DIRECTORY OF MODULES OFFERED IN ENGLISH LANGUAGE

COURSES OFFERED IN ENGLISH AT THE UNIVERSITY OF GÖTTINGEN
ACADEMIC YEAR 2017/2018

FACULTY OF AGRICULTURAL SCIENCES

GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

A very warm welcome!

The University of Göttingen features an outstanding study environment for both exchange and full-degree students. All courses of study benefit from an excellent research-oriented environment formed by a broad network including five Max Planck Institutes, the German Primate Centre, the German Aerospace Centre and the Academy of Science and Humanities: the Göttingen Campus. An increasing number of lectures and courses are taught in the English language attracting more and more international students. This catalogue provides an impression of what is available.

This catalogue of courses taught in English varies from faculty to faculty and the courses available to you depend on whether you are an exchange student coming to Göttingen for a semester or an academic year, or whether you are a full degree student coming to Göttingen to complete an entire degree programme. You may take most courses in the programme you are enrolled in, however in a few cases restrictions may apply. Selecting courses from other subjects or other departments might require negotiations. If you have any questions, please contact the study advisor in charge of your subject.

Prior to their arrival in Göttingen exchange students have to set up a learning agreement. In some cases restrictions will apply, e.g. signing up for certain laboratory courses may not be possible. Generally exchange students are required to take at least half of the lectures and courses within their chosen subject.

Full degree students must first apply for a study place. Links to websites with application guidelines and deadlines are provided by some subjects/faculties. If not stated otherwise please visit:

http://www.uni-goettingen.de/en/3811.html

In any case, you are very welcome to browse through this catalogue to find/check out courses that suit your interests! For the complete course catalogue of the University of Göttingen see:

https://univz.uni-goettingen.de/qisserver/

We look forward to welcoming you in Göttingen!

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The Faculty of Agricultural Sciences offers two full master programs in English language:

- **Sustainable International Agriculture**: *http://www.uni-goettingen.de/en/96913.html*
- **Crop Protection**: *http://www.uni-goettingen.de/de/135654.html*

Since the Faculty offers almost no Bachelor courses in English language, the exchange students are invited to take part in the master courses independent of their level at the home university.

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Georg-August-Universität Göttingen **Module M.Cp.0004: Plant diseases and pests in temperate climate zones**	6 C 4 WLH

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) *Contents*: 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 (45 minutes) **Examination prerequisites:** regular attendance at field practical and excursion **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: none	**Recommended previous knowledge:** none
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 **Module M.Cp.0005: Integrated management of pests and diseases**	6 C 4 WLH

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) *Contents*: 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 (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. Andreas von Tiedemann
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** Master: 1
Maximum number of students: 30	

Georg-August-Universität Göttingen **Module M.Cp.0006: Pesticides I: Mode of action and application techniques, resistance to pesticides**	6 C 4 WLH

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) *Contents*: Mode of action and application techniques of plant protection products (fungicides, insecticides, acaricides, herbicides), the characeristics 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. Andreas von Tiedemann
Course frequency: each winter semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** Master: 1
Maximum number of students: 30	

Georg-August-Universität Göttingen **Module M.Cp.0007: Pesticides II: Toxicology, Ecotoxicology, Environmental Metabolism, Regulation and Registration**	6 C 4 WLH

Learning outcome, core skills: Students will understand the basic and applied pesticide toxicology and ecotoxicology, the development of pesticides and risk assessment, and the regularory 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) *Contents*: 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. Andreas von Tiedemann
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 **Module M.Cp.0010: Plant pathology and plant protection seminar**	3 C 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: Plant Pathology and Plant Protection Seminar (Seminar) *Contents*: 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. *Course frequency:* jedes Wintersemester	4 WLH
Examination: Presentation (ca. 20 minutes) **Examination prerequisites:** Participation in 12 seminars **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. Andreas von Tiedemann
Course frequency: each semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** Master: 2
Maximum number of students: 30	

Georg-August-Universität Göttingen **Module M.Cp.0011: Agricultural entomology seminar**	3 C 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) *Contents*: 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: Presentation (ca. 20 minutes) **Examination prerequisites:** Participation in 12 seminars **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. Stefan Vidal
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 **Module M.Cp.0012: Weed biology and weed management**	6 C 4 WLH

