

Advanced Fluorescence Imaging (CAI) (M4467)				Stand: 6.7.2021	
ECTS-Punkte	Arbeitsaufwand [h]	Dauer	Turnus	Semester	
14	420	6 Wochen	WiSe	2 oder 3	
Lehrveranstaltungen	Typ	Umfang [SWS]	Präsenz [h]	Eigenstud. [h]	Gruppengr.
Lecture	V	2	30	90	
Practical	PExp	18	240	60	12
Modulverantwortlicher	PD Dr. Y. Stahl				
Beteiligte Dozenten	S. Weidtkamp-Peters, Y. Stahl				
Sprache	English				
Verwendbarkeit des Moduls	Studiengang			Modus	
	M.Sc. Biochemie			Elective	
	M.Sc. Biochemistry International				
	M.Sc. Biologie				
Lernziele und Kompetenzen					
<p>The students understand the theoretical basis of fluorescence and its describing parameters like anisotropy, fluorescence quantum efficiency and fluorescence lifetime and can describe the basic concepts of fluorescence microscopy. The students are able to perform state-of-the-art advanced fluorescence microscopic techniques (FCS, FRET, FLIM, FRAP) from sample preparation and image acquisition to data analyses in order to solve relevant biological questions, independently. In addition they understand and can apply advanced nanoscopic techniques (e.g. STED), as well as fast camera-based imaging techniques (e.g. spinning disk, light sheet microscopy). They can explain and compare the pros and cons of the different fluorescent techniques and are able to apply these techniques to solve different relevant biological questions and analyze and judge the results of their experiments.</p>					
Inhalte					
<p>Lecture: In the lectures the basics of light and fluorescence microscopy and their application in relevant biological questions are taught. This includes the fundamentals of fluorescence, the properties of fluorescence and how these are determined. Additionally, the setup of fluorescence microscopes and the different fluorescence microscopy techniques are discussed. The students will get to know different state-of-the-art microscopic techniques which employ fluorescence reporters in order to characterize the behaviour of proteins and biomolecules in cells and in vitro. Due to the content of the lectures, the students are supposed to understand and apply the theoretical fundamentals of these techniques to planning and performing of experiments during the practical part of the course.</p> <p>Practical: The students will apply different fluorescence techniques to two different model systems (human cell lines and tobacco leaves) in order to investigate the properties of different cellular proteins. Using these model systems the students will get to the techniques for transient expression in tobacco leaves and transfection of human cell lines, as well as the following fluorescence microscopic experiments and their analyses. In the plant system, the students will be faced with various difficulties, e.g. autofluorescence and movement of cells during the measurements and due to their acquired theoretical background they should be able to find solutions to these problems independently. Additionally, the students will get to know distinct fluorescence techniques on human cell lines, e.g. indirect immunofluorescence. Using both biological systems, the students will learn how to use a confocal laser scanning microscope (CLSM) and the other advanced imaging microscopes to apply the theoretical knowledge in vivo. The students will analyze the acquired data using the appropriate software. Imaging data shall be prepared in a way that conclusions about localization in different cell types can be drawn; live cell experiment data shall allow conclusions about e.g. interaction and mobility of different proteins.</p>					
Teilnahmevoraussetzungen	Keine				
Studienleistungen	Regelmäßige, aktive Teilnahme				
Zulassungsvoraussetzung zur Abschlussprüfung	Erfüllung der Studienleistungen des Praktikums				
Prüfung und Bewertung	Prüfungsform	Dauer [min]	Gewichtung in Modulnote		
	Klausur	120	80%		
	Wissenschaftlicher Bericht		20%		
Gewichtung in Gesamtnote	gewichtet mit 14 von ca. 100 benoteten LP (ca. 14%)				
Weitere Informationen					
Literatur	Wird zur Vorbereitung des Moduls bekannt gegeben				

