

Winter Semester 2019/20

Module Directory

Faculty 09 - Agricultural Sciences, Nutritional Sciences and Environmental
Management

Core Modules Master Degree "Insect Biotechnology and
Bioresources"

Please consult the timetable and Stud.IP for information regarding dates and
room numbers of the modules taught in the course:

<http://www.uni-giessen.de/cms/fbz/fb09/studium/msc/stpl>

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MK 002	MK 002 Biostatistics and Experimental Design		6 CP
	Biostatistics and Experimental Design		
Core Module / Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Pflanzenbau und Pflanzenzüchtung II		1./2. Sem.;
	Offered for the first time: WS 2015/16		
	Intake capacity: not limited		
Frequency and Duration: WS, 1 semester			
Module Coordinator: Biometrie und Populationsgenetik mit dem Schwerpunkt Bioinformatik			
Applies to the Study Programmes: Agrobiotechnology, Master (1./2.); Insect Biotechnology and Bioresources, Master (1./2.);			
Prerequisites for Participation: None			
Learning Outcomes: Students <ul style="list-style-type: none"> • have profound knowledge of quantitative methods • have profound knowledge experimental designs • are able to design experiments • have profound knowledge in hypothesis testing and inferential statistics 			
Module Content: <ul style="list-style-type: none"> • Methods of descriptive statistics • Test-theory and estimation of parameters • Analysis of variance and analysis of regression • Data analysis using statistical software 			
Forms of Instruction:	Contact hours	Preparation and follow-up work	
Lecture	30	60	
Seminar			
Practical training	30	60	
Exercises			
Excursion			
Total:		180	
Prerequisites for Examination: ...			
Module Examination: <ul style="list-style-type: none"> – Form(s) of assessment Assignments (4), written examination – Components of final grade Assignments (100 %) or written examination (100 %) – Form of module retake examination Written examination 			
Language: English			

MK 087	MK 087 Natural Product Chemistry	6 CP
	Natural Product Chemistry	
Core Module / Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	1. Sem.;
	Offered for the first time: WS 2017/18	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Naturstoffforschung mit Schwerpunkt Insektenbiotechnologie		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (1.);		
Prerequisites for Participation: None (recommended: basic knowledge in organic chemistry)		
Learning Outcomes: The students <ul style="list-style-type: none"> • get comprehensive insight into the chemistry of organic natural products. • know the most important classes of natural products, including their biosynthesis, important structural and chemical features as well as bioactivities. 		
Module Content: <ul style="list-style-type: none"> • Bioresources (=origin), biosynthesis, ecophysiological role, and practical importance of natural products, thereby emphasizing insect-derived and 'anti-insect' compounds • classes of natural products (carbohydrates, lipids, polyketides, phenylpropanoids, terpenes, peptides (non-ribosomally and ribosomally synthesized), and alkaloids) as well as their biosynthesis and important features (structure-activity relationships, toxicity) • Methods section: Introduction to production/fermentation, isolation, purification of natural products (several (column) chromatographic techniques, especially HPLC), and structure elucidation 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	60
Seminar	30	60
Practical training		
Exercises		
Excursion		
Total:	180	

Prerequisites for Examination: ...

Module Examination:

- Form(s) of assessment Written examination and presentation
- Components of final grade Written examination (60 %), presentation (40 %)
- Form of module retake examination Written or oral examination

Language: English

MK 088	MK 088 Entomology I	6 CP
	Entomology I	
Core Module / Optional Module	Agrarwissenschaften, Ökotoxologie und Umweltmanagement / Institut für Insektenbiotechnologie	1. Sem.;
	Offered for the first time: WS 2017/18	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Angewandte Entomologie		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (1.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • gain fundamental knowledge on insects as a central bioresource • study insect anatomy and systematics • know the basics of insect identification and will learn its practical application • learn techniques of insect collecting and preservation of specimens • understand the basics of evolutionary biology & ecology of insects 		
Module Content: <ul style="list-style-type: none"> • studies on internal (including dissections) and external insect morphology • microscopy of organ systems • use of insect identification keys with real specimens • setting and preservation of specimens for scientific collections and documentation • evolutionary strategies of insects • insect ecology 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	60
Seminar		
Practical training		
Exercises	22	44
Excursion	8	16
Total:	180	

Prerequisites for Examination: ...

Module Examination:

- Form(s) of assessment written examination
- Components of final grade Written examination (100 %)
- Form of module retake examination Written examination

Language: English

MK 089	MK 089 Insect Biotechnology and Integrated Pest Management	6 CP
	Insect Biotechnology and Integrated Pest Management	
Core Module / Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	1. Sem.;
	Offered for the first time: WS 2017/18	
	Intake capacity: not limited	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Insektenbiotechnologie im Pflanzenschutz		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (1.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • have important knowledge in various methods of biological pest control (including classical biological control, inundative releases, etc.) • have competencies in biology and ecology as well as the use of physical and microbiological control procedures, • know the basic principles of important biotechnological plant protection strategies, • are able to assess how and to what extent these individual techniques can be used within the framework of integrated control strategies. 		
Module Content: <ul style="list-style-type: none"> • The legal basis of integrated and biological plant protection • Biology and ecology of agricultural pests and entomopathogens and their application possibilities in crop protection (production and application technology) • Case studies on methods of classical biological pest control, inundative releases of antagonists (in the field and greenhouse), sterile insect technology and strategies for the promotion of natural enemies in agricultural ecosystems • Use of pheromones (monitoring, mass capture, confusion, lure and kill) and other biotechnological plant protection methods in agriculture • Compatibility and possibilities for the integration of different biological, microbiological and biotechnological plant protection techniques in the overall context of integrated control methods 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	44	88
Seminar	8	16
Practical training		
Exercises		
Excursion	8	16
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment written examination and presentation – Components of final grade Written examination (50%), presentation (50%) – Form of module retake examination Written examination or oral examination or presentation 		
Language: English		

