

# Modulverzeichnis

**Master's degree programme "Crop Protection"  
- referring to: Prüfungs- und Studienordnung  
für den konsekutiven Master-Studiengang  
"Crop Protection" (Amtliche Mitteilungen  
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# Übersicht nach Modulgruppen

## I. Master-Studiengang "Crop Protection"

At least 120 C must be successfully completed within the following regulations.

### 1. Fachstudium

#### a. Pflichtmodule

The following compulsory modules worth overall 18 C must be successfully completed.

M.Cp.0002: Internship (9 C, 6 SWS).....	14738
M.Cp.0006: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides (6 C, 4 SWS).....	14741
M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration (6 C, 4 SWS).....	14742
M.Cp.0017: Scientific Presenting, Writing and Publishing in Crop Protection (3 C, 2 SWS).....	14751
M.Cp.0018: Journal Club on New Topics in Crop Protection (3 C, 2 SWS).....	14752
M.Cp.0019: Basic Laboratory Techniques (3 C, 2 SWS).....	14753

### 2. Professionalisierungsbereich

#### a. Wahlpflichtmodule

Elective compulsory modules worth at least 66 C must be successfully completed. Students can earn up to 18 C from elective modules from the other master study programmes of the faculty of agriculture, University of Goettingen. Furthermore, maximally one issue-specific module (at maximum worth 6 C) from another faculty can be chosen.

M.Agr.0003: Agribusiness Sugar Beet - an advanced education for graduate students and junior employees of the sugar supply chain (English) (6 C).....	14723
M.Agr.0009: Biological Control and Biodiversity (6 C, 6 SWS).....	14725
M.Agr.0010: Biotechnological Applications in Plant Breeding (6 C, 4 SWS).....	14726
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M.Cp.0004: Plant Diseases and Pests in Temperate Climate Zones (6 C, 4 SWS).....	14739
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M.Cp.0011: Agricultural Entomology Seminar (3 C, 2 SWS).....	14745
M.Cp.0012: Weed Biology and Weed Management (6 C, 4 SWS).....	14746
M.Cp.0014: Plant Nutrition and Plant Health (3 C, 2 SWS).....	14747
M.Cp.0015: Molecular Weed Science (6 C, 4 SWS).....	14748
M.Cp.0020: Ecotoxicological Risk Assessment for Plant Protection Products (3 C, 2 SWS).....	14754
M.Cp.0021: Plant Health Internship (6 C).....	14756
M.SIA.E13M: Microeconomic Theory and Quantitative Methods of Agricultural Production (6 C, 4 SWS).....	14757
M.SIA.P07: Soil and plant science (6 C, 4 SWS).....	14758
M.SIA.P15M: Methods and advances in plant protection (6 C, 4 SWS).....	14760
M.SIA.P22: Management of tropical plant production systems (6 C, 4 SWS).....	14761

## **b. Schlüsselkompetenzen**

Out of the following elective compulsory modules one module worth overall at least 6 C must be successfully completed.

M.Cp.0016: Practical Statistics and Experimental Design in Agriculture (6 C, 4 SWS).....	14750
M.WIWI-QMW.0004: Econometrics I (6 C, 6 SWS).....	14763

## **3. Masterarbeit**

Completion of the Master's thesis is worth 24 Credits.

## **4. Kolloquium zur Masterarbeit**

Successful completion of the colloquium for the Master's thesis is worth 6 Credits.

## **II. Double/Joint-Degree Programm "PlantHealth"**

At least 120 C must be successfully completed within the following regulations.

## 1. Erstes Studienjahr

At least 60 C must be successfully completed within the following regulations.

### a. Pflichtmodule

The following compulsory modules worth overall 27 C must be successfully completed:

M.Cp.0016: Practical Statistics and Experimental Design in Agriculture (6 C, 4 SWS).....	14750
M.Cp.0017: Scientific Presenting, Writing and Publishing in Crop Protection (3 C, 2 SWS).....	14751
M.Cp.0018: Journal Club on New Topics in Crop Protection (3 C, 2 SWS).....	14752
M.Cp.0019: Basic Laboratory Techniques (3 C, 2 SWS).....	14753
M.Cp.0004: Plant Diseases and Pests in Temperate Climate Zones (6 C, 4 SWS).....	14739
M.Cp.0005: Integrated Management of Pests and Diseases (6 C, 4 SWS).....	14740

### b. Wahlpflichtmodule

Out of the following elective compulsory modules four modules worth overall at least 27 C must be successfully completed.

M.Agr.0058: Plant herbivore interactions (6 C, 4 SWS).....	14732
M.Cp.0002: Internship (9 C, 6 SWS).....	14738
M.Cp.0006: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides (6 C, 4 SWS).....	14741
M.Cp.0012: Weed Biology and Weed Management (6 C, 4 SWS).....	14746
M.Cp.0014: Plant Nutrition and Plant Health (3 C, 2 SWS).....	14747
M.Agr.0094: Basics of Molecular Biology in Crop Protection (6 C, 4 SWS).....	14733

### c. Schlüsselkompetenzen

Licit modules comprising at least 6 C must be passed.

## 2. Zweites Studienjahr

At least 60 C must be successfully completed within the following regulations.

### a. Pflichtmodul

The following module comprising 6 C has to be passed.

M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration (6 C, 4 SWS).....	14742
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### b. Wahlpflichtmodule

Four of the following modules comprising 24 C have to be passed.

M.Agr.0058: Plant herbivore interactions (6 C, 4 SWS).....	14732
M.Cp.0008: Fungal Toxins (6 C, 4 SWS).....	14743
M.Agr.0023: Interactions between plants and pathogens (6 C, 4 SWS).....	14727
M.Agr.0039: Molecular Techniques in Phytopathology (6 C, 4 SWS).....	14728
M.Agr.0057: Plant Virology (6 C, 6 SWS).....	14731

### **c. Masterarbeit**

Completion of the Master's thesis is worth 24 Credits.

### **d. Kolloquium zur Masterarbeit**

Successful completion of the colloquium for the Master's thesis is worth 6 Credits.



<b>Georg-August-Universität Göttingen</b> <b>Module M.Agr.0003: Agribusiness Sugar Beet- an advanced education for graduate students and junior employees of the sugar supply chain (English)</b>	6 C
<b>Learning outcome, core skills:</b> To acquire profound knowledge in the following fields of the sugar value chain: breeding and other upstream sectors, technology of the sugar and bioethanol industry and biogas production, other downstream sectors, sugar market, agricultural policy. To identify in detail causal relationships in the process management sugar on the basis of recent scientific knowledge. To intensify the knowledge by interpreting scientific figures and tables and their statistics. To gain from the unique opportunity of an advanced education particularly suitable as an on-the-job training program. To take the opportunity of social networking with not only other graduate students but external participants from different professional backgrounds and sugar beet growing countries worldwide, too.	<b>Workload:</b> Attendance time: 54 h Self-study time: 126 h
<b>Course: Agribusiness Sugar Beet - an advanced education for graduate students and junior employees of the sugar supply chain (English)</b> (Block course, Lecture, Excursion) <i>Contents:</i> In comparison to other cash crops the refining of sugar from sugar beet is characterized by a considerable degree of cooperation between agriculture and food industry. Consequently all specific impacts of the entire production chain of sugar from beet are covered by this module as there are global trade, EU Reform of the Sugar Market Regime, systems for quota and paying, plant breeding, soil cultivation, growing impacts from sowing to harvest including all technical and cultivation aspects, crop yield, extension services, weed control, pathogen and pest management, as well as definition and analysis of the technical quality, processing technology of sugar beets, logistics of harvest and transportation, sugar as food and its marketing. The module consists of lectures by invited speakers and lecturers of the Institute of Sugar Beet Research, study and field trips.	
<b>Examination: Oral examination (approx. 30 minutes)</b> <b>Examination requirements:</b> M.Sc. after the 2nd semester or junior employees of supply chain.  Knowledge of the sugar value chain and understanding of different influences to the system on the basis of the latest scientific insights.	6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none
<b>Language:</b> English	<b>Person responsible for module:</b> apl. Prof. Anne-Katrin Mahlein
<b>Course frequency:</b> each summer semester	<b>Duration:</b> 2 Weeks
<b>Number of repeat examinations permitted:</b>	<b>Recommended semester:</b>

