module code / module title

BMB-B-MSys / Models, Methods and Specialization – Microbial Systems

date / version of the module description	26.10.2021

1	INFORMATION ON THE MODULE	
1a	module code	BMB-B-MSys
1b	module title *(German title)*	Modelle, Methoden und Spezialisierung – Mikrobielle Systeme
1c	module title *(English title)*	Models, Methods and Specialization – Microbial Systems
1d	credit points	15
1e	responsible for the module	Prof. Dr. Barbara Reinhold-Hurek
1f	type of module	compulsory elective module
1g	programs using the module	M.Sc. Biochemistry and Molecular Biology (essential module in Microbial Systems specialization)
1h	organizational unit offering the module	Zentrum für Biomolekulare Interaktionen Bremen (Fachbereich 2) und Biophysik (Fachbereich 1)
1i	content-related prior knowledge or skills	Knowledge of the contents of the module BMB-A, basics in cell biology, chemistry and biochemistry is recommended.
1j	learning contents	**1) Organismic models for bioscience research (2 SWS lecture)** The lecture course provides an introduction to model systems that are frequently used in biomolecular research as organisms to study modern research questions. For each model system basic information on the structure of the organism, on the handling of the organisms as well as on advantages and disadvantages of the organismic model for various types of biomolecular research will be given. In addition, examples for modern biomolecular research questions that have been addressed or are currently addressed by using the respective model organism will be presented and discussed.

The organisms addressed by this lecture course may include (but may be modified according to recent developments):

- Bacteria
- Yeast
- *C. elegans*
- Drosophila
- *Arabidopsis*
- Poplar
- Mouse
- Rat
- Monkey
- Homo sapiens

2) Methods for biomolecular research (2 SWS lecture + 1 SWS seminar)

The lecture course provides an introduction to important methods that are frequently used for biomolecular research to study modern research questions. For each method principles and basic information will be provided as lecture and special aspects will be additionally addressed in the accompanying seminar or exercises. The methods addressed by this course may include (but may be modified according to recent developments):

- Physicochemical analysis of biomolecules (NMR, mass spectrometry, photometry, fluorometry, ...)
- Enzymatic methods (coupled enzymatic tests, cycling assays, ...)
- Immunological test systems (ELISA, immunocytochemistry, ...)
- Microscopy (light, fluorescence, confocal, atomic force, ...)
- Centrifugation
- Protein purification
- Viruses as vectors
- Cell cultures
- Isotope labeling and radioactivity
- Optogenetics
- Omic-technologies
- Bisulfite sequencing
- Chip sequencing

3) Block seminar with excursion

The one week excursion (in February or March) will introduce special research topics to the biochemistry master students, as an example for “field-based molecular research”.

		One option is an excursion to List. During the week in List the participants will learn about the mission of the research station. The overall objectives of this course are (1) to provide a basic understanding of concepts in marine (e.g. ecology & physiology) research topics; (2) to develop ideas for biomolecular research projects addressing marine research questions; (3) to develop ideas how to implement biomolecular methodology into this research and (4) how to adapt experimental setups for field research. **4) Specialization in one of the offered research fields (6 CP)** Tutorial/seminar course of 6 CP in the following specialized research field: <u>Applied Microbiology</u> This option addresses only students in the specialization MicroSys (Microbial Systems). In excursions, the students will visit different companies and other institutions of applied sciences. They will discuss practices, application and research challenges. At the University of Applied Sciences Bremerhaven, the aspect Food Microbiology will be covered in seminars and lectures. The students will apply their basal knowledge in self-structured learning sessions to discuss challenges and potential solutions for the respective topics.
1k	learning outcomes/ competencies/ targeted competencies	**1) Organismic models for bioscience research (2 SWS lecture)** At the end of the course the student will know the organismic models that are frequently used for biomolecular research to study modern research questions. They will be aware of the advantages and disadvantages of these models, will be informed about safety, legal and ethical issues connected with the use of the various organismic models and will be able to choose appropriate organismic models to answer new research questions in biomolecular research. **2) Methods for biomolecular research (2 SWS lecture + 1 SWS seminar)** At the end of the course the student will know the principles and concepts of selected methods and technologies that are frequently used for biomolecular research to study modern research questions. They will be aware of the advantages and disadvantages (such as sensitivities of methods, safety and legal issues, ethical aspects) of the various methods addressed and will be able to choose appropriate methods and technologies to answer new research questions in biomolecular research. **3) Block seminar with excursion (40 h with 8 h per 5 days, 2 h preparation and presentation).** The successful participants will be able (1) to understand basic concepts of a different discipline; (2) to combine concepts of biomolecular research with those of other disciplines; (3) integrate methods and the potential of model systems to address questions derived from other disciplines and (4) to develop ideas how to adapt experimental setups in the field to facilitate biomolecular research.

