

Winter Semester 2020/21

Module Directory

Faculty 09 - Agricultural Sciences, Nutritional Sciences and Environmental
Management

English Profile Modules for International Master Degree
Courses

Please consult the timetable or current university calendar 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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MP 007	MP 007 Internationale Ernährungssicherung II	6 CP
	International Nutrition Security II	
Optional Module	Agrarwissenschaften, Ökotrophologie und Umweltmanagement / Dekanat	1.-4. Sem.;
	Offered for the first time: SS 2016	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Studiendekanat		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: Keine (empfohlen: ernährungswissenschaftliche Grundkenntnisse)		
Learning Outcomes: Die Studierenden <ul style="list-style-type: none"> • können das Management verschiedener Fehlernährungsformen benennen und einordnen (Marasmus und Kwashiokor sowie und Mikronährstoffmangelzuständen), • können anthropometrische Verfahren zur Diagnostik von Malnutrition benennen und hinsichtlich ihrer Bedeutung im Rahmen von Public Health Maßnahmen abgrenzen • können die Voraussetzungen für Ernährungssicherheit für Länder und Regionen analysieren und Empfehlungen zur Förderung der Ernährungssicherung aussprechen, • können die Ursachen und Problematik der ‚double and triple burden‘ der Mangelernährung benennen, • können die Indikation für Nahrungsmittelhilfe stellen, • können Projektaktivitäten hinsichtlich Ihrer potentiellen Wirksamkeit auf die Ernährungssicherung einer Region, eines Landes einordnen, präsentieren und überzeugend verteidigen. 		
Module Content: <ul style="list-style-type: none"> • Pathogenese, Klinik, Diagnostik und Management verschiedener Fehlernährungsformen in Niedrigeinkommensländern • soziale und politische Rahmenbedingungen für Ernährungssicherheit • Analysen, Richtlinien und Probleme der Nahrungsmittelhilfe • anthropometrische Messverfahren mit Übungen • Übungen zu Methoden der Ernährungserhebung in Ländern mit niedrigem Einkommen • Nahrungsmittelkunde tropischer Länder mit Exkursion in den botanischen Garten der JLU Giessen • Rhetorikübungen (Fünfsatz) zur Förderung der Standpunktbildung im Themenfeld der Ernährungssicherung • Gender-Aspekte der Ernährungssicherung • Erarbeitung von Projekten der Entwicklungszusammenarbeit zur Förderung der Ernährungssicherung oder eines Forschungsvorhaben der Ernährungssicherung • Besuch von Vertreterinnen und Vertretern aus Einrichtungen der Entwicklungszusammenarbeit 		

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:		
<ul style="list-style-type: none"> – Form(s) of assessment: Klausur und Vortrag mit schriftlicher Ausarbeitung – Components of final grade: Klausur (50 %), Vortrag mit schriftlicher Ausarbeitung (50 %) – Form of module retake examination: Klausur oder mündliche Prüfung 		
Language: Deutsch (50%) / Englisch (50%)		

MP 020	MP 020 Plant Breeding: Special Topics of Resistance and Quality Breeding	6 CP
	Plant Breeding: Special Topics of Resistance and Quality Breeding	
Optional Module	Agrarwissenschaften, Ökotoxologie und Umweltmanagement / Institut für Pflanzenbau und Pflanzenzüchtung I	2. Sem.;
	Offered for the first time: SS 2016	
	Intake capacity: not limited	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Pflanzenzüchtung		
Applies to the Study Programmes: Profil, Master (2.); Profil englisch, Master (2.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • will obtain profound knowledge about the breeding goals regarding disease resistances and quality aspects of important European crops • will obtain profound knowledge about essential methods to record the respective resistance and quality attributes • will obtain knowledge about how to realize breeding goals in the breeding process depending on the genetics and inheritance of the respective trait • will obtain knowledge about the application of biotechnological, gene technological and molecular-biological tools with respect to optimising resistance and quality parameters of important agricultural crops 		
Module Content: <ul style="list-style-type: none"> • natural diversity and genetics of resistance against the most important pests of major European crops • detection methods for resistance reactions in selected crops • detection methods for important quality parameters of selected crops • natural diversity and genetics of quality parameters (cereals, oil and protein plants) • methods to identify and increase genetic variation for important traits • methods of cell and tissue culture and their use in breeding for resistance and quality 		

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

Prerequisites for Examination: ...

Module Examination:

- Form(s) of assessment: Oral examination and seminar paper
- Components of final grade: Oral examination (80 %), seminar paper (20%)
- Form of module retake examination: Oral examination or written examination

Language: English

MP 029	MP 029 Plant-Microbe Interactions	6 CP
	Plant-Microbe Interactions	
Optional Module	Agrarwissenschaften, Ökotoxologie und Umweltmanagement / Institut für Phytopathologie	2./4. Sem.;
	Offered for the first time: SS 2016	
	Intake capacity: 60	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Phytopathologie		
Applies to the Study Programmes: Profil, Master (2./4.); Profil englisch, Master (2./4.);		
Prerequisites for Participation: None (recommended: basics in microbiology and phytopathology)		
Learning Outcomes: Students will <ul style="list-style-type: none"> • be familiar with interactions of parasitic and symbiotic biocenoses • be able to discuss the application of alternative measures for reduction of pesticide and chemical fertilizers • be familiar with concepts of modern interdisciplinary approaches to the use of microorganisms in disease control 		
Module Content: <ul style="list-style-type: none"> • physical and chemical conditions in the rhizosphere (pH, O₂, exudate gradients) • root pathogens (fungi, bacteria) • pest control strategies on roots • growth promotion of rhizospheric microorganisms (N₂ fixation, regulation of the nif gene, plant-promoting factors, mycorrhiza) • resistance mechanisms • possibilities and limitations of inoculation with VAM or N₂-fixing bacteria • interaction with beneficial microorganisms (PGPR, BCAs) • microbial interactions with lower plants (mosses, lichens, etc.) • methods for the study of uncultivable microorganisms on/in plant tissues 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	45	90
Seminar	15	30
Practical training		
Exercises		
Excursion		
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 (70 %), Presentation (30 %) – Form of module retake examination: Oral or written examination 		
Language: English		

MP 044	MP 044 Economy of Rural Institutions	6 CP
	Economy of Rural Institutions	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	3./4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: not limited	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Agrar- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (3./4.); Profil englisch, Master (3./4.);		
Prerequisites for Participation: None		
Learning Outcomes: Students will <ul style="list-style-type: none"> • have basic knowledge of the relationship between agriculture and society from perspectives of sociology and institutional economics • be able to recognize how human activity is determined in a social context, as well as how institutions are explained economically and socially • recognize the interactions between individuals and society and know methodical approaches to elucidating the structure of agrarian societies • be familiar with basic social issues in agrarian societies and be able to apply various social theories of work, land, credit, input markets 		
Module Content: <ul style="list-style-type: none"> • Foundations of & demands on agrarian institutions by transaction minimal costs • Efficient institutions and rural forms of organization • Work and land: theories of sharecropping and distribution of surplus • Land taxes: potentials and limitations in international comparison • Land policy and land reform, institutional regulation of rural credit markets • Water rights and technology • Comparison of agricultural law in various countries • Problems associated with institutional change • Institutional problems of agricultural transition in Eastern Europe • Interaction between individuals and societal institutions, • Theories of social stratification, community and society • Theories of social change and effects on the agricultural sector • Property and usage rights, property rights and rents • Theories of social justice and appropriation • Agrarian constitutions and labour regulations • Land access and regulations, land ownership • Rural behaviour, rural welfare systems in historical context • Traditional social safety nets • Peasantry and peasant behaviour, farming as a lifestyle 		