twice	
<b>Maximum number of students:</b> 25	

<b>Georg-August-Universität Göttingen</b>		6 C
<b>Module M.Agr.0009: Biological control and biodiversity</b>		6 WLH
<b>Learning outcome, core skills:</b> Gain an understanding of what biological control is and how it can be used effectively as part of an IPM system and how biodiversity contributes to control of pest populations and other ecosystem services.		<b>Workload:</b> Attendance time: 84 h Self-study time: 96 h
<b>Course: Biological Control and Biodiversity</b> (Lecture, Exercise, Seminar) <i>Contents:</i> <ul style="list-style-type: none"> <li>• Theoretical foundations of biological control</li> <li>• Natural enemy behaviour and biological control success</li> <li>• Biodiversity and ecosystem services in agroecosystems</li> <li>• Practical examples of biological control projects</li> <li>• Plant-herbivore-predator-interactions Principles of population dynamics</li> <li>• Biological weed control</li> </ul>		6 WLH
<b>Examination: Written exam (70%; 45 minutes) and presentation (30%; approx. 20 minutes)</b> <b>Examination prerequisites:</b> regular attendance at seminar and exercise and presentation of a seminar talk <b>Examination requirements:</b> Basic knowledge of the mechanisms of biological control of herbivorous insects; methodological approaches based on case examples; role of biodiversity for ecosystem processes and the population dynamic of herbivorous insects, multitrophic interactions between plants, herbivorous insects and their natural enemies; biodiversity and services of ecosystems.		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Michael Georg Rostás	
<b>Course frequency:</b> each winter semester; Göttingen	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>	
<b>Maximum number of students:</b> 12		
<b>Additional notes and regulations:</b> Lecture based materials; details provided during lectures.		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0010: Biotechnological Applications in Plant Breeding</b> <i>English title: Biotechnological applications in plant breeding</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students acquire theoretical and practical knowledge about fundamental plant biotechnological methods and their applications to contribute to solving actual problems in breeding of different crop species. Students learn to critically interpret scientific papers dealing with new biotechnological methods and applications.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Biotechnological Applications in Plant Breeding</b> (Blockveranstaltung, Praktikum, Vorlesung, Seminar) <i>Inhalte:</i> Basics and principles of plant biotechnology and molecular genetics are examined and explained in lectures. Biotechnological applications in plant breeding and agriculture are presented and discussed in accompanying seminars given by the students. Topics covered include in vitro-techniques for the mass-propagation of plants, direct and indirect gene transfer in plants, biochemical and molecular characterization of transgenic plants, safety aspects of gene technological applications, haploid production and utilization in plant breeding, sexual and somatic interspecific hybridization, classical mutagenesis (TILLING), site directed mutagenesis, Polymerase chain reaction (PCR), molecular marker types (RAPD, RFLP, AFLP, SSR, SNP) and their genetic characteristics and applications in Plant Breeding. Experiments and Demonstrations underlining the theory will be performed in the greenhouse and in the laboratory.		4 SWS
<b>Prüfung: Klausur (90 Minuten)</b> <b>Prüfungsanforderungen:</b> Profound and complex theoretical knowledge about fundamental methods and their applications in plant breeding.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Christian Möllers	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 12		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0023: Interactions between plants and pathogens</b> <i>English title: Interactions between Plants and Pathogens</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Understanding interactions between plants and pathogens from general concepts to selected examples on phenomenological, morphological, physiological and molecular levels. Critical appraisal of technical approaches, supported by own practical experiences from the laboratory.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Interaktionen zwischen Pflanzen und phytopathogenen Organismen sowie Viren (Praktikum, Vorlesung)</b> <i>Inhalte:</i> The course deals with interactions between host plants on one side and plant-pathogenic fungi, bacteria and viruses on the other side. The following topics are covered: Categorization of inter-specific interactions among organisms; general concepts of pathogenicity, virulence and avirulence including gene-for-gene hypothesis and its experimental proof. Example of known resistance genes. Resistance factors (preformed and induced); counteracting mechanisms including detoxification. Induced local and systemic resistance. Infection of plants by <i>Agrobacterium tumefaciens</i> and inter-kingdom gene transfer. Disease cycle of plant pathogenic fungi including host recognition, spore germination, penetration of plant surface, colonization of plant tissue, acquisition of nutrient, building biomass and dissemination of the pathogen.  In the practical part of the course, participants will extract phytoalexins from oilseed rape plants and learn chromatographic techniques for their detection and test their biological activity (HPLC-UV and TLC with bioautography detection).		4 SWS
<b>Prüfung: Klausur (90 Minuten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme am praktischen Teil des Moduls im Anschluss an die Vorlesung und Anfertigung eines von den Prüfenden inhaltlich akzeptierten Protokoll <b>Prüfungsanforderungen:</b> Understanding theoretical concepts treated in the lecture; knowledge of specific examples of pathosystems illustrating these concepts.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Birger Koopmann	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 36		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0039: Molecular Techniques in Phytopathology</b> <i>English title: Molecular Techniques in Phytopathology</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Technical skills in nucleic acid analysis techniques; ability to select adequate methods for a research project. Presentation and interpretation of the results.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Molecular Techniques in Phytopathology</b> (Praktikum, Vorlesung) <i>Inhalte:</i> With the help of laboratory experiments, basic molecular techniques will be taught, including the isolation of plasmids and total DNA as well as DNA fragments from electrophoretic agarose gels, cloning of PCR products (enzymatic modification, ligation), transformation and in vivo amplification of plasmids, DNA blotting, labeling of DNA probes for hybridization with nonradioactive labels (DIG-dUTP), Southern hybridization and detection of hybridized probes by chemiluminescence, ITS-RFLP-analysis of pathogens of oilseed rape, real-time PCR for mycotoxin-producing pathogens of cereals. In accompanying lectures, aspects of nucleic acid and protein chemistry relevant for analytical techniques will be explained. Technical solutions for specific scientific questions will be presented and discussed.		4 SWS
<b>Prüfung: Mündlich (ca. 30 Minuten)</b> <b>Prüfungsvorleistungen:</b> Anfertigung eines für den Prüfenden akzeptierten Praktikumsprotokolles <b>Prüfungsanforderungen:</b> Basic knowledge of the structure and properties of nucleic acids, properties and applications of enzymes used in the analysis and manipulation of DNA, understanding of standard techniques (Southern blotting, electrophoresis, DNA sequencing), data analysis, criteria for the selection of a DNA analytical technique for a specific task.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Birger Koopmann	
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 16		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0045: Mycology</b> <i>English title: Mycology</i>	6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> <ul style="list-style-type: none"> <li>• Learning methodology for handling of filamentous fungal organisms <i>in vitro</i></li> <li>• Gaining knowledge on the phytopathogenic, mutualistic and ecological roles of filamentous fungi</li> <li>• Acquiring skills in the experimentation with phytopathogenic fungi on plants</li> <li>• Training in the taxonomic determination of fungal organisms</li> </ul>	<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Mycology</b> (Praktikum, Vorlesung) <i>Inhalte:</i> <ul style="list-style-type: none"> <li>• Overview on the ecology and taxonomy of phytopathogenic fungi</li> <li>• Exercises for the taxonomic determination of fungi based on morphology and molecular genetic analysis</li> <li>• Isolating of fungi from diverse habitats (soil, water, plants)</li> <li>• Inoculation of plants with phytopathogenic fungi and determination of disease severity</li> <li>• Determination of soil fungistasis</li> <li>• Race determination in powdery mildew</li> <li>• Assessment of fungicide resistance in fungi</li> <li>• in situ studies of infection by biotrophic and necrotrophic pathogens</li> </ul>	4 SWS
<b>Prüfung: Mündlich (ca. 20 Minuten)</b> <b>Prüfungsvorleistungen:</b> Gruppenprotokoll und Ergebnispräsentation <b>Prüfungsanforderungen:</b> Basic knowledge on the biology (life cycles, epidemiology) and ecology of filamentous fungi; specific knowledge on the gaining of fungal isolates from diverse habitats, their handling in the lab and their utilization in phytopathological experiments; basic steps in the taxonomic determination of fungi (conidiogenesis types); methods in fungal phytopathology; fungal diseases of crops (general knowledge)	6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> Microbiology, plant pathology, crop protection
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Andreas von Tiedemann
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 1
<b>Maximale Studierendenzahl:</b> 12	

