

**module code /  
module title**

## Module D-FGM/ Functional Genomics of bacteria: RNA and microarray analysis

**date / version of the module  
description**

27.10.2020

**1 INFORMATION ON THE MODULE**

<b>1a</b>	module code	Module D-FGM
<b>1b</b>	module title ( <i>German title</i> )	Klicken Sie hier, um Text einzugeben.
<b>1c</b>	module title ( <i>English title</i> )	Functional Genomics of bacteria: RNA and Microarray analysis
<b>1d</b>	credit points	6
<b>1e</b>	responsible for the module	Dr. Thomas Hurek
<b>1f</b>	type of module	elective module
<b>1g</b>	programs using the module	M.Sc. Biochemistry and Molecular Biology (elective module for students in Integrative BMB, elective component for students in MicroSys specialization )
<b>1h</b>	organizational unit offering the module	Klicken Sie hier, um Text einzugeben.
<b>1i</b>	content-related prior knowledge or skills	Successful attendance in the mandatory BMB-courses in term 1 is recommended
<b>1j</b>	learning contents	<p>The course is research-oriented, each student will work on his own experimental set. Experiments will directly benefit the research of our lab. Molecular principles of plant-microbe interactions, microarray and PCR applications, and RNA analysis will be covered theoretically. Experiments include:</p> <ul style="list-style-type: none"> <li>Gnotobiotic cultivation systems: Inoculation experiments of rice under aseptic conditions (Controlling of bacterial growth, aseptic handling of seedlings).</li> <li>Optimization of reaction conditions for PCR (effect of variation of different parameters).</li> <li>Quantitive PCR experiments for quantification of genes by Real-Time PCR.</li> <li>Extraction of bacterial mRNA and detection of bacterial transcripts (antisense and sense) by RT-PCR, bioinformatic analysis of putative protein function and orientation of transcription.</li> <li>Competition experiments of bacterial mutants after site-directed mutagenesis (DNA extraction from roots, PCR), evaluated by:</li> <li>Oligonucleotide-based microarray experiments including controls (Generation of fluorescent</li> </ul>

		target, amplicon purification, hybridization, scanning and statistical evaluation), and by T-RFLP (terminal restriction fragment length polymorphism
1k	learning outcomes/competencies/targeted competencies	Students can bioinformatically analyze protein functions and predict sense/antisense transcription. They can optimize PCR reactions and quantify specific DNA molecules by quantitative PCR; students are capable to extract bacterial transcripts and to detect transcription of specific genes, and can set up and evaluate plant-microbe interaction studies in gnotobiotic culture systems, and carry out and analyze diagnostic microarrays. They are proficient in understanding the principles of the methods used and in identifying necessary experimental controls. They can present and discuss their scientific findings.
		<b>The total amount of the presence time and working hours of the module has to be calculated additionally in the detailed calculation a) to c).</b>
	a) detailed calculation:	<b>SWS / presence time/working hours in each course of the module</b>
	<input checked="" type="checkbox"/> 1 lecture(s) with	3 SWS/contact hours 42 hours of presence time
	<input type="checkbox"/> seminar(s) with	SWS/contact hours hours of presence time
	<input type="checkbox"/> exercise(s) with	SWS/contact hours hours of presence time
	<input type="checkbox"/> internship(s) with	sum of working hours
	<input type="checkbox"/> seminar(s) with	SWS/contact hours total hours of presence time
1l	calculation of student workload <i>(part a: calculation of presence time and working hours)</i>	<input checked="" type="checkbox"/> 1 laboratory/laboratories with 4 SWS/contact hours 56 total hours of presence time
	<input type="checkbox"/> tutorial(s) with	SWS/contact hours
	<input type="checkbox"/> excursion(s) with	SWS/contact hours working hours in total
	<input type="checkbox"/> other form of course (e.g. block seminar), namely this:	
	Klicken Sie hier, um Text einzugeben.	
	with	SWS / with totally contact hours <input type="checkbox"/> presence time <input type="checkbox"/> working hours
		= sum of presence time and working hours:
	98	