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:		
<ul style="list-style-type: none"> – Form(s) of assessment: Oral examination and presentation – Components of final grade: Oral examination (60%), presentation (40%) – Form of module retake examination: Oral examination 		
Language: English		

MP 075	MP 075 Host-Intestine-Microbe Interactions for Nutrition and Health	6 CP
	Host-Intestine-Microbe Interactions for Nutrition and Health	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Angewandte Mikrobiologie	2./4. Sem.;
	Offered for the first time: SS 2016	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Allgemeine und Bodenmikrobiologie		
Applies to the Study Programmes: Profil, Master (2./4.); Profil englisch, Master (2./4.);		
Prerequisites for Participation: None (recommended: basics knowledge in microbiology)		
Learning Outcomes: Students will: <ul style="list-style-type: none"> • have an overview over morphology and function of various digestive systems • have knowledge of commensalistic, mutualistic and pathogenic bacteria • understand the survival and adhering strategies of microbes in the intestine and the microbial primary and secondary metabolism (vitamin and toxin production) • understand the complexity of human microbiota also in relation to age, sex and disease • gain insight of the microbe interactions with epithel and paneth cells and about cell mediated immunity • become familiar with features of probiotic bacteria and bacteria causing food contamination • have practical experience with various microbial and molecular techniques to quantify and characterize bacteria. 		
Module Content: <ul style="list-style-type: none"> • Intestine systems of humans, ruminants and insects • Physiology and interactions of bacteria in the intestine • Knowledge on human microbiota based on latest publications • Cell mediated immunity • Methods for cultivation and identification of microorganisms 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	20	40
Seminar		
Practical training	70	50
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		

MP 076	MP 076 Laboratory Course: Tissue Culturing and Genetic Transformation	6 CP
	Laboratory Course: Tissue Culturing and Genetic Transformation	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Phytopathologie	1./3. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 30	
Frequency and Duration: WS, Block, 1 Semester		
Module Coordinator: Phytopathologie		
Applies to the Study Programmes: Profil, Master (1./3.); Profil englisch, Master (1./3.);		
Prerequisites for Participation: Molecular Phytopathology (MK 057), Plant Protection and Bioengineering (MK 015)		
Learning Outcomes: Students will <ul style="list-style-type: none"> • have practical knowledge of the methods, strategies, and laboratory techniques for plant and microbe transformation • be able to understand technical problems related to genetic transformation of crop plants, and identify the risks involved in this strategy • have fundamental knowledge in risk assessment, environment protection, farmer and consumer protection, and food security 		
Module Content: <ul style="list-style-type: none"> • guidance for the risk management of genetic engineered plant and microorganisms • practical training in plant transformation • practical training in microbe transformation techniques • practical training in tissue culturing techniques • practical training in detection of transgenes by molecular and cell biology techniques • practical training in confocal laser microscopy • practical training in transgene function assessment 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	5	10
Seminar	5	10
Practical training	50	100
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Oral examination, project work – Components of final grade: Oral examination (50%), project work (50%) – Form of module retake examination: Oral examination 		
Language: English		

MP 077	MP 077 Laboratory Course: Methods in Molecular Phytopathology	6 CP
	Laboratory Course: Methods in Molecular Phytopathology	
Optional Module	Agrarwissenschaften, Ökotoxologie und Umweltmanagement / Institut für Phytopathologie	1./3. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 30	
Frequency and Duration: WS, Block, 1 Semester		
Module Coordinator: Phytopathologie		
Applies to the Study Programmes: Profil, Master (1./3.); Profil englisch, Master (1./3.);		
Prerequisites for Participation: Molecular Phytopathology (MK 057), Plant Protection and Bioengineering (MK 015)		
Learning Outcomes: Students will <ul style="list-style-type: none"> • become acquainted with plant pathogenic organisms and will learn different inoculation techniques • learn laboratory techniques in molecular biology • know different biotechnological strategies in plant protection • broaden their knowledge of plant microbe interactions • gain knowledge about pathogen effector molecules and their targets in the host cell • gain knowledge about protein-protein interactions 		
Module Content: <ul style="list-style-type: none"> • practical training in detection methods of DNA, RNA and proteins • practical training in biotechnological plant protection strategies • practical training in bioinformatics related to sequence similarities and diagnostic matter • practical training in inoculation methods and disease assessment • practical training in detection of protein-protein interactions 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	5	10
Seminar	5	10
Practical training	50	100
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Presentation and project work – Components of final grade: Presentation (50%), project work (50%) – Form of module retake examination: Oral examination 		
Language: English		

MP 087	MP 087 Global Nutrition and Agriculture	6 CP
	Global Nutrition and Agriculture	
Optional Module	Agrarwissenschaften, Ökotrophologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: non limited	
Frequency and Duration: WS, 1 semester		
Module Coordinator: Agrar- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • know the determinants of food and nutrition security, • are able to make estimates of the regional food requirements and the carrying capacity, • are able to overlook the associations between health and nutrition, • have an overview about structures and strategies of nutrition promotion. 		
Module Content: <ul style="list-style-type: none"> • global nutrition a challenge for agricultural development • food requirements, natural resources and population • regional potential of food production • technology development, institutions and human capital • sectoral development strategies, agriculture and nutrition • commercialisation of agriculture, cash-crop- vs. food-crop-debate • international labour division and nutrition security • nutrition security and health • migration and malnutrition • cultural, economic and social determinants of nutrition • breastfeeding and nutrition security • nutrition security and food aid • development aid approaches • international organisations for nutrition security and agricultural development <p>Excursion to Rome or Geneva (participation optional)</p>		

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:		
<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		

MP 090	MP 090 Biotechnology for Pest Control	6 CP
	Biotechnology for Pest Control	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	1./3. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 40	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Insektenbiotechnologie im Pflanzenschutz		
Applies to the Study Programmes: Profil, Master (1./3.); Profil englisch, Master (1./3.);		
Prerequisites for Participation: None (recommended: basic knowledge in zoology, biotechnology, and genetics)		
Learning Outcomes: Students will <ul style="list-style-type: none"> • get an introduction to insect biotechnology • learn about biotechnological applications of insect-derived bioresources in medicine, agriculture, and industry • learn about the importance of genetic and epigenetic tools in model insect species • learn about diseases transmitted by insects and comparative genomic analysis • learn to synthesize and prepare the seminar work on insect biotechnology and molecular entomology 		
Module Content: <ul style="list-style-type: none"> • concepts of insect biotechnology and relevant basics in insect immunity, physiology and epigenetics • application of insect-derived bioresources in medicine, agriculture and industry • a detailed view on environment friendly methods of pest control including molecular, transgenic and gene editing technologies 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	36	72
Seminar	24	48
Practical training		
Exercises		
Excursion		
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: Oral examination or written examination or presentation 		
Language: English		

MP 097	MP 097 Microbial Diagnostics	6 CP
	Microbial Diagnostics	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Angewandte Mikrobiologie	3./4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Mikrobiologie der Recycling-Prozesse		
Applies to the Study Programmes: Profil, Master (3./4.); Profil englisch, Master (3./4.);		
Prerequisites for Participation: None (recommended: Angew. und Umweltmikrobiologie (BK 034) and/or Lebensmittelmikrobiologie (BP 092))		
Learning Outcomes: Students <ul style="list-style-type: none"> • will have detailed knowledge of the fundamentals of microbial diagnostics • will learn methods of quantification and qualification of bacteria with cultivation-dependent and cultivation-independent methods 		
Module Content: <ul style="list-style-type: none"> • microbiological diagnostics (conventional and molecularbiological methods in the context of quality management measures), microbial contamination of food and the environment, in everyday life and in the working environment (legal foundations and standards) • quantification and qualification of biotechnologically important microorganisms; identification of bacteria with conventional and molecularbiological methods; enzyme detection, bacteriological analyses in the context of microbiological quality control 		