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0056: Plant breeding methodology and genetic resources</b> <i>English title: Plant breeding methodology and genetic resources</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students learn the integration of classical and molecular approaches to solve present problems in plant breeding. Social aspects have to be considered.  Students learn, in own presentations, to draw critical conclusions from recent research papers and to communicate these to other students.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Plant breeding methodology and genetic resources (Vorlesung)</b> <i>Inhalte:</i> Principles of breeding methodology: Response to selection, breeding methods for clonal, line, hybrid and population cultivars.  Marker assisted selection for monogenic and polygenic traits.  Use of plant genetic resources: wild species, ex-situ and in-situ conservation, on-farm management.  Breeding for marginal environments, demonstrated with examples from temperate and tropical regions.		4 SWS
<b>Prüfung: Klausur (Gewicht: 80%, Dauer: 90 Minuten) und Präsentation, Referat oder Korreferat (Gewicht: 20%, Dauer: ca. 20 Minuten)</b> <b>Prüfungsanforderungen:</b> Population Genetics, Application of Markers in Plant Breeding, Concepts of using genetic resources in plant breeding. Good knowledge on: 'Pre-Breeding', categories and methods in Plant Breeding.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> Basic knowledge (B.Sc. level) in genetics and plant breeding	
<b>Sprache:</b> Deutsch, Englisch	<b>Modulverantwortliche[r]:</b> apl. Prof. Dr. Wolfgang Link	
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 25		
<b>Bemerkungen:</b> <b>Literature:</b> Lecture based material.		



<b>Georg-August-Universität Göttingen</b>		6 C
<b>Module M.Agr.0057: Plant Virology</b>		6 WLH
<b>Learning outcome, core skills:</b> Knowledge in classical and molecular Plant Virology, Learning of practical plant virus detection methods with electron-optical methods, immunological methods. Deduction of scientific questions and hypotheses and critical review of methods applied based on personal lab experience		<b>Workload:</b> Attendance time: 80 h Self-study time: 100 h
<b>Course: Plant Virology</b> (Internship, Lecture) <i>Contents:</i> Lecture: systematics, vectors, modes of transmission, genome organisation, gene expression strategies, control strategies  Practical course: learning of diagnostic methods, symptom recognition, immunological and molecular detection methods		6 WLH
<b>Examination: Written exam (45 minutes, weighing 50%) and homework (max. 20 pages, weighing 50%)</b> <b>Examination prerequisites:</b> Participation at the practical course following the lecture <b>Examination requirements:</b> Understanding of the imparted detection methods and knowledge about virus biology		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Mark Varrelmann	
<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>	
<b>Maximum number of students:</b> 16		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0058: Plant herbivore interactions</b> <i>English title: Plant herbivore interactions</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Knowledge of complex interactions between plants and herbivorous insects. Preparation and critical reflection of methods applied in current research findings covering the lecture topics by a seminar presentation.		<b>Arbeitsaufwand:</b> Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden
<b>Lehrveranstaltung: Plant herbivore interactions</b> (Vorlesung, Seminar) <i>Inhalte:</i> The modul deals with the interactions between plants and herbivorous insects. The diversity of the organisms involved and the biocenoses are discussed. With regard to plants different adaptations to damage by insects are presented and the role of resistance mechanisms is outlined. The sensory organs of herbivorous insects to discriminate between different plant species and the role of volatile and secondary compounds produced by the plants are demonstrated. Multiple Interactions between plants, their herbivores, and natural enemies and application strategies in plant protection are discussed. The interactions between flowering plants and pollinators are outlined and the importance of seed predation will be exemplified. During the seminar part of the module students will present recent research findings which will complement the content of the lectures.		4 SWS
<b>Prüfung: Klausur (Gewicht: 67%, Dauer: 45 Minuten) und Präsentation, Referat oder Korreferat (Gewicht: 33%, Dauer: ca. 20 Minuten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme an den Seminaren und Bearbeitung und Vorstellung eines Seminarbeitrages <b>Prüfungsanforderungen:</b> Profound knowledge of processes involved in plant selection by herbivorous insects; protection strategies evolved by plants; determinants of herbivorous communities on specific plants, multitrophic interactions between plants; herbivorous insects and their natural enemies; interactions between plants and their pollinators or seed predators.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Michael Georg Rostás	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 20		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0094: Basics of Molecular Biology in Crop Protection</b> <i>English title: Basics of molecular biology in crop protection</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Comprehension about important scientific plant pathogen detection methods like ELISA and PCR used in agriculture, knowledge about biochemical and molecular basics in plant breeding and genetic resistance against plant pathogens.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Basics of molecular biology in crop protection (Vorlesung)</b> <i>Inhalte:</i> In agricultural research and diagnostics there is an increasing use of biochemical and molecular methods and techniques. The lecture conveys the scientific basics that are required for the understanding of these methods and prepares students for further practical courses and lectures. Specific contents are: cytology, cell-wall composition of different organisms, structure and function of different macromolecules (proteins, DNA, carbohydrates), function and regulation of enzymes, DNA-replication, transcription and translation, mechanisms of regulation, introduction into principles of molecular detection methods, lipids and membranes, phytohormones and selected secondary metabolites.		4 SWS
<b>Prüfung: Klausur (90 Minuten)</b> <b>Prüfungsvorleistungen:</b> Klausur (30 Minuten) <b>Prüfungsanforderungen:</b> Composition of macromolecules, output materials, typical molecular binding types, function, regulatory mechanisms on protein and nucleic acid level, phytohormones, secondary metabolism.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Mark Varrelmann	
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 20		

<b>Georg-August-Universität Göttingen</b> <b>Module M.Agr.0120: Molecular Diagnostic and Biotechnology in Crop Protection</b>	6 C 4 WLH
<b>Learning outcome, core skills:</b> Participants will acquire confidence in judging about the suitability of diagnostic techniques for specific purposes and making informed decisions on the use of DNA-based methods in research in crop protection. They will understand the potential of biotechnology in plant protection and principals of the evaluation of risks of the use of GM crops and other genetically modified organisms in plant protection.	<b>Workload:</b> Attendance time: 65 h Self-study time: 115 h
<b>Course: Molecular Diagnostic and Biotechnology in Crop Protection (Lecture)</b> <i>Contents:</i> Principles and applications of diagnostic techniques in plant protection with a focus on nucleic acid: electrophoresis (discovery of new viruses, detection of viroids, dsRNA in fungi and hypovirulence, electrophoretic karyotypes); nucleic acid hybridization (spot hybridization, RFLP, ASO, macro- and microarrays); PCR (principle, classical end-point PCR, qPCR and digital PCR; ligase chain reaction; isothermal amplification (LAMP, used of nicking enzymes, helicase, abortive transcript); sources of primers; specificity and sensitivity. Miniaturization of diagnostic methods: lab on chip, ultra-fast PCR. Aptamers. Molecular markers: RFLP, RAPD, AFLP, SSR, SNP; application in epidemiology of pathogens, analysis of population structure and genetic diversity, genome mapping, and map-based cloning of resistance genes. Remote detection of plant pathogens: optical methods and VOC analysis. Biotechnology in plant protection: delimitation from traditional technologies; applicatons of biotechnology to increase genetic diversity in crops; selection for resistance in tissue culture. Genetic engineering in plant protection: inactivation of genes on DNA and transcript levels; introduction of foreign genes into crop plants: techniques, selection markers, safety, acceptance, legal aspects; GM crops in engineering resistance to viruses, pests, herbicides, bacterial and fungal pathogens. Potential for the use of genetically engineered viruses and microorganisms in plant protection. Current concepts and technologies relevant for plant protection research: genome analysis, omics, saturation mutagenesis, high-throughput screening, systems biology.	4 WLH
<b>Examination: Oral examination (approx. 30 minutes)</b> <b>Examination requirements:</b> Understanding concepts and technical principles of molecular diganostic methods and the applicatoin of molecular markers and plant biotechnology in plant protection. Demonstration of the ability to read primary literature that describes applications of the techniques covered in the course.	6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Petr Karlovsky

