

Physics and Biology of Protein Folding in Cellular Membranes				Stand: 01.01.2018	
ECTS-Punkte	Arbeitsaufwand [h]	Dauer	Turnus	Studiensemester	
8	240	3 Wochen	SoSe		
Lehrveranstaltungen	Typ	Umfang [SWS]	Präsenz [h]	Eigenstud. [h]	Gruppengr.
Vorlesung	V	3	45	90	10
Praktikum	PExp	5	75	30	10
Modulverantwortlicher	Jun.-Prof. Dr. A. Kedrov				
Beteiligte Dozenten	A. Kedrov				
Sprache	Englisch				
Verwendbarkeit des Moduls	Studiengang			Modus	
	M.Sc. Biochemie M.Sc. Biochemistry International M.Sc. Biologie M.Sc. Biology International			Wahlpflicht	
Lernziele und Kompetenzen					
<p>When successfully accomplishing the Module, participants will have theoretical and practical skills in:</p> <ul style="list-style-type: none"> <li>• Physical and biochemical principles of membrane protein biogenesis</li> <li>• Methods to study membrane protein folding, structure and stability</li> <li>• Isolation of membrane folding/insertion machinery and ribosomes, their characterization &amp; functional analysis</li> </ul>					
Inhalte					
<p><b>Lectures</b>  <i>Topics:</i> Thermodynamics of MP folding; protein:protein and protein:lipid interactions; biophysical analysis of MP folding; spontaneous insertion in biology; MP targeting in bacteria and eukaryotes; structure and dynamics of Sec and YidC-type insertases; folding in bacterial outer membranes; tail-anchored proteins; folding in mitochondria and peroxisomes; membrane protein misfolding and degradation, ERAD; designing <i>de novo</i> membrane proteins, macromolecular crowding in membranes.</p> <p><b>Practicals</b>  <i>Topics:</i> Isolation and liposome/nanodisc reconstitution of the Sec:YidC machinery; analysis of Sec-mediated protein translocation; isolation of ribosome:nascent chain complexes (RNC); studying RNC:signal recognition particle or RNC:Sec/YidC interactions; analysis of nascent chain contacts by chemical cross-linking; purification and analysis of MP intermediates.  <i>Methods:</i> bacterial cell culture, membrane isolation, chromatography-based purification, SDS-PAGE &amp; western blotting, ATPase assay, ultra- and zonal centrifugation, fluorescence spectroscopy assays, incl. Förster's resonance energy transfer-based kinetic measurements, cell-free protein synthesis and assembly.</p> <p><b>Seminar</b>            Preparing and presenting a publication on a relevant topic.</p>					
Teilnahmevoraussetzungen	Grundkenntnisse in Proteinbiochemie und Biophysik				
Prüfungsvoraussetzungen	Aktive und regelmäßige Teilnahme am Praktikum; Anfertigung von Protokollen				
Prüfung und Bewertung	Prüfungsform	Dauer [min]	Gewichtung in Modulnote		
	Klausur	60	70%		
	Mündliche Präsentation	30	30%		
Gewichtung in Gesamtnote	Gewichtet nach Leistungspunkten; 8 von ca. 100 benoteten LP bzw. 8%				
Webseite					
Literatur	Will be provided upon the registration and along the course.				