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:		
<ul style="list-style-type: none"> – Form(s) of assessment: Presentation, written examination – Components of final grade: Presentation (20 %), written examination (80 %) – Form of module retake examination: Written examination 		
Language: English		

MP 098	MP 098 Molecular Plant Breeding	6 CP
	Molecular Plant Breeding	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Pflanzenbau und Pflanzenzüchtung I	1.-4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Pflanzenzüchtung		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: Biotechnology and Genomics (MK 016) / (recommended: Plant Breeding: Special Topics of Resistance and Quality Breeding (MP 020))		
Learning Outcomes: The students <ul style="list-style-type: none"> • will gain practical and/or theoretical experience in DNA and RNA extraction and analysis techniques, PCR, genetic mapping and QTL analysis, DNA hybridisation, gene expression and next-generation sequencing • will learn practical applications of biotechnological and molecular genetic methods in plant breeding • will obtain the necessary practical background to apply experimental molecular genetics, biotechnological and gene technological methods in plant breeding 		
Module Content: <ul style="list-style-type: none"> • DNA extraction and quantification • Polymerase chain reaction (PCR) • Agarose and polyacrylamide gel electrophoresis • Next-generation DANN sequencing • Molecular marker analysis, genome mapping and QTL analysis • DNA filter hybridisation, genome libraries • Quantitative real-time PCR • New methods of gene technology in plant breeding: Genome editing, cis-genestics 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	30
Seminar		
Practical training	40	80
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Oral examination and project work – Components of final grade: Oral examination (50 %), project work (50 %) – Form of module retake examination: Oral exam 		
Language: English		

MP 100	MP 100 Bioinformatics	6 CP
	Bioinformatics	
Optional Module	Agrarwissenschaften, Ökotoxologie und Umweltmanagement / Institut für Pflanzenbau und Pflanzenzüchtung II	1.-4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 60	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Biometrie und Populationsgenetik mit dem Schwerpunkt Bioinformatik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: Angewandte Statistik (MK 062) oder Biostatistics and Experimental Design (MK 002)		
Learning Outcomes: Students <ul style="list-style-type: none"> • know the concept of random variates and probability distributions • understand the basics of statistical test and estimation theory • can apply tests to bioinformatics data • have basic knowledge about the analysis of high dimensional data sets 		
Module Content: <ul style="list-style-type: none"> • Probability theory • Test theory • Data and control structures in R • Statistical tests with R and Bioconductor • Visualisation of high dimensional data 		

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) or written examination – Components of final grade: Assignments (100 %) or written examination (100%) – Form of module retake examination: Written examination 		
Language: English		

MP 126	MP 126 Selection for disease resistance in farm animals	6 CP
	Selection for Disease Resistance in Farm Animals	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Tierzucht und Haustiergenetik	3./4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Haustier- und Pathogenetik		
Applies to the Study Programmes: Profil, Master (3./4.); Profil englisch, Master (3./4.);		
Prerequisites for Participation: None (recommended: enhanced knowledge of genetics and molecular genetics; e. g.: Biotechnology and Genomics (MK 016), Molekulare Tierzucht und Biotechnologie (MK 021))		
Learning Outcomes: The students <ul style="list-style-type: none"> • will know phenotypic parameters and molecular mechanisms underlying genetic differences in disease susceptibility • will have practical experience in sample collection, laboratory and data analysis • will be able to assess different strategies for identification of indirect and direct markers for disease susceptibility • will be able to evaluate scientific research projects on disease resistance in farm animals 		
Module Content: <ul style="list-style-type: none"> • barriers of infections, innate and acquired immunity • genetics of disease susceptibility • phenotypic parameters for diagnosis of host infection/susceptibility status • practical exercises: sample collection from farm animals (e. g. sheep, cattle), laboratory analysis of phenotypic parameters for infection/susceptibility status, genetic analysis (genotyping of markers) data analysis (phenotyping and genotyping data, genome-wide association analysis) • strategies for identification of indirect and direct genetic markers for disease resistance 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	60
Seminar	15	30
Practical training		
Exercises	15	30
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination: – Form(s) of assessment: Assignments and written examination (optionally in English or in German language) – Components of final grade: Assignments (20 %), written examination (80 %) – Form of module retake examination: Written examination		
Language: English		

MP 145	MP 145 Methods of Regional Analysis and Planning	6 CP
	Methods of Regional Analysis and Planning	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: WS 2015/16	
	Intake capacity: not limited	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Marktlehre der Agrar- und Ernährungswirtschaft		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: Students will <ul style="list-style-type: none"> • recognize the necessity and purpose of demarcation and differentiations of rural regions • have knowledge of the major methods of region differentiation • know key analytic parameters for describing regional structures • be able to apply quantitative methods for the analysis and forecasting of regional developments • recognize the necessity of evaluation within the scope of regional and environmental planning • be able to assess the advantages and disadvantages of various evaluation methods • be able to select and apply adequate evaluation methods for various regional and environmental Planning • consider the basics of project management 		
Module Content: <ul style="list-style-type: none"> • principles of regional grouping and differentiation • methods of regional demarcation • statistical parameters of regional analysis • complex indicators for describing regional structures • methods of regional structural analysis • regional models • foundations of welfare theory • evaluation methods • application of evaluation methods to examples of regional and environmental planning • project management in regional and environmental planning 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	40	80
Seminar		
Practical training		
Exercises	20	40
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Written examination, paper – Components of final grade: Written examination (80 %), paper (20 %) – Form of module retake examination: Oral examination 		
Language: English		

MP 149	MP 149 Molecular Techniques	6 CP
	Molecular Techniques	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	1./3. 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: Profil, Master (1./3.); Profil englisch, Master (1./3.);		
Prerequisites for Participation: None (knowledge in genetics recommended)		
Learning Outcomes: The students <ul style="list-style-type: none"> • have a basic knowledge of molecular biology, • know important vector and plasmid systems • know important molecular pathways as well as cloning strategies • have a good knowledge of molecular techniques used in insect biotechnology • can independently compile, summarize and present literature on a given topic in a lecture 		
Module Content: <ul style="list-style-type: none"> • Fundamentals in molecular biology • History and evolution of plasmids and DNA cloning • Molecular biology and their benefits in biotechnology • Transformation possibilities and transgenesis in insects • "From plasmids to biotechnologically modified insects" • Current molecular tools in insect biotechnology and their risk assessment 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	28	56
Seminar	24	48
Practical training		
Exercises	8	16
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 or oral examination 		
Language: English		

MP 150	MP 150 Milestones of Insect Biotechnology & Bioresources	6 CP
	Milestones of Insect Biotechnology & Bioresources	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	2./4. Sem.;
	Offered for the first time: SS 2018	
	Intake capacity: 40	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Insektenbiotechnologie im Pflanzenschutz		
Applies to the Study Programmes: Profil, Master (2./4.); Profil englisch, Master (2./4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • have an overview of currently discussed relevant topics in science and industry in the field of insect biotechnology • have an overview of currently discussed relevant topics in science and industry in the field of bioresources • Get an overview of research and presentation of current relevant publications and discussion within the context of the lecture, classification of potential industrial and social relevance 		
Module Content: <ul style="list-style-type: none"> • Discussion of regulatory and ethical topics on the use of insect biotechnology and the generation of novel products for pest control and human health • presentation and discussion of currently important topics in insect biotechnology & bioresources • literature research and presentation of currently relevant topics in pharmaceutical and industrial biotechnology based on publications 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	54	108
Seminar		
Practical training		
Exercises		
Excursion	6	12
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 or oral examination 		
Language: English		