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<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>
<b>Maximum number of students:</b> 30	

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0146: Nematology</b> <i>English title: Nematology</i>		3 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Basic knowledge of the nematode bauplan, their role as pests; basic methods with regard to the quantification and control of nematodes, importance and application of nematodes in biological control programs; their role in regulation processes in ecosystems. Seminar talk on a specific scientific problem related to nematodes.		<b>Arbeitsaufwand:</b> Präsenzzeit: 60 Stunden Selbststudium: 30 Stunden
<b>Lehrveranstaltung: Nematology</b> (Praktikum, Seminar) <i>Inhalte:</i> The module deals with the biology of nematodes and their importance in plant protection. The most important taxa of nematodes are presented by preparations and living organisms; the most important morphological characters will be identified. Interactions between plant parasitic nematodes and their host plants will be discussed. The role of nematodes in inundative biological control measures will be discussed as well. During the course students will become familiar with different nematode species and will learn basic principles of their determination. Phytoparasitic nematodes will be prepared. A practical experiment will demonstrate toxicity of different compounds.		4 SWS
<b>Prüfung: Hausarbeit (max. 30 Seiten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme am Praktikum und Bearbeitung und Vorstellung eines Seminarbeitrages <b>Prüfungsanforderungen:</b> Basic knowledge in morphological characters of nematodes; ability to discriminate between different feeding types of nematodes; role and function of biological control using nematodes; importance of nematodes for biodiversity; in some circumstances preparation of homework.		3 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. i. R. Dr. Stefan Vidal	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 12		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Agr.0175: Plant-Herbivore Interactions (Experimental course)</b> <i>English title: Plant-Herbivore Interactions (Experimental course)</i>		3 C 2 SWS
<b>Lernziele/Kompetenzen:</b> Die Studierenden werden die Fähigkeit erlernen, Experimente zu planen, durchzuführen, statistisch auszuwerten, grafisch darzustellen und zu interpretieren. Sie werden in der Lage sein, Sekundärmetaboliten mit Abwehr- oder Signalfunktion aus der Pflanze zu isolieren und zu quantifizieren. Die Studierenden erlernen die Durchführung von Bioassays, welche die Abwehrfunktion der Sekundärmetaboliten nachweisen sollen.		<b>Arbeitsaufwand:</b> Präsenzzeit: 40 Stunden Selbststudium: 50 Stunden
<b>Lehrveranstaltung: Plant-Herbivore Interactions (Experimental course)</b> (Übung, Seminar) <i>Inhalte:</i> Das Modul ergänzt die gleichnamige Vorlesung und beschäftigt sich mit den Wechselwirkungen zwischen (Nutz)Pflanzen und herbivoren Insekten. Im Praktikum sollen die in der Vorlesung erworbenen Kenntnisse vertieft und Methoden der chemischen Ökologie / Agrarentomologie erlernt werden. Insbesondere werden verschiedene Abwehrstrategien der Pflanze gegenüber Fraßfeinden untersucht. Die Bedeutung von Prädatoren und Parasitoiden für die Populationskontrolle von herbivoren Schädlingen, und somit für den integrierten Pflanzenschutz, werden behandelt. Literatur: Schoonhoven et al. (2005) Insect-Plant Biology, 2nd Ed., Oxford University Press		2 SWS
<b>Prüfung: Protokoll über die durchgeführten Experimente (max. 15 Seiten)</b> <b>Prüfungsanforderungen:</b> Dokumentation und Interpretation der durchgeführten Versuche entsprechend dem wissenschaftlichen Standard. Seminarvortrag		3 C
<b>Zugangsvoraussetzungen:</b> An „M.Agr.0058.Mp: Plant-Herbivore Interactions“ erfolgreich teilgenommen.	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Michael Georg Rostás	
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Woche	
<b>Wiederholbarkeit:</b> einmalig	<b>Empfohlenes Fachsemester:</b> ab 2	
<b>Maximale Studierendenzahl:</b> 12		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0002: Internship</b> <i>English title: Internship</i>		9 C 6 SWS
<b>Lernziele/Kompetenzen:</b> Specific knowledge of the respective area of work/research will be acquired, social abilities and competences like work organization, teamwork, interdisciplinary work, flexibility will be acquired.	<b>Arbeitsaufwand:</b> Präsenzzeit: 240 Stunden Selbststudium: 30 Stunden	
<b>Lehrveranstaltung: Internship (Praktikum)</b> <i>Inhalte:</i> Students will carry out a practical project in different areas of crop protection, in agrochemical companies, in research or consulting institutions and experience the daily work situation. They will work on other projects and experience the daily working routine outside the university.  Duration minimum 6 weeks.		6 SWS
<b>Prüfung: Seminararbeit (max. 20 Seiten, Gewichtung: 50%) und Präsentation, Referat oder Korreferat (ca. 20 Minuten, Gewichtung: 50%)</b> <b>Prüfungsanforderungen:</b> Practical work in a scientific project in different areas of crop protection, written internship report and seminar presentation.		9 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Andreas von Tiedemann	
<b>Angebotshäufigkeit:</b> jedes Semester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 3	
<b>Maximale Studierendenzahl:</b> 20		



<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0004: Plant Diseases and Pests in Temperate Climate Zones</b> <i>English title: Plant diseases and pests in temperate climate zones</i>	6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students will be able to recognize and identify the main pests and diseases, understand the origin, distribution and dynamics of diseases and pests in the field as a basis for the development of control methods.	<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Plant Diseases and Pests in Temperate Climate Zones</b> (Vorlesung, Exkursion, Übung) <i>Inhalte:</i> The main diseases and pests (fungi, viruses, bacteria, nematodes, mites, and insects) of crops (arable crops, vegetables, fruit crops) in temperate climate zones will be presented. The symptoms, diagnosis, biology and life cycles, economic importance, possible control methods will be studied in lectures, practicals and field trips. The economic damage, prognosis, possible control methods using economic thresholds will be presented.	4 SWS
<b>Prüfung: Klausur (45 Minuten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme an Exkursionen und Übungen im Feld <b>Prüfungsanforderungen:</b> Identification and diagnosis of plant pests and diseases of crops of the temperate climate zones, knowledge of the life cycle, distribution, and population dynamics.	6 C
<b>Zugangsvoraussetzungen:</b> Only for students in the study programmes "Crop Protection", EMJMD PlantHealth and "Sustainable international Agriculture".	<b>Empfohlene Vorkenntnisse:</b> keine
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Birger Koopmann
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Semester
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 2
<b>Maximale Studierendenzahl:</b> 30	

