

Modulverzeichnis

**für den konsekutiven Master-Studiengang
"Crop Protection" - zu Anlage 2 der Prüfungs-
und Studienordnung für Master-Studiengänge
der Fakultät für Agrarwissenschaften
(Amtliche Mitteilungen I Nr. 26/2023 S. 856)**

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Übersicht nach Modulgruppen

I. Master-Studiengang "Crop Protection"

Es müssen Leistungen im Umfang von insgesamt wenigstens 120 C erfolgreich absolviert werden.

The following examination components with a rating of at least 120 C should be successfully completed:

1. Fachstudium

a. Pflichtmodule

Es müssen folgende Pflichtmodule im Umfang von insgesamt 30 C erfolgreich absolviert werden.

The following obligatory modules amounting to a total of 30 C must be completed successfully.

M.Cp.0002: Internship (9 C, 6 SWS).....	515
M.Cp.0006: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides (6 C, 4 SWS).....	518
M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration (6 C, 4 SWS).....	519
M.Cp.0019: Basic Laboratory Techniques (3 C, 2 SWS).....	527
M.Cp.0026: Scientific Presenting, Writing, Paper Reviewing and Publishing in Crop Protection (6 C, 4 SWS).....	535

2. Professionalisierungsbereich

a. Wahlpflichtmodule

Es müssen Wahlpflichtmodule im Umfang von insgesamt mindestens 54 C erfolgreich absolviert werden. Ferner können Wahlmodule im Umfang von bis zu 18 C aus den Master-Studiengängen in den Agrarwissenschaften der Universität Göttingen und ein Modul (maximal 6 C) aus dem Masterstudiengang einer anderen Fakultät mit thematischem Bezug zum Studiengang frei gewählt werden.

Elective compulsory modules amounting to a total of at least 54 C must be completed successfully. Up to 18 C in the area of professionalisation can be taken by modules from other master courses of studies in the Agricultural Sciences of the University of Göttingen. In addition, upon request to the examination board, a module amounting to a maximum of 6 C from a master course of study of another faculty may be taken and credited for the area of professionalisation.

M.Agr.0009: Biological Control and Biodiversity (6 C, 6 SWS).....	495
M.Agr.0010: Biotechnological Applications in Plant Breeding (6 C, 4 SWS).....	496
M.Agr.0023: Interactions between plants and pathogens (6 C, 4 SWS).....	497
M.Agr.0039: Molecular Techniques in Phytopathology (6 C, 4 SWS).....	499
M.Agr.0045: Mycology (6 C, 4 SWS).....	501

M.Agr.0056: Plant breeding methodology and genetic resources (6 C, 4 SWS).....	502
M.Agr.0057: Plant Virology (6 C, 6 SWS).....	503
M.Agr.0058: Plant herbivore interactions (6 C, 4 SWS).....	504
M.Agr.0094: Basics of Molecular Biology in Crop Protection (6 C, 4 SWS).....	506
M.Agr.0120: Molecular Diagnostic and Biotechnology in Crop Protection (6 C, 4 SWS).....	507
M.Agr.0173: Nematology (3 C, 2 SWS).....	509
M.Agr.0174: Plant Health Management in Tropical Crops (6 C, 4 SWS).....	510
M.Agr.0175: Plant-Herbivore Interactions (Experimental course) (3 C, 2 SWS).....	512
M.Agr.0222: Sugar beet production – from basics to practice (6 C).....	513
M.Cp.0004: Plant Diseases and Pests in Temperate Climate Zones (6 C, 4 SWS).....	516
M.Cp.0005: Integrated Management of Pests and Diseases (6 C, 4 SWS).....	517
M.Cp.0008: Fungal Toxins (6 C, 4 SWS).....	520
M.Cp.0010: Plant Pathology and Plant Protection Seminar (3 C, 2 SWS).....	521
M.Cp.0011: Agricultural Entomology Seminar (3 C, 2 SWS).....	522
M.Cp.0012: Weed Biology and Weed Management (6 C, 6 SWS).....	523
M.Cp.0014: Plant Nutrition and Plant Health (3 C, 2 SWS).....	525
M.Cp.0020: Ecotoxicological Risk Assessment for Plant Protection Products (3 C, 2 SWS).....	528
M.Cp.0023: Plant Pathogenic Bacteria (3 C, 2 SWS).....	530
M.Cp.0024: Digital Techniques for Crop Monitoring (6 C).....	532
M.Cp.0025: Analytical Techniques for Foods and Agricultural Research (6 C, 4 SWS).....	534
M.Cp.0027: Molecular Weed Science (3 C, 3 SWS).....	536
M.SIA.P07: Soil and plant science (6 C, 4 SWS).....	538
M.SIA.P15M: Methods and advances in plant protection (6 C, 4 SWS).....	540
M.SIA.P22: Management of tropical plant production systems (6 C, 4 SWS).....	541

b. Schlüsselkompetenzen

Es muss mindestens eins von zwei Wahlpflichtmodulen im Umfang von 6 C erfolgreich absolviert werden.

At least one of two elective compulsory modules amounting to 6 C must be completed successfully.

M.Cp.0016: Practical Statistics and Experimental Design in Agriculture (6 C, 4 SWS).....	526
M.WIWI-QMW.0004: Econometrics I (6 C, 6 SWS).....	542

3. Masterarbeit

Durch die erfolgreiche Anfertigung der Masterarbeit werden 24 C erworben.

24 C are awarded for successful completion of the master thesis.

4. Kolloquium zur Masterarbeit

Durch das erfolgreiche Absolvieren des Kolloquiums zur Master-Arbeit werden 6 C erworben.

6 C are awarded for successful completion of the colloquium on the master thesis.

II. Double/Joint-Degree Programm "PlantHealth"

1. Erstes Studienjahr

Es müssen Leistungen im Umfang von insgesamt wenigstens 60 C nach Maßgabe der nachfolgenden Bestimmungen erfolgreich absolviert werden.

Modules with a rating of at least 60 credits in total should be successfully completed in accordance with the following provisions.

a. Pflichtmodule

Es müssen folgende Module im Umfang von insgesamt 27 C erfolgreich absolviert werden:

The following modules with a rating of 27 C in total must be successfully completed:

M.Cp.0016: Practical Statistics and Experimental Design in Agriculture (6 C, 4 SWS).....	526
M.Cp.0026: Scientific Presenting, Writing, Paper Reviewing and Publishing in Crop Protection (6 C, 4 SWS).....	535
M.Cp.0019: Basic Laboratory Techniques (3 C, 2 SWS).....	527
M.Cp.0004: Plant Diseases and Pests in Temperate Climate Zones (6 C, 4 SWS).....	516
M.Cp.0005: Integrated Management of Pests and Diseases (6 C, 4 SWS).....	517

b. Wahlpflichtmodule

Es müssen wenigstens vier der folgenden Module im Umfang von insgesamt wenigstens 27 C erfolgreich absolviert werden:

At least four of the following modules amounting to a total of at least 27 C must be completed successfully:

M.Agr.0058: Plant herbivore interactions (6 C, 4 SWS).....	504
M.Cp.0006: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides (6 C, 4 SWS).....	518
M.Cp.0012: Weed Biology and Weed Management (6 C, 6 SWS).....	523
M.Cp.0014: Plant Nutrition and Plant Health (3 C, 2 SWS).....	525
M.Agr.0094: Basics of Molecular Biology in Crop Protection (6 C, 4 SWS).....	506

c. Schlüsselkompetenzen

Es müssen Module aus dem zulässigen Angebot des Kompetenzbereichs Sprachkenntnisse im Umfang von insgesamt wenigstens 6 C erfolgreich absolviert werden.

Modules from the permitted range of the competence area language skills amounting to a total of at least 6 C must be completed successfully.

