

**Modules M.Sc. Biochemistry and Molecular Biology**

<b>Title of the module</b>	<b>Microbial biofilms</b>		
<b>Term/semester</b>	Summer term/ 2		
<b>VAK-Number</b>	Will be assigned centrally		
<b>Credit points</b>	6 ETCS		
<b>Compulsory/ elective course</b>	Elective course		
<b>Teaching methods</b>	Method	SWS	CP
	Lecture	1 (14 h)	1.5
	Seminar	2 (28 h)	2.5
	Course	4 (56 h)	2
<b>Self study</b>	protocols		20 h
	preparation of the presentation		30 h
	preparation for exams		32 h
<b>Module representative</b>	Prof. Dr. Michael W. Friedrich		
<b>Instructor</b>	Prof. Dr. Michael W. Friedrich, Dr. Alexandra Müller		
<b>Examiner</b>	Prof. Dr. Michael W. Friedrich		
<b>Objectives</b>	<p>The course will focus on deepening theoretical and practical knowledge of structure, function, growth and diversity of microorganisms in biofilms. Strategies for working with biofilms will be learned as well as collecting biofilm samples, characterizing the physico-chemical milieu in biofilms, preparation of biofilms for microscopic techniques, isolation of nucleic acids from biofilms, analysis of microbial diversity with culture-independent techniques, analysis of growth in biofilms.</p> <p>The basic principles of biofilm functioning will lay the foundation to gain a deeper understanding of biofilm structure and biochemical properties of microorganisms in biofilms.</p>		
<b>Content of teaching</b>	<p>The course is research oriented; each student will work with his/her own samples.</p> <p>Theory: Occurrence of biofilms, structure and function of biofilms, methods for biofilm characterization, growth of biofilms and modelling</p> <p>Experimental: Sampling biofilms, strategies to sample biofilms from natural habitats, microscopic techniques (thin sections, 3D-microscopy, fluorescence microscopy, Fluorescence in situ hybridization (FISH), electron microscopy of biofilm structure), functional characterization of biofilms (microelectrode measurements of oxygen gradients), growth of biofilms (flow chambers and direct microscopic evaluation of growth using GFP-tagged strains), characterization of microbial diversity in biofilms (extraction of nucleic acids, PCR of 16S rRNA genes, fingerprint analysis, cloning and sequencing of 16S rRNA genes of selected biofilm isolates, phylogenetic analysis)</p>		
<b>Educational objectives</b>	Goals: learning how to independently work with microbes at the bench using microbial biofilms as paradigm. The focus will be on strategies of generating working hypothesis and deriving experimental design.		
<b>Evaluation of learning progress</b>	Seminars und protocols		
<b>Assessment</b>	Seminar presentation (30); protocols (20); oral exam (50%)		
<b>Frequency</b>	annual		
<b>Usage in other degree programs</b>	The module is suitable for all master students in the BMB program with specialization "Microbial Systems".		
<b>Premise</b>	Successful participation in BMB courses of the first semester		