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0005: Integrated Management of Pests and Diseases</b> <i>English title: Integrated management of pests and diseases</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students will be able to understand and develop plant protection strategies to control plant pathogens and insect pests while observing the sustainability of the whole crop production system.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Integrated Management of Pests and Diseases (Vorlesung)</b> <i>Inhalte:</i> The integrated pest management concept and its main components are presented with regard to the management of fungal plant pathogens and insect pests in temperate zones: preventive methods, selective use pesticides, effect of cultural methods ( sowing date, soil preparation, fertilization, crop rotation, varieties) on occurrence, distribution and damage of plant pathogens and insect pests. The diagnostics and quantification of damage symptoms; prognosis systems are discussed.		4 SWS
<b>Prüfung: Mündlich (ca. 20 Minuten)</b> <b>Prüfungsanforderungen:</b> Knowledge of the relationship between crop production methods and the occurrence of plant diseases and insect pests in temperate zones, concept of integrated pest management.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Andreas von Tiedemann	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 1	
<b>Maximale Studierendenzahl:</b> 30		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0006: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides</b> <i>English title: Pesticides I: Mode of action and application techniques, resistance to pesticides</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students will know the pesticide compounds used in agriculture, their mode of action, application techniques and understand the development of resistance and resistance management strategies.	<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden	
<b>Lehrveranstaltung: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides</b> (Vorlesung, Exkursion) <i>Inhalte:</i> Mode of action and application techniques of plant protection products (fungicides, insecticides, acaricides, herbicides), the characteristics of active ingredients are presented. Technical and technological possibilities of modern crop protection, requirements and pesticide resistance management is discussed.	4 SWS	
<b>Prüfung: Klausur (90 Minuten)</b> <b>Prüfungsanforderungen:</b> Knowledge of pesticides, their mode of action, targets, side effects, application techniques; important factors for resistance development and possibilities for prevention and reduction.	6 C	
<b>Zugangsvoraussetzungen:</b> Only for students from the study programme "Crop Protection" and "Sustainable International Agriculture"	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Andreas von Tiedemann	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 1	
<b>Maximale Studierendenzahl:</b> 30		

<b>Georg-August-Universität Göttingen</b>		6 C 4 WLH
<b>Module M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration</b>		
<b>Learning outcome, core skills:</b> Students will understand the basic and applied pesticide toxicology and ecotoxicology, the development of pesticides and risk assessment, and the regulatory framework of pesticide registration and pesticide risks (Germany, EU)		<b>Workload:</b> Attendance time: 56 h Self-study time: 124 h
<b>Course: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration (Lecture)</b> <i>Contents:</i> This unique module gives an overview of all aspects of pesticide science, presented by Several lecturers, being specialists. Basic and applied toxicology of pesticides , ecotoxicology of pesticides, environmental fate and metabolism of compounds in different environments, development of pesticides, regulation of pesticide use and registration.		4 WLH
<b>Examination: Written examination (90 minutes)</b> <b>Examination requirements:</b> Knowledge of the toxicology of pesticides, ecotoxicology, fate and metabolism in the environment, regulation and registration of pesticides in Germany and the EU.		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Andreas von Tiedemann	
<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b> Master: 3	
<b>Maximum number of students:</b> 30		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0008: Fungal Toxins</b> <i>English title: Fungal toxins</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students will realize the importance of secondary metabolites produced by fungi in plant production. They will be able to compare and rate the significance of natural toxins and anthropogenic substances and to classify different food contaminations according to their toxicology In the laboratory students will acquire practical knowledge of chemical- analytical methods, so they will be able to select the optimum analytical method.		<b>Arbeitsaufwand:</b> Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
<b>Lehrveranstaltung: Fungal Toxins</b> (Vorlesung, Laborpraktikum) <i>Inhalte:</i> The most important mycotoxins will be presented and described, concepts to determine the toxicity and procedures to develop legal maximum values will be discussed, and the risk for consumers and animals will be judged. The ecological importance of mycotoxins will be discussed, methods of mycotoxin identification will be explained and methods to reduce the mycotoxin contents of plant products will be presented. Selected phytoalexins and phytohormones playing a role as a factor of virulence or pathogenicity in plant diseases will be introduced. In the practical students will process plant material and use different methods for analysis of mycotoxins.		4 SWS
<b>Prüfung: Klausur (60 Minuten)</b> <b>Prüfungsvorleistungen:</b> Voraussetzung ist angenommenes Protokoll vom Praktikum <b>Prüfungsanforderungen:</b> Knowledge of the most important mycotoxins occurring in crop plants, methods to analyse their toxicity, development of legal limit values; ecological importance of mycotoxins; methods to determine mycotoxins, factors responsible for mycotoxin content in plant products, the importance of phytotoxins and phytohormones as factors of virulence and pathogenicity.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Petr Karlovsky	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 12		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0010: Plant Pathology and Plant Protection Seminar</b> <i>English title: Plant Pathology and Plant Protection seminar</i>		3 C 2 SWS
<b>Lernziele/Kompetenzen:</b> Students will learn, to present, discuss and defend their own individual research project. They will be able to critically discuss scientific results and provide suggestions for improvement.		<b>Arbeitsaufwand:</b> Präsenzzeit: 28 Stunden Selbststudium: 62 Stunden
<b>Lehrveranstaltung: Plant Pathology and Plant Protection Seminar (Seminar)</b> <i>Inhalte:</i> In this seminar scientific projects, targets of research and results of research projects will be presented and discussed by the MSc students and members of the research staff. Techniques of presentation and the ability to critically review and discuss research results will be practiced which will suggest and lead to new thoughts for further research projects. <i>Angebotshäufigkeit:</i> jedes Wintersemester		2 SWS
<b>Prüfung: Präsentation, Referat oder Korreferat (ca. 20 Minuten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme an 12 Seminaren <b>Prüfungsanforderungen:</b> Very good knowledge of own area of research and good ways of presentation of own results. Participation in discussion.		3 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Birger Koopmann	
<b>Angebotshäufigkeit:</b> jedes Semester	<b>Dauer:</b> 2 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 2	
<b>Maximale Studierendenzahl:</b> 30		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0011: Agricultural Entomology Seminar</b> <i>English title: Agricultural entomology seminar</i>		3 C 2 SWS
<b>Lernziele/Kompetenzen:</b> Students will learn, to present, discuss and defend their own individual research project. They will be able to critically discuss scientific results and provide suggestions for improvement.		<b>Arbeitsaufwand:</b> Präsenzzeit: 28 Stunden Selbststudium: 62 Stunden
<b>Lehrveranstaltung: Agricultural Entomology Seminar (Seminar)</b> <i>Inhalte:</i> In this seminar scientific projects, targets of research and results of research projects in Agricultural Entomology will be presented and discussed by the MSc students. Techniques of presentation and the ability to critically review and discuss research results will be practiced which will suggest and lead to new thoughts for further research projects.		2 SWS
<b>Prüfung: Präsentation, Referat oder Korreferat (ca. 20 Minuten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme an 12 Seminaren <b>Prüfungsanforderungen:</b> Very good knowledge of own area of research and good ways of presentation of own results. Participation in discussion.		3 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Michael Georg Rostás	
<b>Angebotshäufigkeit:</b> jedes Semester	<b>Dauer:</b> 2 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 30		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0012: Weed Biology and Weed Management</b> <i>English title: Weed biology and weed management</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students will understand the biology of local and worldwide important weeds, their taxonomy, life-form and habitat requirement, as well as their evolution, distribution, plant sociology, ecology, population dynamics and genetics. Endangered as well as invasive species, the interaction of weeds and crops (allelopathy and competition), weed control with direct (chemical and mechanical), and indirect (agronomic) measures will be taught.	<b>Arbeitsaufwand:</b> Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden	
<b>Lehrveranstaltung: Weed Biology and Weed Management (Vorlesung)</b> <i>Inhalte:</i> In the lecture the three main topics in Weed Science, the biology of weeds, the interaction of weeds and crops, and the weed management with direct (chemical and mechanical) and indirect (agronomic) measures will be presented. The benefits and harms of weeds for the ecology, society and the economy will be discussed. The need for species conservation vs. weed control is discussed in the context of the efficacy of weed control measures. Project work: Students will work on a project in teams. They will cultivate weeds and crops in the greenhouse and investigate the weed crop interaction in competition experiments.		4 SWS
<b>Prüfung: Klausur (90 Minuten)</b> <b>Prüfungsanforderungen:</b> Basic knowledge of weed characteristics, biology and ecology. Knowledge of the main weed control techniques, mode of action and examples. Knowledge of the main weeds worldwide and ways of management. Ability to associate weed populations with present crop production systems and develop control strategies.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Jean Wagner	
<b>Angebotshäufigkeit:</b> jedes Wintersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 1	
<b>Maximale Studierendenzahl:</b> 20		