MP 151	MP 151 Antibiotics: Present, Past and Future	6 CP
	Antibiotics: Present, Past and Future	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie	2.-4. Sem.;
	Offered for the first time: WS 2018/19	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Naturstoffforschung mit Schwerpunkt Insektenbiotechnologie		
Applies to the Study Programmes: Profil, Master (2.-4.); Profil englisch, Master (2.-4.);		
Prerequisites for Participation: Natural Product Discovery Platforms (MK 090)		
Learning Outcomes: The students <ul style="list-style-type: none"> • get comprehensive insight into the main chemical classes of antibiotics used in human and veterinary medicine as well as for agricultural applications. 		
Module Content: <ul style="list-style-type: none"> • Main chemical classes (β-lactams, tetracyclins, aminoglycosides, macrolides, peptide antibiotics, 'hybrid' structures, others) of antibiotics used in human and veterinary medicine as well as for agricultural applications; • Microbial secondary metabolism as the primary source of antibiotics, including biosynthesis of the most important classes; • Modes of action and target sites of important classes of antibiotics; • Resistance to antibiotics and novel strategies to overcome antibiotic resistance; • Optimizing the effectiveness of antibiotics by chemical and biosynthetic modification (partial synthesis, precursor-directed biosynthesis etc.); • Design & optimization of antibiotic fermentation processes; • History of antibiotic research and to antimicrobial metabolites from other than microbial sources; 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	48	96
Seminar	12	24
Practical training		
Exercises		
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 examination (50 %), presentation (20 %), project work (30 %) – Form of module retake examination: Written examination 		
Language: English		

MP 153	MP 153 Instrumental, Biochemical and Trace Analytical Methods in Food Analysis	6 CP
	Instrumental, Biochemical and Trace Analytical Methods in Food Analysis	
Optional Module	Biologie und Chemie / Institut für Lebensmittelchemie und Lebensmittelbiotechnologie	3. Sem.;
	Offered for the first time: WS 2017/18	
	Intake capacity: 11	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Lebensmittelchemie		
Applies to the Study Programmes: Profil englisch, Master (3.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • learn sophisticated analytical procedures used in the working groups of the Institute of Food Chemistry and Food Biotechnology • gain detailed knowledge of analytical quality assurance and GLP • present their research results in form of a protocol 		
Module Content: <ul style="list-style-type: none"> • Research-related methods of modern food chemistry • Food Chemical trace- and other high-performance analytical methods • Electrophoretic techniques • Methods in molecular biology 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture		
Seminar	6	12
Practical training	108	54
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Project work – Components of final grade: Project work (100 %) – Form of module retake examination: Revision of the project work within 4 weeks 		
Language: English		

MP 154	MP 154 Method Development in Food Analysis and Food Biotechnology		6 CP
	Method Development in Food Analysis and Food Biotechnology		
Optional Module	Biologie und Chemie / Institut für Lebensmittelchemie und Lebensmittelbiotechnologie		2./4. Sem.;
	Offered for the first time: SS 2018		
	Intake capacity: 11		
Frequency and Duration: SS, 1 Semester			
Module Coordinator: Lebensmittelchemie			
Applies to the Study Programmes: Profil englisch, Master (2./4.);			
Prerequisites for Participation: None			
Learning Outcomes: The students <ul style="list-style-type: none"> • learn analytical procedures used in the working groups of the Institute of Food Chemistry and Food Biotechnology • develop and establish new experiments for practical courses • gain detailed knowledge of analytical quality assurance and GLP • present their research results in the form of a protocol 			
Module Content: <ul style="list-style-type: none"> • basic methods used in modern food analysis • gravimetric, photometric, chromatographic and titrimetric methods • Analysis of available databases and literature 			
Forms of Instruction:	Contact hours	Preparation and follow-up work	
Lecture			
Seminar	6	12	
Practical training	108	54	
Exercises			
Excursion			
Total:	180		
Prerequisites for Examination: ...			
Module Examination: – Form(s) of assessment: Project work – Components of final grade: Project work (100 %) – Form of module retake examination: Revision of the project work within 4 weeks			
Language: English			

MP 156	MP 156 Laboratory Course I		6 CP
	Laboratory Course I		
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Insektenbiotechnologie		1.-4. Sem.;
	Offered for the first time: WS 2017/18		
	Intake capacity: not limited		
Frequency and Duration: WS and SS (blockmodule), 1 Semester			
Module Coordinator: Angewandte Entomologie			
Applies to the Study Programmes: Profil englisch, Master (1.-4.); Profil, Master (1.-4.);			
Prerequisites for Participation: see http://www.uni-giessen.de/fbz/fb09/institute/iib/ibp/Teaching/mp156			
Learning Outcomes: The students <ul style="list-style-type: none"> • acquire specific research-relevant laboratory knowledge • improve their cooperative work skills across groups 			
Module Content: <ul style="list-style-type: none"> • cooperation with different work groups • training of modern laboratory techniques and autonomous lab work in specialized topics • topic specific literature research and presentation 			
Forms of Instruction:	Contact hours	Preparation and follow-up work	
Lecture			
Seminar	10	10	
Practical training	80	30	
Exercises		50	
Excursion			
Total:		180	
Prerequisites for Examination: ...			
Module Examination: <ul style="list-style-type: none"> – Form(s) of assessment: Presentation or protocol – Components of final grade: Presentation (100 %) or protocol (100 %) – Form of module retake examination: Presentation or protocol 			
Language: English			

MP 157	MP 157 Laboratory Course II		6 CP
	Laboratory Course II		
Optional Module	Fachbereich/Institut		1.-4. Sem.;
	Offered for the first time: WS 2017/18		
	Intake capacity: not limited		
Frequency and Duration: WS and SS (blockmodule), 1 Semester			
Module Coordinator: ...			
Applies to the Study Programmes: Profil englisch, Master (1.-4.); Profil, Master (1.-4.);			
Prerequisites for Participation: see http://www.uni-giessen.de/fbz/fb09/institute/iib/ibp/Teaching/mp156			
Learning Outcomes: The students <ul style="list-style-type: none"> • acquire specific research-relevant laboratory knowledge • improve their cooperative work skills across groups 			
Module Content: <ul style="list-style-type: none"> • cooperation with different work groups • training of modern laboratory techniques and autonomous lab work in specialized topics • topic specific literature research and presentation 			
Forms of Instruction:	Contact hours	Preparation and follow-up work	
Lecture			
Seminar	10	10	
Practical training	80	30	
Exercises		50	
Excursion			
Total:		180	
Prerequisite for Examination: ...			
Module Examination: – Form(s) of assessment: Presentation or protocol – Components of final grade: Presentation (100 %) or protocol (100 %) – Form of module retake examination: Presentation or protocol			
Language: English			