2. Zweites Studienjahr

Es müssen Leistungen im Umfang von insgesamt wenigstens 60 C nach Maßgabe der nachfolgenden Bestimmungen erfolgreich absolviert werden.

Modules with a rating of at least 60 credits in total should be successfully completed in accordance with the following provisions.

a. Pflichtmodul

Es muss das folgende Modul im Umfang von 6 C erfolgreich absolviert werden:

The following module with a rating of 6 C must be successfully completed:

M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration (6 C, 4 SWS)..... 519

b. Wahlpflichtmodule

Es müssen vier der folgenden Module im Umfang von insgesamt 24 C erfolgreich absolviert werden:

Four of the following modules amounting to 24 C in total have to be completed successfully:

M.Agr.0058: Plant herbivore interactions (6 C, 4 SWS).....	504
M.Cp.0008: Fungal Toxins (6 C, 4 SWS).....	520
M.Agr.0023: Interactions between plants and pathogens (6 C, 4 SWS).....	497
M.Agr.0039: Molecular Techniques in Phytopathology (6 C, 4 SWS).....	499
M.Agr.0057: Plant Virology (6 C, 6 SWS).....	503

c. Masterarbeit

Durch die erfolgreiche Anfertigung der Masterarbeit werden 24 C erworben.

24 C are awarded for successful completion of the master thesis.

d. Kolloquium zur Masterarbeit

Durch das erfolgreiche Absolvieren des Kolloquiums zur Masterarbeit werden 6 C erworben.

By successfully completing the colloquium on the master thesis, 6 C will be acquired.

Georg-August-Universität Göttingen		6 C
Module M.Agr.0009: Biological Control and Biodiversity		6 WLH
Learning outcome, core skills: 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.		Workload: Attendance time: 84 h Self-study time: 96 h
Course: Biological Control and Biodiversity (Lecture, Exercise, Seminar) <i>Contents:</i> <ul style="list-style-type: none"> • Theoretical foundations of biological control • Natural enemy behaviour and biological control success • Biodiversity and ecosystem services in agroecosystems • Practical examples of biological control projects • Plant-herbivore-predator-interactions Principles of population dynamics • Biological weed control 		6 WLH
Examination: Written exam (70%; 45 minutes) and presentation (30%; approx. 20 minutes) Examination prerequisites: Regular attendance at seminar and exercise and presentation of a seminar talk. Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Michael Georg Rostás	
Course frequency: each winter semester; Göttingen	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 12		
Additional notes and regulations: Lecture based materials; details provided during lectures.		

Georg-August-Universität Göttingen Modul M.Agr.0010: Biotechnological Applications in Plant Breeding <i>English title: Biotechnological Applications in Plant Breeding</i>	6 C 4 SWS
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Lernziele/Kompetenzen: Studierende erlernen Kenntnisse über biotechnologische Methoden selbständig auf aktuelle Probleme anzuwenden und Lösungswege zu entwickeln. Sie lernen komplexe wissenschaftliche Texte zu analysieren, aufzuarbeiten und in verständlicher Form an Dritte weiterzugeben	Arbeitsaufwand: Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
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Lehrveranstaltung: Biotechnological Applications in Plant Breeding (Blockveranstaltung,Praktikum,Vorlesung,Seminar) <i>Inhalte:</i> Die Studenten erwerben in diesem Modul vertiefte theoretische und praktische Kenntnisse über biotechnologische und molekulargenetische Methoden in der Pflanzenzüchtung. Im Rahmen der studentischen Seminare werden dazu aktuelle Anwendungen in der Pflanzenzüchtung und der Landwirtschaft vorgestellt und deren Auswirkungen kritisch diskutiert. Zentrale theoretische und praktische Inhalte sind die Anwendung der schnellen In-vitro-Vermehrung, Erzeugung und Nutzung von Hapliden, interspezifische sexuelle und somatische Hybridisierung, direkter und indirekter Gentransfer, biochemische und molekulare Charakterisierung transgener Pflanzen, aktuelle Anwendungen in der Gentechnik und Risikobeurteilung, Eigenschaften und Anwendung verschiedener molekularer Markertypen in der Pflanzenzüchtung.	4 SWS
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Prüfung: Klausur (90 Minuten) Prüfungsanforderungen: Vertiefte und komplexe theoretische Kenntnisse über die wichtigsten biotechnologischen Methoden und Anwendungen in der Pflanzenzüchtung	6 C
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Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine
Sprache: Englisch	Modulverantwortliche[r]: Dr. Christian Möllers
Angebotshäufigkeit: jedes Wintersemester	Dauer: 1 Semester
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:
Maximale Studierendenzahl: 12	

Georg-August-Universität Göttingen Modul M.Agr.0023: Interactions between plants and pathogens <i>English title: Interactions between Plants and Pathogens</i>		6 C 4 SWS
Lernziele/Kompetenzen: Kenntnisse komplexer Wechselwirkungen zwischen Pflanzen und Pathogenen. Ableitung wissenschaftlicher Fragestellungen und kritische Bewertung von angewendeten Methoden unterstützt durch eigene praktische Labortätigkeit.		Arbeitsaufwand: Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
Lehrveranstaltung: Interaktionen zwischen Pflanzen und phytopathogenen Organismen sowie Viren (Praktikum, Vorlesung) <i>Inhalte:</i> Das Modul beschäftigt sich mit der Wechselwirkung von Pflanzen mit phytopathogenen Pilzen, Bakterien und Viren. Hierbei werden pilzliche, bakterielle und virale Aspekte der Infektionslehre behandelt. In diesem Rahmen wird die Sporenkeimung, das Eindringen und die Ausbreitung der Pathogene (incl. Virusreplikation und –verbreitung) in der Wirtspflanze dargestellt. An die Infektionslehre folgt die Beschreibung pflanzlicher Resistenzfaktoren (präformierte und induzierte), deren Bedeutung sowie pathogeneitige Möglichkeiten der Inaktivierung. Als weitere Inhalte des Moduls werden Phänome, wie die induzierte und/oder systemisch erworbene Resistenz (SAR) beschrieben. Detailliert wird auf das Pathosystem <i>Agrobacterium tumefaciens</i> / dikotyle Pflanzen eingegangen. An konkreten Beispielen wird die Gen-für-Gen Hypothese und ihr experimenteller Nachweis erläutert. Hierbei wird kurz und beispielhaft auf bekannte Resistenzgene eingegangen. Im Rahmen des praktischen Teils werden von den Studierenden Phytoalexinextraktionen aus Raps vorgenommen sowie analytische Verfahren zu deren Nachweis und biologischen Wirksamkeit mittels chromatografischer Techniken (HPLC bzw. TLC-Bioassay) durchgeführt.		4 SWS
Prüfung: Klausur (90 Minuten) Prüfungsvorleistungen: Teilnahme am praktischen Teil des Moduls im Anschluss an die Vorlesung und Anfertigung eines von den Prüfenden inhaltlich akzeptierten Protokoll Prüfungsanforderungen: Profunde Kenntnisse von Infektionsvorgängen bei Viren, Bakterien und Pilzen, von Mechanismen der Wirterschließung, Pathogenerkennung, Signaltransduktion, präformierter und induzierter Resistenzmechanismen sowie der Gen-für-Gen Hypothese		6 C
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine	
Sprache: Englisch	Modulverantwortliche[r]: Dr. Birger Koopmann	
Angebotshäufigkeit: jedes Wintersemester	Dauer: 1 Semester	
Wiederholbarkeit:	Empfohlenes Fachsemester:	