<b>Georg-August-Universität Göttingen</b>		3 C
<b>Module M.Cp.0014: Plant Nutrition and Plant Health</b>		2 WLH
<b>Learning outcome, core skills:</b> Understanding the relationship between plant nutrition and plant health and its significance in the value-added food chain.		<b>Workload:</b> Attendance time: 28 h Self-study time: 62 h
<b>Course: Plant Nutrition and Plant Health</b> (Lecture, Seminar) <i>Contents:</i> Nutrient uptake and transport in the plant; function of different nutrients in the plant especially with respect to plant health ( susceptibility, tolerance, resistance ); mechanisms to increase the efficiency of nutrient availability, uptake and use; characteristics of plant health, effect of nutrient imbalances on plant metabolism and development of plant harvest products, the nutrient concentrations and processing quality.		2 WLH
<b>Examination: Written exam (90 minutes)</b> <b>Examination requirements:</b> Knowledge of and ability to present the presented topics in their context: development of nutritional and processing quality in different crop plants; quality requirements and ways of realization by crop production methods.		3 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Klaus Dittert	
<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>	
<b>Maximum number of students:</b> 25		

<b>Georg-August-Universität Göttingen</b>		6 C
<b>Module M.Cp.0015: Molecular Weed science</b>		4 WLH
<b>Learning outcome, core skills:</b> Understanding the basic principles of the interactions between herbicides and the target plant and herbicide selectivity. Resistance mechanisms in weeds and mechanisms of tolerance in cultivated plants are understood, can be distinguished and practical consequences be drawn. Students have a fundamental understanding of the development and distribution of herbicide resistance in weeds.		<b>Workload:</b> Attendance time: 60 h Self-study time: 120 h
<b>Course: Molecular Weed Science</b> (Lecture, Practical course) <i>Contents:</i> Lecture: In the lecture the application of molecular methods in weed science and weed management is presented, focusing on the naturally occurring herbicide resistance in weeds. The genetic basis will be taught with regard to transgenic and non transgenic herbicide tolerance in cultivated plants. The possibilities of the use of molecular techniques for the detection of herbicide resistance in weeds will be discussed. New findings by the so called –omics ( genomics, proteomics and metabolomics) on the interaction of weeds with their environment are of importance in the development of new herbicides and will be discussed as well as alternative transgenic approaches in weed management.  Practical: A one week practical will be held after the lecture. In the practical actual resistance problems in weeds are presented. Resistance detection methods will be presented and carried out on the protein level ( target assay) and on the genetic level (SNP-analysis') and the possible use for a sustainable herbicide weed management will be discussed.		4 WLH
<b>Examination: Written examination (90 minutes)</b> <b>Examination prerequisites:</b> Regular participation in the laboratory practical <b>Examination requirements:</b> Knowledge of the interaction between herbicide and target, the selectivity of herbicides, mechanisms of resistance in weeds, mechanisms of development of tolerance in cultivated plants. Basic knowledge of development and distribution of herbicide resistance in weeds		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Dr. Jean Wagner	
<b>Course frequency:</b> each summer semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>	
<b>Maximum number of students:</b>		

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20	
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<b>Georg-August-Universität Göttingen</b>		6 C 4 WLH
<b>Module M.Cp.0016: Practical statistics and experimental design in agriculture</b>		
<b>Learning outcome, core skills:</b> The aim of the course is to familiarize students with the basic concepts of statistics and their application in agricultural science. The second goal is to learn the use of software packages like SAS.		<b>Workload:</b> Attendance time: 56 h Self-study time: 124 h
<b>Course: Practical Statistics and Experimental Design in Agriculture</b> (Lecture, Exercise) <i>Contents:</i> In the beginning of the course, students are introduced to the basic concepts of statistics like frequency distributions, the normal distribution and hypothesis testing. They are also introduced to software packages like SAS, that are used for the practical exercises.  Regression and correlation analysis are then introduced. Different experimental designs like randomized block, latin square, and split plot are described and analyzed by one-way analysis of variance or as factorial experiments. Generalized Linear Models will be used and multivariate data will be analyzed by cluster and principal component methods.  A large amount of examples and exercises constitute an important aspect of the course, enabling the students to understand and assimilate the theoretical content. Practical analyses of example data sets also provide the students with the required experience and skills for future statistical tasks in the context of Mastertheses.		4 WLH
<b>Examination: Written examination (90 minutes)</b> <b>Examination requirements:</b> Knowledge of the basic concepts of statistics and their application in agricultural science and in the use of software packages like SAS.		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> Mathematics, statistics	
<b>Language:</b> English	<b>Person responsible for module:</b> Dr. Christian Kluth	
<b>Course frequency:</b> each summer semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b> Master: 2	
<b>Maximum number of students:</b> 30		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0017: Scientific Presenting, Writing and Publishing in Crop Protection</b> <i>English title: Scientific presenting, writing and publishing in crop protection</i>		3 C 2 SWS
<b>Lernziele/Kompetenzen:</b> Students are expected to be able to write scientific papers in English, to design graphics and tables, conduct a literature recherche, to prepare oral and poster presentations, to review manuscripts. Students know the process of paper publication, from writing to submitting and reviewing.	<b>Arbeitsaufwand:</b> Präsenzzeit: 28 Stunden Selbststudium: 62 Stunden	
<b>Lehrveranstaltung: Scientific Presenting, Writing and Publishing in Crop Protection</b> (Vorlesung, Seminar) <i>Inhalte:</i> Students will prepare a written paper dealing with selected topics in crop protection. The "Good Scientific Practice", the structure and design of scientific papers, preparation and submission of a manuscript for publication, design of scientific presentations (structure, way of presentation, rhetorics) will be presented.		2 SWS
<b>Prüfung: Hausarbeit (max. 10 Seiten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme an 12 Seminaren <b>Prüfungsanforderungen:</b> Ability to search literature and compile a paper dealing with a scientific topic in crop protection.		3 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Andreas von Tiedemann	
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 2	
<b>Maximale Studierendenzahl:</b> 20		

<b>Georg-August-Universität Göttingen</b> <b>Modul M.Cp.0018: Journal Club on New Topics in Crop Protection</b> <i>English title: Journal club on new topics in crop protection</i>		3 C 2 SWS
<b>Lernziele/Kompetenzen:</b> Students learn how to assess and discuss a scientific subject in crop protection: They will be able to give written and oral presentations of a scientific paper and to critically judge the didactic, structure and scientific content and correctness of a scientific paper.	<b>Arbeitsaufwand:</b> Präsenzzeit: 28 Stunden Selbststudium: 62 Stunden	
<b>Lehrveranstaltung: Journal Club on New Topics in Crop Protection</b> (Vorlesung, Seminar) <i>Inhalte:</i> Methods will be presented how to collect and read scientific literature dealing with a specific topic. The composition and structure of scientific publications, methods and ways of presentation and proving ideas are studied using specific examples. Criteria for quality assessment are applied.	2 SWS	
<b>Prüfung: Präsentation, Referat oder Korreferat (ca. 20 Minuten) mit schriftlicher Ausarbeitung (max. 10 Seiten)</b> <b>Prüfungsvorleistungen:</b> Teilnahme an 12 Seminaren <b>Prüfungsanforderungen:</b> Preparation of written review of a scientific paper, which will be presented and discussed in the seminar.	3 C	
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Andreas von Tiedemann	
<b>Angebotshäufigkeit:</b> jedes Sommersemester	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b> Master: 2	
<b>Maximale Studierendenzahl:</b> 20		

<b>Georg-August-Universität Göttingen</b>		3 C
<b>Module M.Cp.0019: Basic laboratory techniques</b>		2 WLH
<b>Learning outcome, core skills:</b> Students will get prepared for practical research, including basic chemical and microbiological techniques as well as responsible behaviour in the laboratory and operating of machines.		<b>Workload:</b> Attendance time: 28 h Self-study time: 62 h
<b>Course: Basic Laboratory Techniques (Exercise)</b> <i>Contents:</i> The practical includes laboratory safety, planning and recording of experiments, chemical calculations (concentrations in media and buffer), sterilization techniques, working in sterile conditions, pH, photometry, ELISA, PCR, preparation of experiments and writing protocols. Students learn to plan and execute safely experiments, to explain and use methods and equipment effectively.		2 WLH
<b>Examination: Written examination (45 minutes)</b> <b>Examination prerequisites:</b> Accepted protocol <b>Examination requirements:</b> Basic knowledge of calculation of concentrations, sterilization techniques, importance and composition of buffers, principles of photometry, centrifugation, ELISA and PCR.		3 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Dr. Anke Sirrenberg	
<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b> Master: 1	
<b>Maximum number of students:</b> 20		