Learning outcome, core skills: Knowledge of the main weed species, their characteristics, ecology, competition and damage. Students will understand the dynamics and parameters of weed populations. Knowledge of weed control methods, their possibilities and limitations. Students will be able to formulate criteria for selecting suitable weed management techniques. They will know how to theoretically work on a topic in weed science and understand international aspects of weed dissemination, populations and weed management.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Weed Biology and Weed Management (Lecture) *Contents*: The module deals with the biology of weeds and management of weed populations. The botanical weed characteristics and population biology will be presented. Important weeds of Europe and other parts of the world will be presented and the damage caused discussed. Different methods of control are presented: chemical, physical control as well as preventive cultural methods. Actual problems in crop production caused by weeds are discussed. Legal and international aspects of weed dissemination, damage caused and methods of control will be discussed. In the seminar part students will present recent research projects and discuss these in context with the topics presented in the lecture.	4 WLH
Examination: Oral examination (ca. 20 minutes,67%) and Presentation (ca. 20 minutes,33%) **Examination prerequisites:** Oral presentation **Examination requirements:** 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

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Horst-Henning Steinmann
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.0013: Applied weed science**	6 C 4 WLH

Learning outcome, core skills: Knowledge of the main weed species, their characteristics, ecology, competition and damage. Students will be able to identify the main weed species. Understanding weed population dynamics. Knowledge of possibilities and limitations of weed control. Knowledge of the mode of action of chemical and non chemical weed control. Students will be able to diagnose and explain weed problems in the field and develop problem solving competences.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Weeds and Herbicides/Applied Weed Science (Lecture) *Contents*: The module deals with practical aspects of weed biology and weed management strategies. The botanical weed characteristics will be presented in the field and in the greenhouse. The main weeds species of Europe and their characteristics for identification will be studied. Weed management strategies in use today and difficulties in weed control will be shown and discussed on field trips. In the practical students will prepare a herbarium of weeds collected in the field.	4 WLH
Examination: Oral examination (ca. 20 minutes, 66%), written paper (max. 10 pages, 34%) **Examination prerequisites:** Participation in the practical and excursions, preparation of a herbarium. **Examination requirements:** Basic knowledge of the main weed species and characteristics for identification. Knowledge of the mode of action of the main control methods including examples. Ability to recognize weed populations of respective crop production systems in the field and to develop control strategies. Preparation of a written paper (excursion or practical protocol) and a herbarium.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Horst-Henning Steinmann
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 **Module M.Cp.0014: Plant Nutrition and Plant Health**	3 C 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) *Contents*: 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 exam (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 **Module M.Cp.0015: Molecular weed science**	6 C 4 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: 60 h Self-study time: 120 h

Course: Molecular Weed Science (Lecture, Practical course) *Contents*: 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
Examination: Oral examination (approx. 20 minutes) **Examination prerequisites:** Participation I the laboratory practical **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 summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students:	

20	

Georg-August-Universität Göttingen **Module M.Cp.0016: Practical statistics and experimental design in agriculture**	6 C 4 WLH

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) *Contents*: 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 by 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:** Prof. Dr. Heiko C. Becker
Course frequency: each summer semester	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** Master: 3
Maximum number of students: 30	

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A01: Organic livestock farming under temperate and tropical conditions**	6 C 4 WLH

Learning outcome, core skills: Animal Welfare I: Students should acquire a basic understanding of animal welfare, familiarize with practical problems and scientific concepts including how to assess animal health and welfare at different process levels. Advances in animal nutrition and animal health: Students are introduced in scientific methods and approaches, appropriate to estimate and assess problems within organic livestock production in relation to imbalances in nutrient supply and production diseases. Sustainable forage production systems: Students are able to assess relationships between sward management and structural (yield, botanic) and functional (nutrient efficiency) sward characteristics. Organic livestock farming in the (sub)tropics: Students are able to discuss under which conditions organic livestock farming can be introduced in (sub)tropical countries or regions.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Courses:	
1. Animal Welfare I (Lecture) *Contents*: Principles of animal welfare in organic livestock farming; scientific methods to assess animal health and welfare.	1 WLH
2. Advances in animal nutrition and animal health (Lecture) *Contents*: Advances in animal nutrition and animal health; possibilities and limitations within organic livestock farming to ensure a high level of animal health; strategies within animal nutrition to increase the efficiency in the use of limited resources; system-oriented approach versus technical approaches.	1 WLH
3. Sustainable forage production systems (Lecture) *Contents*: Sustainable forage production systems; design and management of a sustainable forage production; management of forage quality and biodiversity on grassland; minimizing nutrient losses towards water and atmosphere.	1 WLH
4. Organic livestock farming in the (sub)tropics (Lecture) *Contents*: Characterization and evaluation of organic livestock farming systems in different locations of southern regions/countries; pros and cons of organic livestock farming under different bio-physical and socioeconomic conditions.	1 WLH