zweimalig	
Maximale Studierendenzahl: 36	

Georg-August-Universität Göttingen Modul M.Agr.0039: Molecular Techniques in Phytopathology <i>English title: Molecular Techniques in Phytopathology</i>		6 C 4 SWS
Lernziele/Kompetenzen: Methodische Kenntnisse im Umgang mit Nukleinsäuren, Ableitung von methodischen Lösungsansätzen für eigene wissenschaftliche Fragestellungen. Präsentation von Ergebnissen und grundlegenden Methodenkenntnissen sowie Ergebnisinterpretation im Rahmen einer Abschlussbesprechung.	Arbeitsaufwand: Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden	
Lehrveranstaltung: Molecular Techniques in Phytopathology (Praktikum, Vorlesung) <i>Inhalte:</i> Im Rahmen dieses Praktikums werden mit Hilfe von Experimenten grundlegende molekularbiologische Techniken vermittelt: Isolierung von Plasmiden und Gesamt-DNA sowie DNA-Fragmenten aus Agarosegelen, Restriktionsanalyse, Agarose-Gelelektrophorese, Klonierung von PCR-Produkten (enzymatische Modifikation, Ligation), Transformation und in vivo Amplifikation von Plasmiden, DNA Blotting, Markierung von DNA-Sonden mit nicht-radioaktiven Methoden (DIG-dUTP), Southern-Hybridisierung und immunologische Detektion von hybridisierten Sonden mit Chemolumineszenzsubstraten, ITS-RFLP-Analysen bei pilzlichen Rapspathogenen, Real-time PCR-Diagnostik von mykotoxinbildenden pilzlichen Getreidepathogenen. In dem begleitenden Vorlesungsteil werden grundlegende und anwendungs-bezogene nukleinsäurechemische und proteinchemische Kenntnisse vermittelt, die zum Verständnis nicht nur der vorgestellten Techniken notwendig sind. Zudem werden in einem anwendungsbezogenen Teil Lösungsansätze für bestimmte wissenschaftliche Fragestellungen dargelegt und diskutiert.		4 SWS
Prüfung: Mündlich (ca. 30 Minuten) Prüfungsvorleistungen: Anfertigung eines für den Prüfenden akzeptierten Praktikumsprotokolles Prüfungsanforderungen: Grundlegende Kenntnisse über den Aufbau von Nukleinsäuren, von Enzymen und deren Einsatz in molekular-biologischen Experimenten, von Standardanalyseverfahren (Southern Blot, PCR, Elektrophorese, DNA-Sequenzierung), der Analyse multivariater Daten sowie dem Einsatz verschiedener Verfahren für wissenschaftliche Fragestellungen.		6 C
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine	
Sprache: Englisch	Modulverantwortliche[r]: Dr. Birger Koopmann	
Angebotshäufigkeit: jedes Sommersemester	Dauer: 1 Semester	
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:	

Maximale Studierendenzahl:	
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Georg-August-Universität Göttingen		6 C
Module M.Agr.0045: Mycology		4 WLH
Learning outcome, core skills: <ul style="list-style-type: none"> • Learning methodology for handling of filamentous fungal organisms <i>in vitro</i> • Gaining knowledge on the phytopathogenic, mutualistic and ecological roles of filamentous fungi • Acquiring skills in the experimentation with phytopathogenic fungi on plants • Training in the taxonomic determination of fungal organisms 		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Mycology (Internship, Exercise) Contents: <ul style="list-style-type: none"> • Overview on the ecology and taxonomy of phytopathogenic fungi • Exercises for the taxonomic determination of fungi based on morphology and molecular genetic analysis • Isolating of fungi from diverse habitats (soil, water, plants) • Inoculation of plants with phytopathogenic fungi and determination of disease severity • Determination of soil fungistasis • Race determination in powdery mildew • Assessment of fungicide resistance in fungi • in situ studies of infection by biotrophic and necrotrophic pathogens 		4 WLH
Examination: Oral examination (approx. 20 minutes) Examination prerequisites: Attendance of the laboratory course, oral presentation of experiments, drawings of selected fungi with labelling of important microscopical structures Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: Microbiology, plant pathology, crop protection	
Language: English	Person responsible for module: Dr. Anke Sirrenberg	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 12		

Georg-August-Universität Göttingen Modul M.Agr.0056: Plant breeding methodology and genetic resources <i>English title: Plant Breeding Methodology and Genetic Resources</i>		6 C 4 SWS
Lernziele/Kompetenzen: Die Studierenden lernen, klassische und molekulare Methoden und Techniken bei der Lösung pflanzenzüchterischer Problemen zu integrieren. Sie lernen, eigene Schlussfolgerungen aus klassischen und neuesten Veröffentlichungen zu ziehen und diese Wissenschaftlern und Studierenden verständlich, knapp und klar zu vermitteln.	Arbeitsaufwand: Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden	
Lehrveranstaltung: Plant breeding methodology and genetic resources (Vorlesung) <i>Inhalte:</i> Grundlagen der Zuchtmethodik: Populationsgenetik, Zuchtmethoden in der Klon-, Linien-, Hybrid- und Populationszüchtung, Marker-gestützte Selektion für monogene und polygene Merkmale. Nutzung pflanzengenetischer Ressourcen: Wildarten, ex-situ und in-situ-Erhaltung, on-farm-Management. Züchtung für marginale Standorte mit Beispielen aus gemäßigten und tropischen Breiten. Dieses Modul und das Modul "Genetic Principles of Plant Breeding" ergänzen sich wechselseitig.		4 SWS
Prüfung: Klausur (Gewicht: 80%, Dauer: 90 Minuten) und Präsentation, Referat oder Korreferat (Gewicht: 20%, Dauer: ca. 20 Minuten) Prüfungsanforderungen: Grundlagen zu: Populationsgenetik, Einsatz von Markern in der Pflanzenzüchtung, Konzepte zur Nutzung Pflanzengenetischen Ressourcen. Gute Kenntnisse: 'Pre-Breeding', Kategorien und Methoden der Pflanzenzüchtung.		6 C
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine	
Sprache: Deutsch, Englisch	Modulverantwortliche[r]: apl. Prof. Dr. Wolfgang Link	
Angebotshäufigkeit: jedes Sommersemester	Dauer: 1 Semester	
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:	
Maximale Studierendenzahl: 25		

Georg-August-Universität Göttingen		6 C
Module M.Agr.0057: Plant Virology		6 WLH
Learning outcome, core skills: 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		Workload: Attendance time: 80 h Self-study time: 100 h
Course: Plant Virology (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
Examination: Written exam (45 minutes, weighing 50%) and term paper (max. 20 pages, weighing 50%) Examination prerequisites: Regular participation at the practical course following the lecture Examination requirements: Understanding of the imparted detection methods and knowledge about virus biology		6 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Mark Varrelmann	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 16		