MP 158	MP 158 Insects for Food and Feed Production Systems		6 CP
	Insects for Food and Feed Production Systems		
Optional Module	Fachbereich/Institut		1.-4. Sem.;
	Offered for the first time: WS 2018/19		
	Intake capacity: 30		
Frequency and Duration: WS, 1 Semester			
Module Coordinator: ...			
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);			
Prerequisites for Participation: None			
Learning Outcomes: The students <ul style="list-style-type: none"> • learn analytical procedures used in the area of food and feed • gain insight into processing systems for food production • learn to identify edible insects and get information about their morphology, physiology, and ecology • gain knowledge on strategies to convert waste to food • present their research results in the form of a seminar talk 			
Module Content: <ul style="list-style-type: none"> • basic methods used in modern food analysis • Analysis of available databases and literature for suitable insects, protein requirements and improved waste management 			
Forms of Instruction:	Contact hours	Preparation and follow-up work	
Lecture	42	84	
Seminar	18	36	
Practical training			
Exercises			
Excursion			
Total:	180		
Prerequisite for Examination: ...			
Module Examination: – Form(s) of assessment: Written examination and presentation – Components of final grade: Written examination (50%), presentation (50%) – Form of module retake examination: Written examination			
Language: English			

MP 163	MP 163 Python for Environmental Scientists	6 CP
	Python for Environmental Scientists	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Landschaftsökologie und Ressourcenmanagement	1.-4. Sem.;
	Offered for the first time: WS 2018/19	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Landschafts-, Wasser- und Stoffhaushalt		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • understand the basic concepts of Python, • can work with data from different sources and formats, • know common scientific Python packages and what they are used for, • can perform basic time series analysis, • can create graphics for environmental data, • can perform basic statistics in Python. 		
Module Content: <ul style="list-style-type: none"> • Basic concepts of Python • Scientific Python packages like numpy, matplotlib, pandas • Using data from different formats • Plotting in Python • Time series analysis in Python • Statistics in Python 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	15	30
Seminar		
Practical training		
Exercises	45	90
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Assignments and presentation – Components of final grade: Assignments (50 %), presentation (50 %) – Form of module retake examination: Failed individual projects will be re-examined after 4 weeks 		
Language: English or German		

MP 175	MP 175 Effect-directed Analysis by HPTLC-Assay-HRMS	6 CP
	Effect-directed Analysis by HPTLC-Assay-HRMS	
Optional Module	Agrarwissenschaften, Ökotoxikologie und Umweltmanagement / Institut für Ernährungswissenschaft	1.-4. Sem.;
	Offered for the first time: WS 2018/19	
	Intake capacity: 12	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Lebensmittelwissenschaften		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: Keine		
Learning Outcomes: The students <ul style="list-style-type: none"> • understand the meaning of effect-directed analysis and possible techniques, • know the advantages and disadvantages of the different techniques, • survey the variety of in situ assays (in the adsorbent bed), • experience the fast effect-directed profiling (2-15 min/sample), • recognize the efficient combination of planar chromatography with biological and biochemical assays, • realize the power of hyphenated high-performance thin-layer chromatography (HPTLC), • know the streamlined workflow on one plate, • separate complex samples in parallel, discover active compounds and characterize these, • transfer the knowledge gained to a new assay to be outlined in a subsequent project work. 		
Module Content: <ul style="list-style-type: none"> • Theoretical basics of the different options for the performance of effect-directed analysis, • Benefits of coupling the different assays with HPTLC, • Different options for couplings to mass spectrometry (MS), • Training in the straightforward workflow of HPTLC-UV/Vis/FLD-assay-MS, • Performance of a specific assay type on each of the five practical days: <ol style="list-style-type: none"> 1. Antimicrobials against Gram-negative bacteria via <i>Aliivibrio fischeri</i> bioassay, 2. Antimicrobials against Gram-positive bacteria via <i>Bacillus subtilis</i> bioassay, 3. Hormone-effective compounds via planar yeast estrogen/androgen screen (pYES/pYAS), 4. Enzyme inhibitors via cholinesterase/tyrosinase assay, 5. Enzyme inhibitors via α/β-glucosidase/amylase assay, • Project work: Task to outline a new assay for transfer or application on the plate. 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	35	50
Seminar		
Practical training	25	70
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Written examination and project work – Components of final grade: Written examination (60 %), project work (40%) – Form of module retake examination: Written examination and revision of the project work within 4 weeks 		
Language: English		

MP 176	MP 176 Food Systems	6 CP
	Food Systems	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Pflanzenbau und Pflanzenzüchtung II	1.-4. Sem.;
	Offered for the first time: WS 2020/21	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Ökologischer Landbau mit dem Schwerpunkt nachhaltige Bodennutzung		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • Can apply inter- and transdisciplinary research approaches (e.g. participatory research, action research) • Can analyse their own food systems • Know about best practices of sustainable food system components • Are able to critically examine food systems and suggest improvements • Are able access and address a topic by means of scientific methodologies 		
Module Content: <ul style="list-style-type: none"> • Widening the focus from farming/agroecosystems to food systems • Methods to assess the sustainability of different food systems • Components of sustainable food systems (agricultural production, transformation, logistics, ...) • Food system innovations (e.g. Food Policy Councils, Community Supported Agriculture, Food Saving) • Discussions with local food system stakeholders • Writing and presenting own contributions to the given topics 		

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

MP 178	MP 178 Empirical Research Methods for Natural Resource Analysis	6 CP
	Empirical Research Methods for Natural Resource Analysis	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Landschaftsökologie und Ressourcenmanagement	1.-4. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 30	
Frequency and Duration: SS (Block), 1 Semester		
Module Coordinator: Landschaftsökologie und Landschaftsplanung		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None (Basic knowledge of statistics/empirical research methods recommended)		
Learning Outcomes: The students <ul style="list-style-type: none"> • Will know best practice examples of empirical research designs • Know how to analyse and interpret multivariate statistics (ordination methods) • Know how to classify data (cluster analysis) • Handle data in the R environment to analyse their own data • Will be able to write a scientific research report 		
Module Content: <ul style="list-style-type: none"> • Tutorials in small groups working on exemplary data of empirical research on natural resources • Developing own sampling strategy for field research • Own data collection • Multivariate analysis of data • Writing a research report 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	20	40
Seminar		
Practical training		
Exercises	40	80
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination: – Form(s) of assessment: Presentation and written assignment – Components of final grade: Presentation (30 %), written assignment (70 %) – Form of module retake examination: Written assignment		
Language: English		

MP 179	MP 179 Natural Resources and Ecosystem Services	6 CP
	Natural Resources and Ecosystem Services	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Landschaftsökologie und Ressourcenmanagement	1.-4. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Landschafts-, Wasser- und Stoffhaushalt		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None (Basic knowledge of environmental processes and GIS recommended)		
Learning Outcomes: The students <ul style="list-style-type: none"> • Understand the concept of ecosystem services • Know how to estimate ecosystem services using InVEST • Are able to assess and evaluate natural resources with regard to multiple ecosystem services for an individual project 		
Module Content: <ul style="list-style-type: none"> • Introduction to the concept of supporting, regulating, provisioning and cultural ecosystem services • Identification and understanding of multiple ecosystem services provided by different ecosystems • Repetition of GIS using ArcGIS software • Learning how to use and analyse spatial datasets with InVEST • Evaluate and use results in the frame of a decision support analysis 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	20	40
Seminar		
Practical training		
Exercises	40	80
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Seminar paper and presentation – Components of final grade: Seminar paper (70 %), presentation (30 %) – Form of module retake examination: Failed individual projects will be re-examined after 4 weeks 		
Language: English		