Publikationen zu Fallstudien werden über eine E-learning Plattform bereitgestellt	
Examination: Written examination (120 minutes) **Examination requirements:** Animal Welfare (Prof. Dr. Knierim) Basic knowledge in scientific concepts of animal health and welfare and in organic livestock farming; scientific methods to assess animal welfare. Animal nutrition and Animal health (Prof. Dr. Sundrum) Basic knowledge regarding organic cattle and pig production in Europe and possibilities and limitations within organic livestock farming to ensure a high level of animal health; strategies within animal nutrition to increase the efficiency in the use of limited resources in a system-oriented approach. Sustainable forage production (Prof. Dr. Wachendorf) Knowledge in the function of the sustainable development of forage crops, productivity and quality of grassland in relation to local conditions and management. Organic livestock farming in the (sub)tropics (Prof. Dr. Schlecht) Knowledge about the characterization and evaluation of organic livestock farming systems under (sub)tropical conditions; bio-physical and socioeconomic pros and cons of organic livestock farming in different regions.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Albert Sundrum
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 27	

Additional notes and regulations:
Literature:

Animal Welfare I:

Appleby, M.C., Hughes, B.O. (eds) 1997: Animal welfare. CAB International,

Wallingford; Vaarst, M. et al. (eds.) 2004: Animal health and welfare in organic agriculture. CAB International, Wallingford.

Advances in animal nutrition and animal health:

Sundrum, A. (2012): “Healthy food” from healthy cows. In: Konvalina, P. (ed.), Organic Farming and Food Production. InTech Book, p. 95-120.

Sundrum, A. (2012): Health and welfare of organic livestock and its challenges. In J. Ricke & O’Bryan (ed.), Organic meat production and processing. Wiley-Blackwell p. 89-112.

Sundrum, A. (2007): Quality production in organic, low-input and conventional pig production. In: Cooper, J., U. Niggli, C. Leifert (eds.). Handbook of Organic Food Safety and Quality. Woodhead Publishing, p. 144-177.

Sustainable forage production systems:

Hopkins, A. 2000: Grass, its production and utilization. Blackwell Science, Oxford, UK;

Cherney J.H. 1998: Grass for Dairy Cattle CABI Publishing, Exon, UK; Frame, J. 1992:

Improved Grassland Management. Farming Press Books, Ipswich, UK.

Organic livestock farming in the (sub)tropics:

Different publications of case studies are provided via an E-learning platform.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A02M: Epidemiology of international and tropical animal infectious diseases**	6 C 4 WLH

Learning outcome, core skills: Based on a scientific and practical up-to-date level, students know to evaluate and develop modern and effective livestock hygiene and husbandry concepts and to integrate them into complex quality management programs. Graduates are trained to be competent in implementing and communicating their knowledge in a multidisciplinary occupational setting that establishes epizootic control programs.	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: Epidemiology of international and tropical animal infectious diseases (Lecture, Exercise) *Contents*: Infectious diseases play an enormous role in international animal health control. National health and veterinary authorities, as well as international organizations (WHO, FAO) are very much involved in the surveillance of epidemics and establishment of health and hygiene monitoring programs. These efforts will increase in future, because of a further globalization of international markets, and will require well-educated experts collaborating worldwide in this multidisciplinary field. This module will give a generalized view of current epidemics together with a specialized understanding of infectious diseases and hygienic programs in subtropical and tropical countries. Characteristics of the biology of relevant infectious agents like parasites, fungi and bacteria together with their toxins, viruses, and prions will be presented in detail. Some of these germs included in this unit cause severe zoonotic diseases with a lethal danger for humans. Immunological host-defence mechanisms of wild and domestic farm animals against pathogens will be discussed together with modern strategies of active and passive immunizations. Diagnostic methods presently available and new biotechnological approaches in future assay and vaccine development will be demonstrated. The adaptation of practical health and standardized quality management processes to various animal production systems (ruminants, pigs, poultry) and the corresponding management measurements will be explained. The view will deeply focus on environmental impacts (water, soil, air hygiene), epizootiology and modern tools in epizootiological research. It will include biology and eradication of vectors (insects, ticks) transmitting pathogens of animal and zoonotic diseases, as well as biological and chemical methods for vector control. In the laboratory course, this module will also communicate well-established techniques of microbiological and parasitological diagnostics. Students will be practically trained in classical methods and in modern biochemical, immunological, biotechnological and molecular biological techniques for the detection of infectious agents, toxins and noxious substances. Tissue culture procedures for vaccine or antibody development are also used. Modification of livestock-environment interactions through human management are discussed.	4 WLH
Examination: Oral examination (approx. 90 minutes)	6 C