Georg-August-Universität Göttingen Modul M.Agr.0058: Plant herbivore interactions <i>English title: Plant-Herbivore Interactions</i>		6 C 4 SWS
Lernziele/Kompetenzen: Kenntnisse komplexer Wechselwirkungen zwischen Pflanzen und herbivoren Insekten. Ableitung wissenschaftlicher Fragestellungen und kritische Bewertung von angewendeten Methoden durch Erarbeitung eines eigenen Seminarbeitrages zu aktuellen Forschungsergebnissen.	Arbeitsaufwand: Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden	
Lehrveranstaltung: Plant herbivore interactions (Vorlesung, Seminar) <i>Inhalte:</i> Das Modul beschäftigt sich mit der Wechselwirkung zwischen Pflanzen und herbivoren Insekten. Die Diversität der beteiligten Organismen und der Lebensgemeinschaften werden dargestellt. Auf der Seite der Pflanzen werden die verschiedenen Abwehrstrategien unter Einschluss der Resistenzmechanismen gegenüber Fraßfeinden exemplarisch vorgestellt. Die sensorischen Ausstattungen der herbivoren Insekten zur Erkennung der Pflanzen werden beschrieben. Multiple Interaktionen zwischen Pflanzen, Fraßfeinden und natürlichen Gegenspielern sowie die Anwendungsmöglichkeiten werden diskutiert. Schließlich werden die Wechselbeziehungen zwischen Pflanzen und blütenbestäubenden bzw. blütenbesuchenden Insekten behandelt. Im Rahmen des Semiarbeits werden von den Studierenden jeweils aktuelle Forschungsergebnisse vorgestellt und im Zusammenhang mit den in den Vorlesungen behandelten Themen diskutiert.		4 SWS
Prüfung: Klausur (Gewicht: 67%, Dauer: 45 Minuten) und Präsentation, Referat oder Korreferat (Gewicht: 33%, Dauer: ca. 20 Minuten) Prüfungsvorleistungen: Teilnahme an den Seminaren und Bearbeitung und Vorstellung eines Seminarbeitrages. Prüfungsanforderungen: Umfassende Kenntnisse der wesentlichen Faktoren der Wirtspflanzenwahl herbivorer Insekten, Abwehrstrategien der Pflanzen, Determinanten für herbivore Lebensgemeinschaften an spezifischen Pflanzen, multitrophische Interaktionen zwischen Pflanzen, herbivoren Insekten und Gegenspielern; Wechselbeziehungen zwischen Pflanzen und Bestäubern. Beide Teilprüfungen müssen erfolgreich absolviert und bestanden werden.		6 C
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine	
Sprache: Englisch	Modulverantwortliche[r]: Prof. Dr. Michael Georg Rostás	
Angebotshäufigkeit: jedes Wintersemester	Dauer: 1 Semester	
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:	

Maximale Studierendenzahl:	
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20	
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Georg-August-Universität Göttingen Modul M.Agr.0094: Basics of Molecular Biology in Crop Protection <i>English title: Basics of Molecular Biology in Crop Protection</i>		6 C 4 SWS
Lernziele/Kompetenzen: Verständnis der Grundlagen wichtiger agrarwissenschaftlicher Untersuchungsmethoden wie ELISA und PCR, Verständnis der biochemischen und molekularbiologischen Grundlagen von Züchtung und pflanzlicher Resistenzen gegen Schaderreger.		Arbeitsaufwand: Präsenzzeit: 56 Stunden Selbststudium: 124 Stunden
Lehrveranstaltung: Grundlagen und Anwendung der Molekularbiologie in der Phytomedizin (Vorlesung) <i>Inhalte:</i> In der landwirtschaftlichen Forschung und Diagnostik werden vermehrt biochemische und molekularbiologische Methoden verwendet. Die Vorlesung vermittelt die Grundlagen, die zum Verständnis dieser Methoden notwendig sind, und bereitet auf weiterführende Praktika und Vorlesungen vor. Inhalte sind: Cytologie, Aufbau der Zellwände verschiedener Organismengruppen, Struktur und Funktion von Makromolekülen (Proteine, DNA, RNA, Kohlenhydrate), Funktion und Regulation von Enzymen, DNA-Replikation, Transkription und Translation, Regulationsmechanismen, Einführung in das Prinzip grundlegender molekularer Nachweismethoden, Lipide und Membranen, Phytohormone, ausgewählte Sekundärstoffe.		4 SWS
Prüfung: Klausur (90 Minuten) Prüfungsanforderungen: Aufbau von Makromolekülen, Ausgangsstoffe, typische Bindungstypen, Funktion, Bedeutung, Regulationsmechanismen auf Protein- und Nukleinsäureebene, Phytohormone, Sekundärstoffwechsel		6 C
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine	
Sprache: Englisch	Modulverantwortliche[r]: Dr. Anke Sirrenberg	
Angebotshäufigkeit: jedes Sommersemester	Dauer: 1 Semester	
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:	
Maximale Studierendenzahl: 20		

Georg-August-Universität Göttingen Module M.Agr.0120: Molecular Diagnostic and Biotechnology in Crop Protection	6 C 4 WLH
Learning outcome, core skills: Participants will be able to understand nucleic acid based as well as immunologic diagnostic tools for detection of plant pathogens and pests. More the ability to select appropriate diagnostic techniques and make informed decisions regarding their development and application is one of the core skills. Students shall understand the role of biotechnology in plant protection and resistance breeding to be able to assess the potentials and risks of GM crops and other GMOs in plant protection.	Workload: Attendance time: 65 h Self-study time: 115 h
Course: Molecular Diagnostic and Biotechnology in Crop Protection (Lecture) <i>Contents:</i> Principles and applications of diagnostic techniques in plant protection with a focus on nucleic acid analysis (characteristics as accuracy, detection level, multiplexing, quantification, portability, and designability). Nucleic acid detection: RT-PCR viruses, group specific primers, multiplex dsRNA-diagnosis (viruses), qPCR (SYBR, TaqMan, fluorophores), Nested-PCR, RFLP, MLSA, ddPCR (phytoplasma), Barcoding (fungi, insects, weeds) SNP-genotyping (KASP, etc.), RCA (DNA viruses, Padlock-probes), Hybridisation (dot-blot viruses, RNAscope, SABER-FISH), DNA-arrays (microarrays), HTS/NGS/ Transcriptomics (Virome/metagenomics analysis, discovery of new virus diseases), Sequencing platforms (Roche 454, Illumina, Solid and Ion Torrent, SMRT and MinION nanopore sequencing), Isothermal amplification techniques (LAMP, RPA, HAD, NASBA), CRISPR based diagnosis (viruses) Molecular detection of specific traits (fungicide, herbicide, insecticide resistance). Protein detection: ELISA, TPIA, LFA, Immune fluorescence, ISEM electron microscopy, confocal microscopy and fluorescent labelled viruses, Immuno(capture)-PCR, Luminex. Biotechnology in plant protection: Crop trait targets, techniques to increase genetic diversity, cisgenesis, NGS and third generation sequencing, omics, genetically modified organisms (GMOs) in engineering resistance to viruses, pests, herbicides, bacterial and fungal pathogens, genome editing tools, applications of RNA interference and epigenome modifications, RNAi machinery, cross-kingdom RNAi, VIGS, HIGS, SIGS, Epigenetics, regulation and public acceptance, risk assessment	4 WLH
Examination: Oral examination (approx. 30 minutes) Examination requirements: Understanding concepts and technical principles of molecular diagnostic methods and the application of molecular markers and plant biotechnology in plant protection. Demonstration of the ability to read primary literature that describes applications of techniques covered by the module	6 C
Admission requirements: none	Recommended previous knowledge: none

Language: English	Person responsible for module: Prof. Dr. Mark Varrelmann
Course frequency: each winter semester	Duration: 1 semester[s]
Number of repeat examinations permitted: twice	Recommended semester:
Maximum number of students: 30	

