

Module Name Advanced Light and Electron Microscopy						
Type of Module ○ Advanced Module				Module Code Advanced Microscopy		
Identification Number MN-B-SM (Z 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 40 h 80 h 3 h	Private Study 80 h 133 h 24 h	Planned Group Size* max. 6 max. 2-3 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	<p>Module Content</p> <p><u>Electron microscopy (EM):</u></p> <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 <p><u>Advanced Light microscopy:</u></p> <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) <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	<p>Teaching Methods</p> <p>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)</p> <p>Enrollment in the Master´s degree course “Biological Sciences”, in the Master’s degree course “Biochemistry” or in the Master´s degree course “Chemistry”</p>
6	<p>Type of Examination</p> <p>The final examination consists of two parts: written examination on topics of lectures, seminars and the practical/lab part (1 hour; 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>Biological subject module in the Master´s degree course “Biochemistry”</p>
9	<p>Proportion of Final 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>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: April 1, 2022 at 11:00 a.m., CECAD Building (Joseph-Stelzmann-Str. 26), seminar room (ground floor) 0.039 / 0.040</p> <p>Written examination: May 20, 2022, second/supplementary examination August 05, 2022; 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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* 5 students from the Master's degree course "Biological Sciences" and 1 student from the Master's degree course "Biochemistry".