MP 181	MP 181 Gender and Development	6 CP
	Gender and Development	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Dekanat	1.-4. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Studiendekanat		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • have profound knowledge of the covered subject areas • are able to identify, organize and analyze specialist literature about the topic/research question and can summarize and present the current state of research • are capable to prepare a selected topic independently, can write a paper about it and are able to present it • are able to take part in scientific discussions on the subject • are able to critically evaluate special research issues and take a substantiated position 		
Module Content: <ul style="list-style-type: none"> • Main definitions: Gender, (sustainable) development, diversity, intersectionality, human rights based approach, Gender Justice, Empowerment • Historical development of discourse (WID, GAD, Gender mainstreaming, MDG, SDG) • Personal experiences (considering the life cycle), Gender competence • Understanding gender dynamics: The power of Analysis • Gender analysis frameworks • Participatory approaches as a means to reflection and empowerment • Care economy, featuring time as a resource (UNRISD) • Heterodox feminist economics: Economic literacy and the 5 sector model by Louise Gubitzer as an analytical tool of the economy • Developing strategies, plans and monitoring systems to enhance gender justice at different levels (Global (UN), National, At local level) • Civil Society, Empowerment Movements, led by diverse women and men, • Identification of topics to be covered in the reader 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture		
Seminar	60	120
Practical training		
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Seminar paper or presentation and seminar paper – Components of final grade: Seminar paper (100 %) or presentation (40 - 60 %) and seminar paper (40 - 60 %) – Form of module retake examination: Revision of the seminar paper within 4 weeks 		
Language: German or english		

MP 184	MP 184 Democracy and Postcoloniality	6 CP
	Democracy and Postcoloniality	
Optional Module	Sozial- und Kulturwissenschaften / Institut für Politikwissenschaft	1.-4. Sem.;
	Offered for the first time: SS 2016	
	Intake capacity: Not limited	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Politische Theorie und Ideengeschichte		
Applies to the Study Programmes: Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • are introduced to normative theories of democracy with a focus on the classical canon of European and American Political Thought; • will gain knowledge of fundamental concepts in democratic theory, particularly political legitimacy, equality, participation and representation; • will broaden their knowledge beyond the classical canon of democratic theory by exploring feminist, non-Western, race critical, and postcolonial theories, criticisms, and models of democracy; • will deepen their understanding of recent debates about the crisis of democracy and will learn to discuss political, social, and economic challenges inherent to modern democracies in a postcolonial world. 		
Module Content: <ul style="list-style-type: none"> • Conceptions of Democracy in Modern Political Thought • The Classical and the Secret History of Democracy • The Moral and the Undemocratic Foundations of Democracy: Coloniality, Gender, Class, Race • Democracy and the Rule of Law, Human Rights, and Justice • Transnational, Global, and Cosmopolitan Democracy • Critics of Democracy within Western and non-Western Political Thought • Migration, Refugees, and the Limits of Democratic Citizenship • Problems of External Democracy Promotion • The Crisis of Liberal Constitutional Democracy and the Challenges of Authoritarianism, Populism, and Neoliberalism • Alternative Models of Democracy Beyond Liberalism and the Rule of Law (Abolition Democracy, Ecological Democracy, Radical Democracy, Politics of the Commons, etc.) • Democracy and Postcoloniality in the Global South and North 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture		
Seminar	30	150
Practical training		
Exercises		
Excursion		
Total:		180

Prerequisites for Examination: ...

Module Examination:

- Form(s) of assessment: Presentation and seminar paper or presentation and oral examination or presentation and written examination
- Components of final grade: Presentation (20 %), seminar paper (80 %) or presentation (20 %), oral examination (80 %) or presentation (20 %), written examination (80 %)
- Form of module retake examination:

Language: English

MP 185	MP 185 Renewable Energy Transition	6 CP
	Renewable Energy Transition	
Optional Module	Mathematik und Informatik, Physik, Geographie / Physik	1.-4. Sem.;
	Offered for the first time: SS 2018	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Physik		
Applies to the Study Programmes: Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students acquire <ul style="list-style-type: none"> • basic physics knowledge about energy production, transport, storage and consumption using fossil, nuclear and renewable sources • understanding of the options and problems of various energy systems, including their impact on global climate and the global carbon and water cycles • in-depth knowledge of renewable energy systems and their elements • ability to identify and address challenges in the transition phase of energy systems that are related to socio-economic and cultural factors 		
Module Content: <ul style="list-style-type: none"> • energy usage and conversion • fossil and nuclear power plants • climate change and acidification of oceans • potential of wind, solar, hydro and geothermal energies • energy transport and storage • interference of energy sectors for industrial, residential, thermal and mobility applications • socio-economic and cultural aspects and challenges related to energy scarcity and energy system transitions 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	36	72
Seminar	24	48
Practical training		
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Presentation, written exam – Components of final grade: Presentation (50%), written exam (50%) – Form of module retake examination: Oral exam 		
Language: English		

MP 187	MP 187 Climate Change and Development	6 CP
	Climate Change and Development	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: WS 2019/20	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: Students will <ul style="list-style-type: none"> • be aware of the international challenges in dealing with climate change, • understand the climate change risks in different developing regions, • be able to discuss the potential of climate change mitigation and adaptation strategies and ways to implement and finance them. 		
Module Content: <ul style="list-style-type: none"> • Coastal regions and islands under risk of flooding. • Migration and conflicts as possible consequences. • The potential for emissions reductions in emerging and developing countries. • The role of emerging economies like China and India. • Climate change and economic development in low income countries. 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	10	20
Seminar	50	100
Practical training		
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Seminar paper or seminar paper and presentation or presentation – Components of final grade: Seminar paper (100 %) or seminar paper (60 %) and presentation (40 %) or presentation (100 %) – Form of module retake examination: Seminar paper or seminar paper and presentation or presentation 		
Language: English		

MP 196	MP 196 Internship	12 CP
	Internship	
Optional Module	Agrarwissenschaften, Ökotrophologie und Umweltmanagement / Dekanat	1.-4. Sem.;
	Offered for the first time: WS 2019/20	
	Intake capacity: not limited	
Frequency and Duration: WS and SS, 1 Semester		
Module Coordinator: Studiendekanat		
Applies to the Study Programmes: Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The Students <ul style="list-style-type: none"> • gain in-depth experience as interns in future fields of activity and professions • have practical knowledge and skills from their internship companies and understand the connection between study and practice • concretise their personal career perspectives (career planning) 		
Module Content: <ul style="list-style-type: none"> • Development of future occupational fields • Practical experience in companies in the fields of agricultural sciences, environmental sciences, ecotrophology and nutritional sciences • Reflection on one's own practical professional activity 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture		
Seminar		
Practical training	360	
Exercises		
Excursion		
Total:	360	
Prerequisites for Examination: ...		
<p>Module Examination:</p> <ul style="list-style-type: none"> – Form(s) of assessment: Internship report (tasks, activities, acquired knowledge and skills, reflection). The report must be assessed as "passed". – Components of final grade: Formation of the module mark: ungraded performance – Form of module retake examination: Revision of the internship report (within 4 weeks) 		
Language: German or English		