Georg-August-Universität Göttingen		3 C
Module M.Agr.0173: Nematology		2 WLH
Learning outcome, core skills: Basic knowledge of nematode biology, importance as pests; basic methods with regard to their detection, identification and measures of control, use of beneficial nematodes in biological insect control programs; their role in regulation of processes in ecosystems.		Workload: Attendance time: 40 h Self-study time: 50 h
Course: Nematology (Praktikum, Seminar) <i>Contents:</i> The module deals with the biology of nematodes and their importance in plant protection. The most important taxa of nematodes are presented using permanent slides and living specimen; the most important morphological characters will be identified. Interactions between plant parasitic nematodes, their host plants and antagonistic microorganisms will be discussed. The use of nematodes for inundative biological control will be discussed as well. During the course, students will become familiar with different plant parasitic nematode species and will learn basic techniques for detection and identification. Plant parasitic nematodes will be used to demonstrate effects of different compounds on activity and viability.		
Examination: Written examination (45 minutes) Examination requirements: Basic knowledge of morphological characters of nematodes; species identification by DNA-barcoding ability to discriminate between different feeding types of nematodes; biological control of and biological control with nematodes; importance of nematodes for biodiversity		3 C
Admission requirements: none	Recommended previous knowledge: Basic knowledge of molecular diagnostics	
Language: English	Person responsible for module: Dr. Birger Koopmann	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: from 3	
Maximum number of students: 12		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Agr.0174: Plant Health Management in Tropical Crops		
Learning outcome, core skills: Students are able to recognize pests and diseases of tropical crops as treated in this course. They critically evaluate scientific and non-scientific publications on crop protection in the tropics. Students are able to create a scientific presentation according to the standards of international conferences and use interactive teaching material; students know the scope and limits of their knowledge in the treated field, they know where to find relevant, reliable information. Students learn to consider subject-related issues from a variety of different perspectives and to work effectively in international teams.		Workload: Attendance time: 36 h Self-study time: 144 h
Course: Plant Health Management in Tropical Crops (Lecture,Excursion,Seminar) <i>Contents:</i> Blended learning module; presentation of the most important pests and diseases of the most important tropical crop plants: symptoms, life cycles and plant health management (eg. in rice, maize, cacao, coffee, bananas). Additional crops may be included according to students´ preferences and practical experience. Introduction to relevant international data banks and networks. Use of scientific videos on selected topics of crop protection in the tropics.		4 WLH
Examination: Written exam (45 min, 40%), Student presentation with discussion (ca. 20 min presentation + ca. 10 min discussion 60%) Examination requirements: <ul style="list-style-type: none"> • Written exam: main groups of causal agents, basic botany of the crop plants treated, basic biology of causal agents (life cycles etc.), recognition of symptoms, knowledge of control strategies. • Presentation: appropriate according to the standard of international conferences: relevant and sound content, clear structure, style, language (written and spoken) and pronunciation, citation and use of sources according to good scientific practice. • You must successfully complete and pass both partial examinations. 		6 C
Admission requirements: none	Recommended previous knowledge: Basics of plant pathology, including basics of integrated pest management	
Language: English	Person responsible for module: Prof. Dr. Michael Georg Rostás	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: from 2	
Maximum number of students: 30		

Additional notes and regulations:

The module is designed as a blended learning-course with strong emphasis on digital material and student based learning. Contact time is reduced to allow thorough preparation of the presentations.

Georg-August-Universität Göttingen Modul M.Agr.0175: Plant-Herbivore Interactions (Experimental course) <i>English title: Plant-Herbivore Interactions (Experimental course)</i>		3 C 2 SWS
Lernziele/Kompetenzen: 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.	Arbeitsaufwand: Präsenzzeit: 40 Stunden Selbststudium: 50 Stunden	
Lehrveranstaltung: Plant-Herbivore Interactions (Experimental course) (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	
Prüfung: Protokoll über die durchgeführten Experimente (max. 15 Seiten) Prüfungsanforderungen: Dokumentation und Interpretation der durchgeführten Versuche entsprechend dem wissenschaftlichen Standard. Seminarvortrag	3 C	
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: M.Agr.0058 Plant-Herbivore Interactions	
Sprache: Englisch	Modulverantwortliche[r]: Prof. Dr. Michael Georg Rostás	
Angebotshäufigkeit: jedes Sommersemester	Dauer: 1 Woche	
Wiederholbarkeit: einmalig	Empfohlenes Fachsemester: ab 2	
Maximale Studierendenzahl: 12		

Georg-August-Universität Göttingen		6 C
Module M.Agr.0222: Sugar beet production – from basics to practice		
Learning outcome, core skills: <ul style="list-style-type: none"> • profound knowledge in the following fields of the sugar value chain: breeding, sugar beet cultivation, plant protection, digitalisation, sustainability and basics on quality and sugar refinery, first insights in individual trending topics of the sugar beet value chain • detailed identification of causal relationships in the process management on the basis of recent scientific knowledge • knowledge enhancement by interpreting scientific figures and tables and their statistics • opportunity of an advanced education particularly suitable as an on-the-job training program • opportunity to develop a professional network with other graduate students and external participants from different professional backgrounds and sugar beet growing areas worldwide 		Workload: Attendance time: 54 h Self-study time: 126 h
Course: Sugar beet production – from basics to practice (Block course, Lecture, Excursion) <i>Contents:</i> Sugar beet is an important crop for sugar production that places high demands on the cultivation system, and field resources such as soil, light and water. The sugar beet cultivation system is being consistently developed further through close cooperation between various stakeholders from agriculture, industry and upstream sectors. To provide a comprehensive insight, this module addresses the agronomically relevant aspects of sugar beet production as a raw material for sugar production, from sowing to harvesting, as well as the basics of sugar extraction. The module focuses on sugar beet breeding, agronomy, physiology and yield formation; sustainability, protection of natural resources, such as soil and biodiversity; basic knowledge on relevant pests, plant diseases, weeds and methods of plant protection; digitalization in sugar beet cultivation; the basics of technological quality and its measurement, as well as processing and sugar extraction. The module consists of lectures by scientists of the Institute of Sugar Beet Research and international lectures by invited speakers, workshops, field trips and excursion. The module is open for master students, PhD students and junior employees of the sugar supply chain.		WLH
Examination: Oral examination (approx. 30 minutes) Examination requirements: Knowledge of the sugar value chain and understanding of different influences on the system on the basis of the latest scientific insights.		6 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Anne-Katrin Mahlein	

Course frequency: each summer semester	Duration: 2 Weeks
Number of repeat examinations permitted: twice	Recommended semester:
Maximum number of students: 25	

Georg-August-Universität Göttingen		9 C
Module M.Cp.0002: Internship		6 WLH
Learning outcome, core skills: 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.		Workload: Attendance time: 240 h Self-study time: 30 h
Course: Internship (Internship) <i>Contents:</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 WLH
Examination: Written report (max. 10 pages) Examination requirements: Practical work in a scientific project in different areas of crop protection, written internship report and seminar presentation.		9 C
Admission requirements: Enrolment in the master's programme Crop Protection	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Rebecka Dücker Prof. Alexey Mikaberidze	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 2 - 3	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0004: Plant diseases and pests in temperate climate zones		
Learning outcome, core skills: 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.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Plant Diseases and Pests in Temperate Climate Zones (Lecture,Excursion,Exercise) <i>Contents:</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 WLH
Examination: Written examination Written exam (45 minutes) (45 minutes) Examination prerequisites: Teilnahme an Exkursionen und Übungen im Feld Examination requirements: 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
Admission requirements: Only for students in the study programmes "Crop Protection", EMJMD PlantHealth and "Sustainable international Agriculture".	Recommended previous knowledge: Once you have successfully completed module B.Agr.0346, Special Phytomedicine, you will no longer be able to take module M.Cp.0004, Plant Diseases and Pests in Temperate Climate Zones.	
Language: English	Person responsible for module: Dr. Birger Koopmann	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: Master: 2	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0005: Integrated management of pests and diseases		
Learning outcome, core skills: 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.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Integrated Management of Pests and Diseases (Lecture) <i>Contents:</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 WLH
Examination: Oral examination Oral examination (20 minutes) (approx. 20 minutes) Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexey Mikaberidze	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: Bachelor: 1 - 6; Master: 1	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0006: Pesticides I: Mode of action and application techniques, resistance to pesticides		
Learning outcome, core skills: 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.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Pesticides I: Mode of Action and Application Techniques, Resistance to Pesticides (Lecture,Excursion) <i>Contents:</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 WLH
Examination: Written examination (90 minutes) Examination requirements: 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
Admission requirements: Only for students from the study programme "Crop Protection" and "Sustainable International Agriculture"	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexey Mikaberidze	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: Bachelor: 1 - 6; Master: 1	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration		
Learning outcome, core skills: 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)		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration (Lecture) <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
Examination: Written examination (90 minutes) Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexey Mikaberidze Dr. Rebecka Dücker	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: Master: 3	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C
Module M.Cp.0008: Fungal toxins		4 WLH
Learning outcome, core skills: 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.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Fungal Toxins (Lecture, Practical course) <i>Contents:</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 WLH
Examination: Written examination (60 minutes) Examination prerequisites: Voraussetzung ist angenommenes Protokoll vom Praktikum Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. M. Alhussein	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 12		