<b>Georg-August-Universität Göttingen</b> <b>Module M.Cp.0020: Ecotoxicological Risk Assessment for Plant Protection Products</b>	3 C 2 WLH
<b>Learning outcome, core skills:</b> To gain a basic knowledge of ecotoxicology and understanding its principles and associated testing and ecological risk assessment methods, specifically for application to plant protection products.	<b>Workload:</b> Attendance time: 28 h Self-study time: 62 h
<b>Course: Ecotoxicological Risk Assessment for Plant Protection Products</b> (Lecture, Exercise) <i>Contents:</i> In this module, students will be lectured on the basics of risk assessment for plant protection products. The most important aspects and definitions in the field of exposure, selection of representative test species, (statistical) data evaluation and risk assessment will be discussed. The for registration purposes considered organism groups, i.e. birds, mammals, aquatic organisms (incl. fish, invertebrates, primary producers), honeybees, soil organisms (incl. earthworms), non-target arthropods and non-target plants, and the corresponding data requirements will be reviewed. Specific aspects of exposure and assessment of each of these organism groups will be discussed. Furthermore, the importance of ecotoxicology in the registration process of a plant protection product will be discussed. The theoretical basis will be handled in the lectures and subsequently some aspects will then be applied in the practical part. This includes: <ul style="list-style-type: none"> <li>• Methods in ecotoxicology (e.g. standardisation and quality of testing)</li> <li>• Exposure pathways, bioavailability</li> <li>• Selection of test species and testing methods</li> <li>• Risk assessment and risk management</li> </ul> In the practical part, students will learn to design, conduct and evaluate acute toxicity tests with plant protection products in the laboratory. It is planned to use test species from the group of arthropods, mainly insect larvae (depending on animal availability). The aim of the tests is to obtain a dose-response relationship and (mathematically) derive EC50 or LC50 values and also, if the data permit, to (statistically) derive NOEC and LOEC values. Finally, a choice of publically available European registration dossiers will be reviewed and critically discussed.	2 WLH
<b>Examination: Written examination (60 minutes)</b> <b>Examination requirements:</b> Knowledge of ecotoxicological testing methods and their evaluation for the risk assessment of plant protection products.	3 C
<b>Admission requirements:</b> Plant Health/Crop Protection	<b>Recommended previous knowledge:</b> none



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<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Lennart Weltje
<b>Course frequency:</b> each winter semester	<b>Duration:</b> 1 semester[s]
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>
<b>Maximum number of students:</b> 15	

<b>Georg-August-Universität Göttingen</b>		6 C
<b>Module M.Cp.0021: Plant Health Internship</b>		
<b>Learning outcome, core skills:</b> Specific knowledge of the respective area of work/research will be acquired, social abilities like work organization, teamwork, interdisciplinary work, flexibility will be practiced		<b>Workload:</b> Attendance time: 20 h Self-study time: 160 h
<b>Course: Plant Health Internship</b> <i>Contents:</i> Students will carry out practical work in areas of crop protection, in agrochemical companies, in research or consulting institutions and experience the daily work situation Duration: approx. 4 weeks		4 WLH
<b>Examination: Term Paper (max. 20 pages)</b> <b>Examination requirements:</b> Practical work in a scientific project in different areas of crop protection, written internship report showing that students gathered knowledge of their research topic, its relevance, are able to evaluate data, explain and interpret them in a written document.		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Andreas von Tiedemann	
<b>Course frequency:</b> each summer semester	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>	
<b>Maximum number of students:</b> 8		

<b>Georg-August-Universität Göttingen</b> <b>Universität Kassel/Witzenhausen</b> <b>Module M.SIA.E13M: Microeconomic theory and quantitative methods of agricultural production</b>		6 C 4 WLH
<b>Learning outcome, core skills:</b> Students are familiar with microeconomic approaches and can apply them to analyze issues related to agriculture and rural development. Students are also familiar with quantitative methods used for the analysis and planning of farms and enterprises in the agricultural sector.		<b>Workload:</b> Attendance time: 56 h Self-study time: 124 h
<b>Course: Microeconomic theory of agricultural production (Lecture)</b> <i>Contents:</i> Consumer theory, producer theory, markets, monopoly situations, risk and uncertainty, economics of technical change, farm household models, institutional innovations in the small farm sector.		2 WLH
<b>Course: Quantitative methods in agricultural business economics (Lecture)</b> <i>Contents:</i> Budgeting, accounting, annual balance sheets, linear programming, finance, investment analysis		2 WLH
<b>Examination: Written examination (120 minutes)</b> <b>Examination requirements:</b> Consumer theory; producer theory; risk; technological progress; farm household models; institutional innovations; budgeting and accounting; linear programming; finance; investment analysis		6 C
<b>Admission requirements:</b> none	<b>Recommended previous knowledge:</b> none	
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Matin Qaim	
<b>Course frequency:</b> each winter semester; Göttingen	<b>Duration:</b> 1 semester[s]	
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b>	
<b>Maximum number of students:</b> 40		
<b>Additional notes and regulations:</b> Literature: Text books, research articles and lecture notes. After successful conclusion of M.Agr.0060 students can not complete M.SIA.E13M. This module is designed for students with relatively little economics during their previous BSc studies.		

<b>Georg-August-Universität Göttingen</b> <b>Universität Kassel/Witzenhausen</b> <b>Modul M.SIA.P07: Soil and plant science</b> <i>English title: Soil and plant science</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Bridging module for students lacking basic knowledge in some agronomy disciplines. With the help of lectures and reading materials students will be enabled to fill in gaps and get updated on state-of-the art knowledge with a special focus on questions pertinent to organic agriculture. Students, having taken this module, will be able to follow advanced courses in the above fields.		<b>Arbeitsaufwand:</b> Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden
<b>Lehrveranstaltung: Soil and plant science</b> (Vorlesung, Seminar) <i>Inhalte:</i> Influence of soil formation processes on physical properties (texture, soil water, pore space), chemical properties (buffering, exchange capacity, nutrients), and biological properties (organic matter, edaphon), soil formation and classification. Nutrient availability and and nutrient mobilization under conventional and organic agricultural conditions. Major and minor nutrients and food quality. Plant breeding goals for different agricultural systems. Plant morphology, genetics and breeding: principles of plant domestication and use, characterization and evaluation, use of genetic resources in plant breeding, genetic basis for plant breeding Genetics of host-parasite interactions, epidemiology and plant defence. Insect physiology and ecology.  Spezifische allgemeine und wissenschaftliche Artikel, die sich mit dem Zielland der Exkursion befassen werden über eine E-Learning Plattform zur Verfügung gestellt		4 SWS
<b>Prüfung: Klausur (120 Minuten) oder Fachgespräch (ca. 20 Minuten)</b> <b>Prüfungsanforderungen:</b> Fundamentals of soil science: Physical properties (texture, soil water, pore space), chemical properties (buffering, exchange capacity, nutrients), biological properties (organic matter, edaphon), soil formation and classification.  Plant nutrition: Role of major and minor elements in plants, nutrient availability and nutrient mobilisation, plant nutrients and food quality  Plant breeding and genetics: plant morphology, genetics and breeding: principles of plant domestication and use, characterization and evaluation, use of genetic resources in plant breeding, genetic basis for plant breeding.  Plant protection: principles of plant pathology and entomology, genetics of plant diseases, epidemiology, plant defence mechanisms; insect physiology and ecology		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Dr. Helmut Saucke	

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<b>Angebotshäufigkeit:</b> jedes Wintersemester; Witzenhausen	<b>Dauer:</b> 1 Semester
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>
<b>Maximale Studierendenzahl:</b> nicht begrenzt	

**Bemerkungen:****Literature:**

Brady, N.C. 1990: The nature and properties of soils. 10th edition, Prentice Hall; Marschner, H. 1995: Mineral Nutrition of Higher Plants, Academic Press, New York; Sanchez, P. 1976: Properties and Management of Soils of the Tropics, Wiley, New York; van Wyk, B.E. 2005: Food Plants of the World. Briza Publication, Pretoria; Rehm, S., Espig, G. 1991: The Cultivated Plants of the Tropics and Subtropics. Verlag Josef Margraf, Weikersheim, Germany; Agrios, G.N. 2005: Plant Pathology, 5th edition, Academic Press, New York; Pedigo, L.P. 2002: Entomology and Pest Management, 4th edition, Macmillan Pub Co.