MP 199	MP 199 Farming Systems in the Tropics	6 CP
	Farming Systems in the Tropics	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Pflanzenbau und Pflanzenzüchtung II	1.-4. Sem.;
	Offered for the first time: SS 2020	
	Intake capacity: 40	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Ökologischer Landbau mit dem Schwerpunkt nachhaltige Bodennutzung		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • Get insight knowledge about tropical geographical environment and the challenges associated with tropical farming. • Should know and understand the common well-define systems of crop classification, and the agronomic requirement influencing crop selection. • Define and identified the main farming systems in sub Saharan Africa (SSA), and to design a farming system model that will ensure optional utilization and conservation of available resources and effective recycling of farm residues within the system. • Distinguish farming systems from production systems, outline their advantages and disadvantages and apply the principle of organic agriculture, conservation agriculture, permaculture, agroforestry and integrated agriculture. • To know the need for farming system research, how is farming research is undertaken and issues and problems in farming system research • Know the different methods use in nutrient and water use efficiency analysis as well as their advantages and disadvantages 		
Module Content: <ul style="list-style-type: none"> • Tropical geographical environmental (climate, soil and biological features). • Challenges of tropical farming (soil fertility, risks and uncertainty, seasonality, labour, etc.). • Classification of agricultural crops (descriptive classification of crops, ecological classification, agronomic classification, horticultural classification, ornamental and plantation classification), and agronomic requirement influencing crop selection. • Farming systems in the tropics (definition of farming systems, dynamics of tropical farming systems, and main farming systems in the tropics). • Production systems in sub Saharan Africa (traditional agriculture, organic agriculture, conventional agriculture, integrated agriculture, conservation agriculture, agroforestry, and permaculture)- Principles, advantages and disadvantages. • Soil resource (nitrogen, phosphorous, water) recovery and use efficiency in organic and conventional farming systems. • Farming system research and development (agricultural ecology and farming systems research; characteristics of farming system research; principles guiding designing of farming system research; elements of system research i.e. disciplinarity, multi-disciplinarity, inter-disciplinarity and trans-disciplinarity; participatory on farm trial methods and analysis). • Practical work 1- Reflect on one of the farming systems in your country and formulate a farming system model involving main and allied enterprises that will sustain production system without damaging resources/environment. • Practical work 2-Term paper on water conservation and use efficiency in conventional organic farming systems 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture		
Seminar	40	80
Practical training		
Exercises	12	24
Excursion	8	16
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Project work and oral examination – Components of final grade: Project work (75 %), oral examination (25 %) – Form of module retake examination: Oral examination 		
Language: English		

MP 208	MP 208 Concepts of Ecological Economics	6 CP
	Concepts of Ecological Economics	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: SS 2020	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • know about ecological economics and political ecology as analytical concepts to assess challenges in the sustainable use of natural resources in the world, and especially natural resource use conflicts between different agents. • understand the difference between neo-classical economic models, environmental economics and ecological economics. • can explain the basic assumptions held in ecological economics • can identify work domain in which ecological economics is appropriate and formulation questions which can be answered by using approaches rooted in ecological economics. • know by name and by basic concept several different analytical methods used in ecological economics • know in-depth about one analytical methods and are in a position to convey their knowledge to peers 		
Module Content: <ul style="list-style-type: none"> • Introduction to ecological economics and position with regard to other neo-classical economics of natural resources • Context of use of ecological economics and history of development: conflicts in natural resource use • Main assumptions underlying ecological economics • Different methods and approaches used in ecological economics studies • Role of political aspects in the use of natural resources 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	20	40
Seminar	40	80
Practical training		
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Presentation with written assignment – Components of final grade: Presentation with written assignment (100 %) – Form of module retake examination: Revision of the written assignment or oral examination 		
Language: English		

MP 209	MP 209 Field-Work based Research in Socio-Economics	6 CP
	Field-Work based Research in Socio-Economics	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: WS 2019/20	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • are informed about the usual proposal structure • learn evaluation criteria for the quality of the proposal • are comfortable with the terms, research questions, empirical questions, main research hypothesis/claim, and research design. • practice in operationalizing the concepts in their own work and the work of others for the planning of research activities • learn about mixed methods and plan a research design for their proposal • reflect on writing for an audience • are introduced to thinking about the art of conducting research • practice peer-reviewing. • learn about good scientific practices regarding their field work in aspects of: <ul style="list-style-type: none"> ○ Organization ○ Ethics and data protection ○ Digital data collection for questionnaires. • can recognize ethical dilemmas in the conduction of research. 		
Module Content: <ul style="list-style-type: none"> • Inputs on proposal writing, research design and mixed methods, the role of the research, university guidelines for data management and ethical dilemmas. • Theatre techniques • to improve scientific communication • Individual work on the own research design and practice of peer-reviewing • Awareness on digital data collections • Student inputs on methods • Discussion and exchange among participants • Role plays 		

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

MP 210	MP 210 Land Governance for Sustainable Land Use in Africa	6 CP
	Land Governance for Sustainable Land Use in Africa	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time:	
	Intake capacity: 20	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • are able to identify and explain key issues with respect to land governance for sustainable land use in the context of African countries • are able to apply knowledge to multidisciplinary and practical problems on issues of access to land • are able to apply knowledge to multidisciplinary and practical problems on issues of land management • are able to identify and address challenges of land governance in the African context. 		
Module Content: <ul style="list-style-type: none"> • Access to land in Africa (land rights, land markets, land reform, social and human implications of the land reform) • Land management (impacts of land use, stakeholders, • Sustainable land management, land governance, case studies 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	54	108
Seminar	6	12
Practical training		
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Presentation and written exam – Components of final grade: Presentation (50 %), written exam (50 %) – Form of module retake examination: Written exam 		
Language: English		

MP 211	MP 211 Agriculture, Ecosystem Functioning and Climate Change	6 CP
	Agriculture, Ecosystem Functioning and Climate Change	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Landschaftsökologie und Ressourcenmanagement	1.-4. Sem.;
	Offered for the first time: WS 2020/21	
	Intake capacity: 30	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Landschaftsökologie und Landschaftsplanung		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • understand the importance of climatic conditions and effects of climate change for agricultural production and ecosystem functioning, • understand the biochemical processes in agriculture resulting in greenhouse gas emissions and carbon sequestration, • know how to quantify greenhouse gas emissions from agriculture on local to regional scales, • know measures in agriculture to mitigate and adapt to climate change 		
Module Content: <ul style="list-style-type: none"> • Abiotic controlling factors in agriculture and for ecosystem functioning • Biochemical processes of CO₂, nitrous oxide and methane release in agriculture • Calculation methods of greenhouse gas emissions from agriculture on various spatial scales • Climate as driver of biodiversity change • Climate mitigation and adaptation strategies in agriculture • CO₂ footprints of agricultural products 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	40	80
Seminar		
Practical training		
Exercises	20	40
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Written examination, presentation and written assignment – Components of final grade: Written examination (50 %), presentation (25 %), written assignment (25 %) – Form of module retake examination: Written examination 		
Language: English		

MP 214	MP 214 Econometrics & Modelling Applications	6 CP
	Econometrics & Modelling Applications	
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: SS 2020	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • gain deep knowledge about econometrics and economic modelling methods that are common in international, environmental and development economics; • know the application possibilities of different methods, the interpretation of results and their advantages and limitations; • are able to critically read and interpret scientific articles; • are able to write a methodology-based thesis on their own in the future. 		
Module Content: <ul style="list-style-type: none"> • US trade policy • EU climate policy • EU agricultural policy • agricultural or technology support for developing countries 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	8	16
Seminar	52	104
Practical training		
Exercises		
Excursion		
Total:	180	
Prerequisites for Examination: ...		
Module Examination:		
<ul style="list-style-type: none"> – Form(s) of assessment: Seminar paper and presentation – Components of final grade: Seminar paper (50 %), presentation (50 %) – Form of module retake examination: Revision of the seminar paper within 4 weeks 		
Language: English		

MP 215	MP 215 Regulation of Agricultural Value Chains	6 CP
	Regulation of Agricultural Value Chains	
Optional Module	Agrarwissenschaften, Ökotrophologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung	1.-4. Sem.;
	Offered for the first time: SS 2020	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik		
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • have in-depth knowledge of the discussed subject • know the theoretical basics of the field and know how to classify it • are able to apply their knowledge of research results and research methods to selected scientific issues • are capable to process advanced knowledge and to put it into practice 		
Module Content: <ul style="list-style-type: none"> • Food safety • Nutrition and health • Animal welfare • Environmental sustainability and organic farming • Agrobiotechnology • Digitalisation and innovation 		