Georg-August-Universität Göttingen		3 C 2 WLH
Module M.Cp.0010: Plant Pathology and Plant Protection seminar		
Learning outcome, core skills: Master 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.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Plant Pathology and Plant Protection Seminar (Seminar) <i>Contents:</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.		2 WLH
Examination: Präsentation, Referat oder Korreferat (ca. 20 Minuten) Examination prerequisites: Teilnahme an 12 Seminaren Examination requirements: Very good knowledge of own area of research and good ways of presentation of own results. Participation in discussion.		3 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexey Mikaberidze Dr. Birger Koopmann	
Course frequency: each semester	Duration: 2 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: from 2	
Maximum number of students: 30		

Georg-August-Universität Göttingen		3 C
Module M.Cp.0011: Agricultural entomology seminar		2 WLH
Learning outcome, core skills: 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.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Agricultural Entomology Seminar (Seminar) <i>Contents:</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 WLH
Examination: Präsentation, Referat oder Korreferat (ca. 20 Minuten) Examination prerequisites: Teilnahme an 12 Seminaren Examination requirements: Very good knowledge of own area of research and good ways of presentation of own results. Participation in discussion.		3 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Michael Georg Rostás	
Course frequency: each semester	Duration: 2 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 30		

Georg-August-Universität Göttingen		6 C 6 WLH
Module M.Cp.0012: Weed biology and weed management		
Learning outcome, core skills: Understanding the biology and control of local and globally important weeds, their taxonomy, life-forms and habitat requirements, as well as their evolution, 30 h distribution, ecology, population dynamics and genetics. Endangered, as well as invasive species, the interactions of weeds and crops (allelopathy and competition) and weed control with direct and indirect measures will be taught.		Workload: Attendance time: 30 h Self-study time: 150 h
Course: Weed Biology and Weed Management (Lecture,Excursion,Seminar) <i>Contents:</i> The module consists of a lecture, the visit of a field trial and the creation of a herbarium in own work according to instructions. In the lecture knowledge about sustainable weed control and the biology of plant species and their potential as weeds is imparted. Direct and indirect control strategies to regulate weeds, considering economic and ecological aspects, are presented. The lecture deals with solutions for individual production systems and their transferability discussed. Advantages and disadvantages of weed control for health, economy, society and ecology are covered. For the herbarium 30 plant species that occur in the agricultural landscape are to be collected in bloom (20-25 dicots and 5-10 monocot species). The plants must be identified correctly. Information about their relevance in the agricultural landscape should also be provided in short form (ecological values, aspects of crop competition and peculiarities).		6 WLH
Examination: Written exam (60%; 60 minutes) and a herbarium prepared as home work (40%) Examination prerequisites: Submission of the herbarium Examination requirements: Basic knowledge on the biology and ecology of arable weeds and knowledge about direct and indirect measures of weed control as well as the ability to identify key weed species.		6 C
Admission requirements: none		Recommended previous knowledge: none
Language: English		Person responsible for module: Dr. Rebecka Dücker
Course frequency: each summer semester		Duration: 1 semester[s]
Number of repeat examinations permitted: twice		Recommended semester:
Maximum number of students:		

30	
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Georg-August-Universität Göttingen		3 C
Module M.Cp.0014: Plant Nutrition and Plant Health		2 WLH
Learning outcome, core skills: Understanding the relationship between plant nutrition and plant health and its significance in the value-added food chain.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Plant Nutrition and Plant Health (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
Examination: Written examination (90 minutes) Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Klaus Dittert	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 25		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0016: Practical statistics and experimental design in agriculture		
Learning outcome, core skills: 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.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Practical Statistics and Experimental Design in Agriculture (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
Examination: Written examination (90 minutes) Examination requirements: Knowledge of the basic concepts of statistics and their application in agricultural science and in the use of software packages like SAS.		6 C
Admission requirements: none	Recommended previous knowledge: Mathematics, statistics	
Language: English	Person responsible for module: Dr. Christian Kluth	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 30		
Additional notes and regulations: This module and M.Agr.0036 "Methodisches Arbeiten: Versuchsplanung und -auswertung" are mutually exclusive.		

Georg-August-Universität Göttingen		3 C
Module M.Cp.0019: Basic Laboratory Techniques		2 WLH
Learning outcome, core skills: 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.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Basic Laboratory Techniques (Exercise) <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
Examination: Written examination (45 minutes) Examination prerequisites: Akzeptiertes Protokoll Examination requirements: Basic knowledge of calculation of concentrations, sterilization techniques, importance and composition of buffers, principles of photometry, centrifugation, ELISA and PCR.		3 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Anke Sirrenberg	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: Master: 1	
Maximum number of students: 20		

Georg-August-Universität Göttingen Module M.Cp.0020: Ecotoxicological Risk Assessment for Plant Protection Products	3 C 2 WLH
Learning outcome, core skills: 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.	Workload: Attendance time: 28 h Self-study time: 62 h
Course: Ecotoxicological Risk Assessment for Plant Protection Products (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"> • Methods in ecotoxicology (e.g. standardisation and quality of testing) • Exposure pathways, bioavailability • Selection of test species and testing methods • Risk assessment and risk management 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
Examination: Written examination (60 minutes) Examination requirements: Knowledge of ecotoxicological testing methods and their evaluation for the risk assessment of plant protection products.	3 C
Admission requirements: Plant Health/Crop Protection	Recommended previous knowledge: none

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

Georg-August-Universität Göttingen		3 C
Module M.Cp.0023: Plant Pathogenic Bacteria		2 WLH
Learning outcome, core skills: Students gain knowledge on the most important plant pathogenic bacteria, their biology, dissemination, life cycles, diagnosis and control, as well as on their molecular and taxonomic features. They are able to understand the theoretical background and to apply the knowledge in practice. In particular, students are able to recognize plant bacterial diseases presented during this course and to make a preliminary diagnosis. They critically evaluate scientific and non-scientific publications on plant pathogenic bacteria, and know where to find relevant and reliable information. Students are able to prepare a scientific presentation according to the standards of international conferences and use interactive teaching material.		Workload: Attendance time: 28 h Self-study time: 62 h
Course: Plant Pathogenic Bacteria (Lecture, Seminar) <i>Contents:</i> Blended learning module; this module comprises a general and a specific part. The general part addresses the following topics: history of phytobacteriology; origin and evolution of phytopathogenic bacteria; diversity and taxonomy of phytopathogenic bacteria; general features of phytopathogenic bacteria, their cultivation and preservation; epidemiology and ecology of plant bacterial diseases, and economical significance; pathogenesis, host-pathogen interactions and symptomatology; diagnosis and management of plant bacterial diseases, including the use of bacteriophages. The specific part is organized in separate sessions, according to the main bacterial taxa causing diseases on plants. In particular, it covers the most important phytopathogenic bacteria and diseases they cause, and includes sections on their distribution, economic significance, symptomatology, epidemiology, pathogen characteristics and disease management.		2 WLH
Examination: Written exam, 90 min, 70%; Student presentation with discussion, 30% Each part of the examination must be passed with at least 50% of the maximum possible number of score points Examination requirements: Each part of the examination must be passed with at least 50% of the maximum possible number of score points.		3 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Birger Koopmann Dr. Nemanja Kuzmanovic	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: 1 - 3	