4) Specialization in one of the offered research fields (6 CP)

Applied Microbiology (MicroSys)

At the end of this course, the participating students have advanced knowledge on applied aspects of microbiological and biotechnological research and can solve problems with a scientific approach. In addition, they can communicate and present their work professionally and can work in a team. For example, students:

- can work in a team
- can present in a poster format
- can ask high quality questions
- can identify problems and develop approaches to solve them

1l

calculation of student workload

(part a: calculation of presence time and working hours)

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).

a) detailed calculation:

SWS / presence time/working hours in each course of the module

☒	2	lecture(s) with	4	SWS/ contact hours	56	hours of presence time
☒	1	seminar(s) with	1	SWS/ contact hours	14	hours of presence time
☐		exercise(s) with		SWS/ contact hours		hours of presence time
☐		internship(s) with		sum of working hours		
☐		seminar(s) with		SWS/ contact hours		total hours of presence time
☐		laboratory/laboratories with		SWS/ contact hours		total hours of presence time
☐		tutorial(s) with		SWS/ contact hours		
☒	1	excursion(s) with	3	SWS contact hours in total	42	working hours

		☒ 1 other form of course (e.g. block seminar), namely this: tutorial or seminar course of 6 CP in a specialized research field with 4 SWS / with totaly 56 contact hours ☒ presence time ☐ working hours = sum of presence time and working hours: 168
	calculation of student workload *(part b: preparation time and follow-up work/self-study)*	**b) working hours for preparation/follow-up work of the course(s) and/or self-study** = sum of working hours: 242
	calculation of student workload *(part c: exam preparation etc.)*	**c) exam preparation (incl. examination)** = sum of working hours: 40
	calculation of student workload *(total amount of hours including a) - c))*	**Total amount of the presence time and working hours a) to c):** 450
1m	description of possible optional courses in the module	*Can a student choose between different courses within the module?* NO *Short description of selection option* Klicken Sie hier, um Text einzugeben.
1n	language(s) of instruction	☐ German ☒ English ☐ Spanish ☐ French ☐ 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* winter semester yearly Klicken Sie hier, um Text einzugeben.

1p	duration	one semester module Klicken Sie hier, um Text einzugeben.
1q	Literature (*optional*)	Klicken Sie hier, um Text einzugeben.
1r	more information on the module (*optional*)	limited to 10 students per course Teachers of Universities of Applied Sciences and various companies participate.
2	**INFORMATION ON THE MODULE EXAMINATION** (see also AT Art. 5 section 8)	
2a	type of examination	☒ module exam; i.e. exam with only one component (MP) ☐ combination exam, i.e. exam with several components (administered by instructors) (KP) ☐ partial exam; i.e. exam with several components (administered by registrar) (TP)
2b	exam components or prerequisites *(type, number)*	***PL*** *= graded component of the examination* ***SL*** *= ungraded component of the examination, coursework* ***PVL*** *= prerequisite of the examination (see AT Art. 5 Section 10)* ☒ PL | 1 ☐ SL | ☐ PVL | justification If necessary, further explanations: MP: Oral examination with 3 examiners (the person in charge of selected specialized research field as well as an examiner from each of the lectures 1 and 2.
2c	Give this information for combination examinations only: Weights (in percentage) of component grades	PL 1: PL 2: PL 3: Klicken Sie hier, um Text einzugeben. PL 4: Klicken Sie hier, um Text einzugeben. If necessary, further comments: Klicken Sie hier, um Text einzugeben.
2d	form of examination (see AT BPO/AT MPO Art. 8, 9 and 10)	☐ Assignment ☒ Oral examination (single) ☐ Presentation, oral ☐ Written examination ☐ Group examination, oral ☐ Presentation and written assignment ☐ Portfolio ☐ Project report ☐ Bachelor Thesis ☐ Internship report ☐ Colloquium ☐ Master Thesis ☐ Other (concrete definition is given in the examination regulations):

2e	language(s) of instruction	☐ German ☒ English ☐ Spanish ☐ French ☐ Other, namely this: Klicken Sie hier, um Text einzugeben.