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: ...		
<p>Module Examination:</p> <ul style="list-style-type: none"> – Form(s) of assessment: Written examination and project work or oral examination and project work or oral examination – Components of final grade: Written examination (50 %) and project work (50 %) or oral examination (50 %) and project work (50 %) or oral examination (100 %) – Form of module retake examination: Written examination or oral examination 		
Language: English		

MP 218	MP 218 The Economics of Nitrate Pollution		6 CP
	The Economics of Nitrate Pollution		
Optional Module	Agrarwissenschaften, Ökotropologie und Umweltmanagement / Institut für Agrarpolitik und Marktforschung		1.-4. Sem.;
	Offered for the first time: WS 2020/21		
	Intake capacity: 30		
Frequency and Duration: WS, 1 Semester			
Module Coordinator: Agrar-, Ernährungs- und Umweltpolitik			
Applies to the Study Programmes: Profil, Master (1.-4.); Profil englisch, Master (1.-4.);			
Prerequisites for Participation: None			
Learning Outcomes: The students <ul style="list-style-type: none"> • have in-depth knowledge of the discussed subject • know the theoretical basics of the field and know how to classify it • are able to apply their knowledge of research results and research methods to selected scientific issues • are capable to process advanced knowledge and to put it into practice 			
Module Content: <ul style="list-style-type: none"> • Theoretical and methodological concepts for the economic analysis of nitrate pollution • Specific emphasis on the topic of nitrate pollution from the perspective of (1) environmental economics, (2) institutional economics, (3) behavioral economics, and (4) innovation economics 			
Forms of Instruction:	Contact hours	Preparation and follow-up work	
Lecture	30	60	
Seminar			
Practical training	30	60	
Exercises			
Excursion			
Total:		180	
Prerequisite for Examination: ...			
Module Examination: <ul style="list-style-type: none"> – Form(s) of assessment: Written examination and project work or oral examination and project work or oral examination – Components of final grade: Written examination (50 %) and project work (50 %) or oral examination (50 %) and project work (50 %) or oral examination (100 %) – Form of module retake examination: Written examination or oral examination 			
Language: English			

THM 01	THM 01 Pharmaceutical Basics	6 CP
	Pharmaceutical Basics	
Core Module/ Optional Module	Technische Hochschule Mittelhessen / Institut für Bioverfahrenstechnik und Pharmazeutische Technologie	1./3. Sem.;
	Offered for the first time: WS 2017/18	
	Intake capacity: 16	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Biopharmazeutische Technologie und Biopharmazie		
Applies to the Study Programmes: Profil englisch, Master (1./3.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • have a basic knowledge in different dosage forms (solid, liquid, semi-solid) • can name properties, characterization and testing of dosage forms • can describe the requirements for medicinal product test according to Pharmacopeia • have an overview of rules and guidelines in the pharmaceutical industry • can name excipients and packing materials • apply to Pharmacopeia und pharmaceutical terms • can interpret laws, Rich lines and standards • designate the fundamentals of quality management 		
Module Content: <ul style="list-style-type: none"> • Fundamentals of drug morphology • Pharmacopeia and other standard work • Drug forms by Pharmacopeia • Excipients and active ingredients • Preparations of medical forms • Testing of the pharmaceutical quality • Fundamentals of quality management • Legal framework: DIN ISO, GMP-guideline • Cycle of quality control • Quality assurance program • Lab: making and testing of several dosage forms 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	40	40
Seminar	20	10
Practical training	40	30
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		

THM 02	THM 02 Quality Management	6 CP
	Quality Management	
Core Module / Optional Module	Technische Hochschule Mittelhessen / Institut für Bioverfahrenstechnik und Pharmazeutische Technologie	2./4. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 30	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Biopharmazeutische Technologie und Biopharmazie		
Applies to the Study Programmes: Profil englisch, Master (2./4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • can safely deal with the concepts and definitions of quality management • understand the meaning and importance of quality management • can perform and analyze risk assessments • know how to identify critical process steps • can accompany qualifications and validations in companies • can develop steps for risk reduction 		
Module Content: <ul style="list-style-type: none"> • Basic concepts for risk and quality management • Quality management systems (DIN ISO) • Strategies for handling and managing risks in manufacturing companies • Risk assessment by FMEA, HACCP, Kepner-Tregoe, FTA • Quality-related strategies (TQM, EFQM, TPM, KVP) • Further qualification and validation phases • Internal / external quality audits • certification 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture		
Seminar	45	90
Practical training		
Exercises	15	30
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		

THM 03	THM 03 Bioprocess Engineering II – Advanced	6 CP
	Bioprocess Engineering II – Advanced	
Core Module/ Optional Module	Technische Hochschule Mittelhessen / Institut für Bioverfahrenstechnik und Pharmazeutische Technologie	3. Sem.;
	Offered for the first time: WS 2017/18	
	Intake capacity: 12	
Frequency and Duration: WS, 1 Semester		
Module Coordinator: Bioverfahrenstechnik, Membrantechnologie und Zellkulturtechnik		
Applies to the Study Programmes: Profil englisch, Master (3.);		
Prerequisites for Participation: Bioprocess Engineering I (MK 093)		
Learning Outcomes: The students show knowledge in upstream processing: successful strategies for expression, expansion and product formation in different bioreaction-systems can be developed and ideally combined based on the competences gained in the core module concepts, possibilities, show knowledge in downstream processing: successful strategies for cell separation and product purification can be developed and ideally combined based on the competences gained in the core module know how to analyze, characterize and optimize developed processes, also in combination with mathematical operations know how to transfer, verify and optimize designed process steps into experiments and integrate them into the overall process concept		
Module Content: <ul style="list-style-type: none"> • Bioprocesses for the production of recombinant products with different expression systems • Advanced process analysis of bioreactor systems including system balances • Process description – kinetics, mass- and heat transfer • Downstream processing- advanced tools, concepts, choice, requirements • Application of modern software for design, development, modelling and simulation of complex bioreactor systems and biosynthesis for specific topics regarding the overall process including up- and downstream • Conceptual development of downstream processing for a certain topic • Transfer of the specific topics of up- and downstream processing based on the seminar into lab experiments • Presentation and discussion of the results within the seminar 		

Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	15	30
Seminar	30	60
Practical training	15	30
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		

THM 04	THM 04 Selected Chapters of Pharmaceutical & Industrial Biotechnology	6 CP
	Selected Chapters of Pharmaceutical & Industrial Biotechnology	
Core Module / Optional Module	Technische Hochschule Mittelhessen / Institut für Bioverfahrenstechnik und Pharmazeutische Technologie	2./4. Sem.;
	Offered for the first time: SS 2019	
	Intake capacity: 15	
Frequency and Duration: SS, 1 Semester		
Module Coordinator: Bioverfahrenstechnik, Membrantechnologie und Zellkulturtechnik		
Applies to the Study Programmes: Profil englisch, Master (2./4.);		
Prerequisites for Participation: None		
Learning Outcomes: The students <ul style="list-style-type: none"> • have an overview of currently discussed relevant topics in science and industry in the field of biotechnology • know how to research and present current relevant publications and discuss them within the context of the lecture, classification of potential industrial and social relevance 		
Module Content: <ul style="list-style-type: none"> • currently important topics in pharmaceutical and industrial biotechnology • literature research and presentation of currently relevant topics in pharmaceutical and industrial biotechnology based on publications 		
Forms of Instruction:	Contact hours	Preparation and follow-up work
Lecture	30	75
Seminar	15	60
Practical training		
Exercises		
Excursion		
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		