Maximum number of students:	
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30	
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<p>Georg-August-Universität Göttingen Module M.Cp.0024: Digital Techniques for Crop Monitoring</p>	<p>6 C</p>
<p>Learning outcome, core skills: Learning outcome, core skills: The module teaches basic principles for the use of digital tools in greenhouse and field experiments. It covers camera-based methods for single plant and plot scale (RGB, spectral, 3D) as well as the use of GPS for georeferenced measurements. Furthermore, the analysis of data, for single recordings and time series, is taught. Upon completion of the module, the students are able to independently carry out measurements with selected technologies of crop plants according to a measurement protocol, combine reference measurements, carry out analyses and compile results. Furthermore, they can plan complex measurement procedures for their own experimental projects and assess the effort involved. Finally they obtain skills to interpret sensor data with an agricultural meaning.</p>	<p>Workload: Attendance time: 40 h Self-study time: 140 h</p>
<p>Course: Digital Techniques for Crop Monitoring (Block course, Internship) <i>Contents:</i> In the course, selected topics on the use of digital technologies in field experiments for crop science are focused. The students are enabled to actively use optical sensors. In addition to data acquisition, the main content focuses on the processing of raw data, evaluation, and combination with reference data. Reference data is extracted with established tools from the plant sciences and geo-referenced in the field using GPS, in a way that an allocation to the optical measurement methods is possible. Data acquisition is carried out using digital carrier platforms (robot, drone, etc.). Another essential content is the summary of metadata of field trials in order to store trial data in such a way that they can be reused and used by third parties.</p> <p>The module is divided into two sub-aspects: (i) Theoretical basics as a lecture and (ii) hands-on exercises with digital technologies. While the practical handling is taught in the exercises, the theoretical lecture teaches the overall context, the differences between the sensors, as well as the analysis using sample data sets, and the application of complex evaluation algorithms.</p> <p><i>Literature: latest publication from the providing institute</i></p> <p><i>Course frequency: each winter semester</i></p>	
<p>Examination: Providing a technical video (5 Minutes). This professional video includes a structured introduction into the topic (sensors and measuring) Idea description and screenplay must be provided.</p> <p>Examination prerequisites: Regular participation in the block course</p> <p>Examination requirements: Understanding of digital methods and sensor technologies and their application at different scales. Deep understanding of the planning of a digital survey in field testing. Knowledge of methods of evaluation, referencing and interpretation of optical sensor data.</p>	<p>6 C</p>

Admission requirements: none	Recommended previous knowledge: none
Language: English	Person responsible for module: Prof. Anne-Katrin Mahlein, Dr. Stefan Paulus
Course frequency: 1	Duration: 1 semester[s]
Number of repeat examinations permitted: twice	Recommended semester: from 1
Maximum number of students: 20	

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0025: Analytical Techniques for Foods and Agricultural Research		
Learning outcome, core skills: This module aims to provide students with a comprehensive understanding of chemical analysis techniques employed in agricultural research through a combination of practical experiments and lectures, which will cover the analysis of major chemical groups in plants, fungi, and pesticide residues.		Workload: Attendance time: 70 h Self-study time: 110 h
Course: Analytical Techniques for Foods and Agricultural Research (Lecture, Practical course) <i>Contents:</i> The module will include various topics related to chemical analysis methods in agricultural sciences. The analysis of plant primary and secondary metabolites (such as carbohydrates, amino acids, organic acids, phytohormones, phytoalexins, glucosinolates, and volatiles) will be discussed. Moreover, the analysis of mycotoxins, fungal secondary metabolites, and pesticide residues will be covered. The module will introduce the fundamental analytical chemistry methods, including sample preparation, separation techniques, detection methods, characterization, and quantification of metabolites using state-of-the-art chromatographic and mass spectrometric methods.		4 WLH
Examination: oral exam (30 min, 70%), Student presentation with discussion (ca. 20 min presentation + ca. 10 min discussion, 30%)		6 C
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Mohammad Alhussein	
Course frequency: not specified	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students: 16		

Georg-August-Universität Göttingen		6 C 4 WLH
Module M.Cp.0026: Scientific Presenting, Writing, Paper Reviewing and Publishing in Crop Protection		
Learning outcome, core skills: Students are expected to learn writing scientific papers in English, to design graphics and tables, to conduct a literature search, to prepare oral and poster presentations, and to analyze, critically discuss and review scientific papers. Students know the process of scientific publication, from writing to submitting and reviewing and become aware of the principles in good scientific practice.	Workload: Attendance time: 56 h Self-study time: 124 h	
Course: Scientific Presenting, Writing, Paper Reviewing and Publishing in Crop Protection (Lecture,Seminar) <i>Contents:</i> Students will learn how to properly write scientific texts (papers, applications etc.), how to collect information from scientific literature by literature search, how to prepare a presentation on a selected topic in crop protection and how to present it. In a particular 'journal club', students will analyze the structure, content, relevance and soundness of scientific papers and present and discuss their evaluations in the classroom. They will learn the principles and institutions established to save-guard good scientific practice and avoid scientific misconduct. They obtain insight into the process of scientific publishing from the preparation and submission of a manuscript until revision and correspondence with publishers and reviewers.	4 WLH	
Examination: Reviewing an individual scientific paper and presenting the review in the class, 15 min PPT (30%) Discussion of scientific papers (20%) Reviewing a paper and writing a review in a written exam, 120 Min (50%) Examination prerequisites: Participation in the lectures and discussion seminars	6 C	
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Prof. Dr. Alexey Mikaberidze Dr. Rebecka Dücker	
Course frequency: each summer semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester: until 2	
Maximum number of students: not limited		

Georg-August-Universität Göttingen		3 C
Module M.Cp.0027: Molecular Weed Science		3 WLH
Learning outcome, core skills: 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.		Workload: Attendance time: 30 h Self-study time: 60 h
Course: Molecular Weed Science (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.		3 WLH
Examination: Written examination (90 minutes) Examination prerequisites: Attendance of the laboratory course. Examination requirements: 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
Admission requirements: none	Recommended previous knowledge: none	
Language: English	Person responsible for module: Dr. Jean Wagner	
Course frequency: each winter semester	Duration: 1 semester[s]	
Number of repeat examinations permitted: twice	Recommended semester:	
Maximum number of students:		