MK 090	MK 090 Bioresources for Natural Product Discovery	6 CP
	Bioresources for Natural Product Discovery	
Core Module / Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	2. Sem.;
	Offered for the first time: SS 2018	
	Intake capacity: Not limited	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Naturstoffforschung mit Schwerpunkt Insektenbiotechnologie		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (2.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> gain insights into suitable bioresources for natural product discovery approaches and how discovery pipelines are set-up (biological activity-based platforms versus modern genomics / bioinformatics-driven pipelines) get knowledge in currently used and emerging natural product-producing microorganisms and their application in pharmaceutical, agricultural and food industry acquire knowledge in the industrial value chain from spanning early discovery programs up to lead candidate identification and lead development get experience in the application of bioinformatic tools for biosynthetic gene cluster identification get insights into recent literature and acquire skills in selecting and presenting publications as well as other data in seminars 		
Module Content: <ul style="list-style-type: none"> Systematics, biology, and ecology of microorganisms producing natural products Examples of plant-derived natural products Examples of natural products biosynthesis in microorganisms (physiology, gene regulation) From bioresource to product: Strategies to select and exploit bioresources for natural product discovery Principles and application of biological detection systems and their application in academic and industrial screening systems Target identification and target-based screening systems Analytical platforms in natural product identification Connection of gene clusters and metabolites: modern approaches for drug discovery Lead identification and strategies for lead development Seminar on recent approaches in drug discovery Demonstration / hands on training to gain insights into bioinformatics tools in drug discovery (using the antiSMASH platform as an example to exploit genome sequence information) 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	42	84
Seminar	9	18
Practical training		
Exercises	9	18
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment Written examination, presentation and project work – Components of final grade Written exam (50 %), presentation (40 %), project work (10 %) – Form of module retake examination Written examination or presentation 		
Language: English		

MK 091	MK 091 Entomology II	6 CP
	Entomology II	
Core Module / Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	2. Sem.;
	Offered for the first time: SS 2018	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Angewandte Entomologie		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (2.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • gain in-depth knowledge on insect anatomy • broaden their knowledge on insect systematics • increase their skills in insect identification • understand concepts of insect physiology • understand insect adaptations to environmental pressures • extend their knowledge about insect ecological strategies 		
Module Content: <ul style="list-style-type: none"> • microscopic studies on histological sections of insect tissues • identification of specimens on family and species level • specific taxonomic techniques (dissection of insect genitalia) • insect physiology (including development) • examples and concepts how insects adapt to their environment • insect feeding strategies (including field observations) 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	28	56
Seminar		
Practical training		
Exercises	24	48
Excursion	8	16
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment Written examination – Components of final grade Written examination (100 %) – Form of module retake examination Written examination 		
Language: English		

MK 092	MK 092 Food Technology	6 CP
	Food Technology	
Core Module / Optional Module	Biologie und Chemie / Institut für Lebensmittelchemie und Lebensmittelbiotechnologie	2. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Lebensmittelchemie		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (2.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • master basic engineering and bioprocess principles relevant to the food industry • know special separation techniques • understand the basic principles of the processing of animal and plant food • can perform basic food biotechnological processes • are able to analyze and assess parameters relevant in processes of food biotechnology 		
Module Content: <ul style="list-style-type: none"> • Cereal technology • Production of sugar and confectionery • Techniques to produce fats and oils • Production processes of food additives • Food Biotechnology • Asian food 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	50
Seminar	10	20
Practical training	30	40
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment written examination – Components of final grade Written examination (100 %) – Form of module retake examination Written examination 		
Language: English		

MK 093	MK 093 Bioprocess Engineering I	6 CP
	Bioprocess Engineering I	
Core Module / Optional Module	Technische Hochschule Mittelhessen / Institut für Bioverfahrenstechnik und Pharmazeutische Technologie	2. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Bioverfahrenstechnik, Membrantechnologie und Zellkulturtechnik		
Applies to the Study Programmes: Insect Biotechnology and Bioresources, Master (2.);		
Prerequisites for Participation: None		
Learning Outcomes: Lecture/Exercises: The students show competences in: <ul style="list-style-type: none"> • basics concerning prokaryotic and eukaryotic cells and enzymes in biotechnological processes • essential mathematical model concepts to gather cell growth and metabolism • special aspects of fermentation processes and bioreactors • basics of essential unit operations of downstream processes • basic possibilities of process design, characterization, description, and monitoring in up- and downstream of biotechnological production processes Lab work: The students learn: <ul style="list-style-type: none"> • the handling of bioreactors and their tools within the concept and application of cellular/ microbial cultivations • application of essential bioanalytical methods for cell growth and metabolism analysis • concepts of downstream operations 		
Module Content: Lecture/Exercises: <ul style="list-style-type: none"> • Industrial application of microbial and cell cultures, enzymes • Process kinetics • Batch-, Fed-batch and continuous processes, models and kinetics • Heat and mass transfer including the combination with biological reactions • Bioreactors and their choice • Sterilisation: technologies, construction, hygienic design • Methods of cell separation and product purification (lysis, sedimentation, centrifugation, filtration, chromatography, extraction) Lab work: <ul style="list-style-type: none"> • Bioreactor cultivation including process monitoring • Exemplary downstream processing with various tools • Presentation and discussion of results within the seminar 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	60
Seminar		
Practical training	20	40
Exercises	10	20
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment written examination – Components of final grade Written examination (100 %) – Form of module retake examination Written examination 		
Language: English		