced Light microscopy:</u>					
	<ul style="list-style-type: none"> • 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) 					
	<u>Electron microscopy (EM):</u>					
	<ul style="list-style-type: none"> • Principles of transmission and scanning electron microscopy • Basic EM preparation techniques (embedding, cutting, contrasting) • Advanced EM preparation techniques (Tokuyasu with Immunogold, negative staining) • Electron Tomography • Correlative light and electron microscopy <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 LM, two weeks EM). Three days are dedicated to Image Analysis and Data handling. An oral presentation will be given on dedicated techniques.</p>					
4	Teaching Methods					
	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 degree course “Biological Sciences”, in the Master’s degree course “Biochemistry” or in the Master’s degree course “Chemistry”					

6	<p>Type of Examination</p> <p>The final examination consists of two parts</p> <p>Written examination on topics of lectures, seminars and the practical/lab part (1 hours; 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</p> <p>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 "Biological Sciences"</p>
9	<p>Proportion of Final Grade</p> <p>In the Master's degree course "Biochemistry": 10 % of the overall grade (see also appendix of the examination regulations)</p>
10	<p>Module Coordinator</p> <p>Dr. Astrid Schauss, phone 478-84027, e-mail: aschauss@uni-koeln.de</p>
11	<p>Further Information</p> <p>Subject module of the Master's degree course "Biological Sciences",</p> <p>Participating faculty: Dr. A. Schauss, Math.-Nat. faculty, CECAD</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 1-6 (Mon.-Fri.): Lectures and practical/lab and preparation for the seminar talk (topic and date will be arranged individually); Week 7 (Mon.-Fri): Preparation for the written examination</p> <p>Note: The module contains hand-on laboratory work conducted by small groups of students and is taught in research laboratories. Only if the Corona situation permits it, the module will be held in an online format.</p> <p>Introduction to the module: March 31st, 2023 at 10:00 a.m., CECAD Building (Joseph-Stelzmann-Str. 26), Room 0.037/0.038 or online (in this case, further information/link will be sent to your Smail-Account).</p> <p>Written examination: May 19, 2023, second/supplementary examination August 05, 2023; the latter date may vary if students and module coordinator agree. More details will be given at the beginning of the module.</p>

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