20	
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<p>Georg-August-Universität Göttingen Universität Kassel/Witzenhausen Modul M.SIA.P07: Soil and plant science <i>English title: Soil and plant science</i></p>	<p>6 C 4 SWS</p>
<p>Lernziele/Kompetenzen: Brückenmodul um die neuesten Kenntnisse in den pflanzenbaulichen Grundlagenfächern insbesondere im Hinblick auf Fragen der ökologischen Landwirtschaft, die üblicherweise so nicht gelehrt werden, zu vermitteln. Studierende, die diesen Kurs besucht haben können den weiterführenden pflanzenbaulichen Modulen folgen.</p>	<p>Arbeitsaufwand: Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden</p>
<p>Lehrveranstaltung: Soil and plant science (Vorlesung,Seminar) <i>Inhalte:</i> Einfluss von Bodenbildungsprozessen auf physikalische Eigenschaften (Bodenart, Bodenwasser, Porenraum), chem. Eigenschaften (Puffervermögen, Austauschkapazität, Nährstoffe) und biol. Eigenschaften (organische Substanz, Edaphon). Nährstoffverfügbarkeit und Nährstoffmobilisierung unter konventionellen und ökologischen Anbaubedingungen, Haupt- und Spurennährstoffe und Nahrungsqualität. Züchtungsziele für unterschiedliche landwirtschaftliche Systeme: Pflanzenmorphologie, -genetik und –züchtung, Pflanzendomestikation und Nutzung, Charakterisierung und Beurteilung, Nutzung genetischer Ressourcen in der Pflanzenzüchtung. Genetik von Wirts-Parasit Interaktionen, Epidemiologie der Pflanzenkrankheiten, Pflanzenabwehrmechanismen, Insektenphysiologie und –ökologie. Spezifische allgemeine und wissenschaftliche Artikel, die sich mit dem Zielland der Exkursion befassen werden über eine E-Learning Plattform zur Verfügung gestellt</p>	<p>4 SWS</p>
<p>Prüfung: Klausur (120 Minuten) oder Fachgespräch (ca. 20 Minuten) Prüfungsanforderungen: Physikalische Eigenschaften (Bodenart, Bodenwasser, Porenraum); chem. Eigenschaften (Puffervermögen, Austauschkapazität, Nährstoffe); biol. Eigenschaften (organische Substanz, Edaphon); Bodenbildung und –klassifikation. Rolle der Haupt- und Spurennährstoffe in Pflanzen, Nährstoffverfügbarkeit und Nährstoffmobilisierung, Pflanzennährstoffe und Nahrungsqualität. Pflanzenmorphologie, -genetik und –züchtung, Prinzipien der Pflanzendomestikation und Nutzung, Charakterisierung und Beurteilung, Nutzung genetischer Ressourcen in der Pflanzenzüchtung, genetische Grundlagen für die Züchtung. Prinzipien der Pflanzenkrankheiten und Entomologie, Entstehung von Pflanzenkrankheiten, Epidemiologie, Pflanzenabwehrmechanismen, Insektenphysiologie und –ökologie.</p>	<p>6 C</p>
<p>Zugangsvoraussetzungen: keine</p>	<p>Empfohlene Vorkenntnisse: keine</p>

Sprache: Englisch	Modulverantwortliche[r]: Dr. Helmut Saucke
Angebotshäufigkeit: jedes Wintersemester; Witzenhausen	Dauer: 1 Semester
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:
Maximale Studierendenzahl: nicht begrenzt	

Georg-August-Universität Göttingen Universität Kassel/Witzenhausen Modul M.SIA.P15M: Methods and advances in plant protection <i>English title: Methods and advances in plant protection</i>		6 C 4 SWS
Lernziele/Kompetenzen: Studierende sind imstande, veröffentlichte Ergebnisse kritisch zu evaluieren und dieses Wissen auf aktuelle Probleme im Feld anzuwenden. Ebenso sind sie imstande, Probleme zu identifizieren und experimentelle und analytische Lösungsansätze zu formulieren.		Arbeitsaufwand: Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden
Lehrveranstaltung: Methods and advances in plant protection (Vorlesung, Exkursion, Übung) <i>Inhalte:</i> <ul style="list-style-type: none"> • Fortgeschrittener Kurs in Pflanzenschutz (Entomologie und Pathologie) • Methodologie und Auswertungsmethoden im Pflanzenschutz • Fallstudien spezieller Pflanzenschutzthemen im ökologischen Anbau in Form von Vorlesungen, Seminar und praktischen Übungen 		4 SWS
Prüfung: Klausur (120 Minuten) oder Fachgespräch (ca. 20 Minuten) (Gewichtung: 70%) und Protokoll (max. 3 Seiten) oder Referat (ca. 10 Minuten) (Gewichtung: 30%) Prüfungsanforderungen: Fortgeschrittenes Wissen im Pflanzenschutz (Entomologie und Pathologie), Methodologie und Auswertungsmethoden im Pflanzenschutz anhand von Fallstudien spezieller Pflanzenschutzthemen.		6 C
Zugangsvoraussetzungen: Pflanzenschutz (mindestens 6 ECTS) oder Brückenmodul M.SIA.P07 Soil and Plant Science	Empfohlene Vorkenntnisse: keine	
Sprache: Englisch	Modulverantwortliche[r]: Prof. Dr. Maria Renate Finckh	
Angebotshäufigkeit: jedes Wintersemester; Witzenhausen	Dauer: 1 Semester	
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:	
Maximale Studierendenzahl: nicht begrenzt		

Georg-August-Universität Göttingen Universität Kassel/Witzenhausen Modul M.SIA.P22: Management of tropical plant production systems <i>English title: Management of tropical plant production systems</i>		6 C 4 SWS
Lernziele/Kompetenzen: Kenntnisse der botanischen, ökologischen und agronomischen Fakten der vorgestellten Nutzpflanzen und Anbausysteme, Zuordnung von Nutzpflanzen und Anbausystemen zu verschiedenen Standortbedingungen und systemorientierte Beurteilung einer nachhaltigen Produktion an ausgewählten Standorten.		Arbeitsaufwand: Präsenzzeit: 60 Stunden Selbststudium: 120 Stunden
Lehrveranstaltung: Management of tropical plant production systems (Vorlesung) <i>Inhalte:</i> Vorstellung der wichtigsten Nutzpflanzen der Tropen und Subtropen bezüglich Botanik, Morphologie, Herkunft, klimatischer und ökologischer Ansprüche, Anbausystem, Ernteverfahren, Bedeutung in Landnutzungssystemen, Nutzung als Nahrungsmittel, Futter, Rohstoff und zur Energiegewinnung aus Biomasse. Diskussion der verschiedenen Anbausysteme in den Tropen und Subtropen und des spezifischen Managements für eine nachhaltige Steigerung der Produktivität Literatur Rehm, S., Espig, G. 1991: The Cultivated Plants of the Tropics and Subtropics. Verlag Josef Margraf. Weikersheim, Germany; lecture notes		4 SWS
Prüfung: Written exam (90 minutes) or oral exam (ca. 30 minutes) Prüfungsanforderungen: Wissen der botanischen, ökologischen und agronomischen Fakten der vorgestellten Nutzpflanzen und Anbausysteme. Kenntnisse der Zuordnung von Nutzpflanzen und Anbausystemen an verschiedene Standortbedingungen, sowie systemorientierte Beurteilung einer nachhaltigen Produktion an ausgewählten Standorten.		6 C
Zugangsvoraussetzungen: keine	Empfohlene Vorkenntnisse: keine	
Sprache: Englisch	Modulverantwortliche[r]: Prof. Dr. Reimund Paul Rötter	
Angebotshäufigkeit: jedes Wintersemester; Göttingen	Dauer: 1 Semester	
Wiederholbarkeit: zweimalig	Empfohlenes Fachsemester:	
Maximale Studierendenzahl: 35		
Bemerkungen: Die schriftliche Prüfung erfolgt am ersten, die mündliche Prüfung am zweiten Termin.		

Georg-August-Universität Göttingen		6 C 6 WLH
Module M.WIWI-QMW.0004: Econometrics I		
Learning outcome, core skills: 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.		Workload: Attendance time: 56 h Self-study time: 124 h
Course: Econometrics I (Lecture) <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.		2 WLH
Course: Econometrics I (Exercise) <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
Course: Econometrics I (Tutorial) <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
Examination: Written examination (90 minutes)		6 C
Examination requirements: 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.		
Admission requirements: none	Recommended previous knowledge: Required: Mathematics (linear algebra), statistics. Desirable: Introduction to Econometrics (or comparable lecture).	
Language: English	Person responsible for module: Prof. Dr. Helmut Herwartz	
Course frequency: each semester	Duration: 1 semester[s]	

Number of repeat examinations permitted: twice	Recommended semester: 1 - 2
Maximum number of students: not limited	