<b>Georg-August-Universität Göttingen</b> <b>Universität Kassel/Witzenhausen</b> <b>Modul M.SIA.P15M: Methods and advances in plant protection</b> <i>English title: Methods and advances in plant protection</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Students are able to critically evaluate published results and apply this knowledge to actual problems in the field. They are also able to deal with problems in the field: Identification and measurements, design of experimental and analytical approaches to problems.		<b>Arbeitsaufwand:</b> Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden
<b>Lehrveranstaltung: Methods and advances in plant protection</b> (Vorlesung, Exkursion, Übung) <i>Inhalte:</i> Advanced course in plant pathology and entomology. Methodology and evaluation methods in plant protection. Case studies of specific plant protection issues in organic farming in the form of lectures, seminars and practical courses.		4 SWS
<b>Prüfung: Klausur (120 Minuten) oder Fachgespräch (ca. 20 Minuten) (Gewichtung: 70%) und Protokoll (max. 3 Seiten) oder Referat (ca. 10 Minuten) (Gewichtung: 30%)</b> <b>Prüfungsanforderungen:</b> Advanced knowledge in plant protection (Entomology and Pathology) Methodology and evaluation methods in plant protection based on case studies.		6 C
<b>Zugangsvoraussetzungen:</b> Introductory course in plant protection (entomology and pathology, at least 6 ECTS or equivalent) or bridging module M.SIA.P07 Soil and Plant Science	<b>Empfohlene Vorkenntnisse:</b> keine	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Maria Renate Finckh	
<b>Angebotshäufigkeit:</b> jedes Wintersemester; Witzenhausen	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> nicht begrenzt		
<b>Bemerkungen:</b> <b>Literature:</b> Agrios, G.N. 2005: Plant Pathology, 5th edition Academic Press, New York; Pedigo, L.P. 2002: Entomology and Pest Management, 4th edition, Macmillen Pub Co.		

<b>Georg-August-Universität Göttingen</b> <b>Universität Kassel/Witzenhausen</b> <b>Modul M.SIA.P22: Management of tropical plant production systems</b> <i>English title: Management of tropical plant production systems</i>		6 C 4 SWS
<b>Lernziele/Kompetenzen:</b> Knowledge of botanical, ecological and agronomic facts of presented crops and cropping systems. The students should be able to classify crops and cropping systems in relation to site conditions and undertake system-orientated evaluation of sustainable production.		<b>Arbeitsaufwand:</b> Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden
<b>Lehrveranstaltung: Management of tropical plant production systems (Vorlesung)</b> <i>Inhalte:</i> Presentation of the most important crops with respect to: botany, morphology, origin, climatic and ecological requirements, crop production, harvest procedure, significance in local farming systems, utilisation as food, feed, raw materials and as bioenergy source. Discussion of specific cropping systems in the tropics and subtropics and specific management systems for the sustainable improvement of productivity. <b>Literatur</b> Rehm, S., Espig, G. 1991: The Cultivated Plants of the Tropics and Subtropics. Verlag Josef Margraf. Weikersheim, Germany; lecture notes		4 SWS
<b>Prüfung: Written exam (90 minutes) or oral exam (ca. 30 minutes)</b> <b>Prüfungsanforderungen:</b> Knowledge of botanical, ecological and agronomic facts of the presented crops and cropping systems. Knowledge of the assignment of crops and cropping systems to different site conditions, as well as system-oriented evaluation of sustainable production at selected sites.		6 C
<b>Zugangsvoraussetzungen:</b> keine	<b>Empfohlene Vorkenntnisse:</b> Basic knowledge on plant production (BSc-level)	
<b>Sprache:</b> Englisch	<b>Modulverantwortliche[r]:</b> Prof. Dr. Reimund P. Rötter	
<b>Angebotshäufigkeit:</b> jedes Wintersemester; Göttingen	<b>Dauer:</b> 1 Semester	
<b>Wiederholbarkeit:</b> zweimalig	<b>Empfohlenes Fachsemester:</b>	
<b>Maximale Studierendenzahl:</b> 35		
<b>Bemerkungen:</b> <b>Literature:</b> Literatur, u.a.: Rehm, S., Espig, G. 1991: The Cultivated Plants of the Tropics and Subtropics. Verlag Josef Margraf. Weikersheim, Germany; lecture notes		

Slides, selected articles and other materials will be provided



<b>Georg-August-Universität Göttingen</b> <b>Module M.WIWI-QMW.0004: Econometrics I</b>	6 C 6 WLH
<b>Learning outcome, core skills:</b> This lecture provides a detailed introduction and discussion to the theory of several topics of econometrics. In a practical course the students will apply the methods discussed to real economic data and problems using the statistical software packages Eviews and R.	<b>Workload:</b> Attendance time: 56 h Self-study time: 124 h
<b>Course: Econometrics I (Lecture)</b> <i>Contents:</i> Multiple linear regression model: Estimation, Inference and Asymptotics. Maximum likelihood modeling. Generalized least squares. Stochastic regressors. Instrumental variable estimators. Generalized method of moments, likelihood based inference. Dynamic models, weak exogeneity, cointegration, stochastic integration. <b>Literature:</b> Wooldridge, Jeffrey M. 2006. <i>Introductory econometrics: a modern approach</i> . Mason, OH: Thomson/South-Western; Chapters 1, 2, 3, 4, 5, 6, 8. Verbeek, Marno. 2008. <i>A guide to modern econometrics</i> . Chichester, England: John Wiley & Sons; Chapters 1-4, 6. Judge et al. 1988. <i>Introduction to the theory and practice of econometrics</i> . Wiley, 2nd edition.	2 WLH
<b>Course: Econometrics I (Exercise)</b> <i>Contents:</i> The practical deepens the understanding of the lecture topics by applying the methods from the lecture to economic problems and data, and reviewing and intensify theoretical concepts.	2 WLH
<b>Course: Econometrics I (Tutorial)</b> <i>Contents:</i> The tutorials are small classes with max. 20 students, which give room for applying the concepts to specific problem sets and discussing questions, that students might encounter regarding the concepts addressed in the lecture and practical. A part of the tutorial are hands-on computer exercises using the software R. This enables students to conduct regression analysis in practice and prepares them for others (applied) courses.	2 WLH
<b>Examination: Written examination (90 minutes)</b>	6 C
<b>Examination requirements:</b> Linear regression models, generalized linear regression models. OLS, GLS, EGLS estimation. Multiplikative heteroskedasticity, autocorrelation. LM specification testing, Durbin Watson test. Convergence in probability, convergence in distribution. Asymptotics (consistency, asymptotic normality) of OLS estimators. IV estimation, GMM estimation.	
<b>Admission requirements:</b>	<b>Recommended previous knowledge:</b>

none	Notwendige: Mathematik (lineare Algebra), Statistik. Erwünscht: Einführung in die Ökonometrie (oder vergleichbare Vorlesung)
<b>Language:</b> English	<b>Person responsible for module:</b> Prof. Dr. Helmut Herwartz
<b>Course frequency:</b> each semester	<b>Duration:</b> 1 semester[s]
<b>Number of repeat examinations permitted:</b> twice	<b>Recommended semester:</b> 1 - 2
<b>Maximum number of students:</b> not limited	