	calculation of student workload <i>(part b: preparation time and follow-up work/self-study)</i>	<b>b) working hours for preparation/follow-up work of the course(s) and/or self-study</b> = sum of working hours: 52
	calculation of student workload <i>(part c: exam preparation etc.)</i>	<b>c) exam preparation (incl. examination)</b> = sum of working hours: 30
	calculation of student workload <i>(total amount of hours including a) - c))</i>	<b>Total amount of the presence time and working hours a) to c):</b> 180
1m	description of possible optional courses in the module	<u>Can a student choose between different courses within the module?</u> NO <u>Short description of selection option</u>  Klicken Sie hier, um Text einzugeben.
1n	language(s) of instruction	<input type="checkbox"/> German <input checked="" type="checkbox"/> English <input type="checkbox"/> Spanish <input type="checkbox"/> French <input type="checkbox"/> Other, namely this: Klicken Sie hier, um Text einzugeben.
1o	frequency	(regular cycle module is offered) e.g.: winter semester, yearly or summer semester, yearly or each semester summer semester yearly Klicken Sie hier, um Text einzugeben.
1p	duration	one semester module Klicken Sie hier, um Text einzugeben.
1q	Literature ( <i>optional</i> )	Klicken Sie hier, um Text einzugeben.
1r	more information on the module ( <i>optional</i> )	With Prof. Barbara Reinhold-Hurek
<b>2</b>	<b>INFORMATION ON THE MODULE EXAMINATION</b> (see also AT Art. 5 section 8)	
2a	type of examination	<input type="checkbox"/> module exam; i.e. exam with only one component (MP) <input checked="" type="checkbox"/> combination exam, i.e. exam with several components (administered by instructors) (KP) <input type="checkbox"/> partial exam; i.e. exam with several components (administered by registrar) (TP)

	<p><b>PL</b> = graded component of the examination  <b>SL</b> = ungraded component of the examination, coursework  <b>PVL</b> = prerequisite of the examination (see AT Art. 5 Section 10)</p> <p><input checked="" type="checkbox"/> PL   <b>2</b>      <input type="checkbox"/> SL   <b>1</b>      <input type="checkbox"/> PVL   justification</p> <p>If necessary, further explanations:      SL: Lab-book like protocols for training purposes</p>
<b>2b</b>	exam components or prerequisites ( <i>type, number</i> )
<b>2c</b>	<p>Give this information for combination examinations only:      Weights (in percentage) of component grades</p> <p>PL 1: Presentation on bioinformatic analysis of gene/protein and transcriptional analysis strategies (35%)</p> <p>PL 2: Oral exam (65%)</p> <p>PL 3: Klicken Sie hier, um Text einzugeben.</p> <p>PL 4: Klicken Sie hier, um Text einzugeben.</p> <p>If necessary, further comments:</p>
<b>2d</b>	<p>form of examination (see AT BPO/AT MPO Art. 8, 9 and 10)</p> <p><input type="checkbox"/> Assignment      <input checked="" type="checkbox"/> Oral examination (single)      <input checked="" type="checkbox"/> Presentation, oral</p> <p><input type="checkbox"/> Written examination      <input type="checkbox"/> Group examination, oral      <input type="checkbox"/> Presentation and written assignment</p> <p>Portfolio      <input type="checkbox"/> Project report      <input type="checkbox"/> Bachelor Thesis</p> <p><input type="checkbox"/> Internship report      <input type="checkbox"/> Colloquium      <input type="checkbox"/> Master Thesis</p> <p><input type="checkbox"/> Other (concrete definition is given in the examination regulations):      Klicken Sie hier, um Text einzugeben.</p>
<b>2e</b>	<p>language(s) of instruction</p> <p><input type="checkbox"/> German      <input checked="" type="checkbox"/> English      <input type="checkbox"/> Spanish      <input type="checkbox"/> French</p> <p><input type="checkbox"/> Other, namely this:      Klicken Sie hier, um Text einzugeben.</p>