Examination requirements: Knowledge of current veterinary epidemic and infectious diseases inclusive emerging diseases. Background of hygiene and eradication programs. Profound knowledge in important infectious agents (parasites, fungi, bacteria, viruses) as well as toxins and prions. Skills in immunologic defense mechanisms of wildlife, zoo and domesticated animals in connection with modern active and passive vaccination strategies and biotechnological vaccine development. Knowledge in modern diagnostic tools as well as in biology and control of biological vectors (ticks, midges).	

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of soil, plant and animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Dr. Claus-Peter Czerny
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:

Literature:

Lecture based materials.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A03M: International and tropical food microbiology and hygiene**	6 C 4 WLH

Learning outcome, core skills:	**Workload:**
Based on a scientific and practical up-to-date level, students know to evaluate and develop modern and effective food hygiene concepts and to integrate them into complex quality management programs. Graduates are competent to implement and to communicate their knowledge in a multidisciplinary occupational area establishing epizootic control programs in food microbiology and hygiene. They are able to understand international experts of public health authorities and collaborate in international and multidisciplinary platforms including control, monitoring, and research.	Attendance time: 84 h Self-study time: 96 h

Course: International and tropical food microbiology and hygiene (Lecture, Exercise) *Contents*: Infectious and toxic pathogens cause most of the food-borne impacts on human health all over the world. Global markets require an international surveillance system together with standardized food hygiene regulations. This module will give a generalized view of currently and internationally relevant food-borne zoonotic diseases, epidemics and food hygiene programs together with a specialized view on the conditions in subtropical and tropical countries. The biology of infectious agents (parasites, fungi, yeasts, bacteria, viruses, prions, together with their toxins) responsible for contaminations and intoxications of human food of animal origin will be discussed in detail. Some of these germs cause severe zoonotic diseases with a lethal potential for humans or certain age groups. Special characteristics of germ resistance in the food matrices meet, milk and eggs as well as in the corresponding products are elucidated along the complete manufacturing processes: from stable to table. Deterioration and spoilage of foodstuffs by microorganisms will be discussed as well. Diagnostic methods presently available for the detection of contaminated or spoiled nourishments and new biotechnological approaches in future assay designs will be analysed. The adaptation of practical hygiene and standardized quality management adjustment factors to various animal production systems (ruminants, pigs, poultry) as well as to the subsequent production processes will be explained together with the corresponding management measurements. This includes food conservation procedures, germ depletion and eradication techniques (cleaning, disinfection, autoclaving, sterilization). Beside negative microbial effects influencing food quality, positive effects especially of bacteria and fungi in food production will also be presented. Biotechnological aspects of genetic engineering of foodstuff supplements or directed genetic germ design will be discussed. In a laboratory course on food microbiology, this module will also communicate well-established techniques of microbiological and parasitological diagnostics in food matrices. Students will be practically trained in classical methods and in modern biochemical, immunological, biotechnological and molecular biological techniques for the detection of food-borne infectious agents, toxins and noxious substances.	4 WLH

Vorlesungsbegleitende Materialien	
Examination: Oral examination (approx. 90 minutes) **Examination requirements:** Knowledge in current food-borne zoonoses, programs in food hygiene and requirements for their implementation in tropical and subtropical countries. Background of the biology of infectious agents, tenacity of special microorganisms and microbial spoilage of foodstuffs, available diagnostic tools for detection of contaminated or spoiled foodstuffs and about new biotechnological diagnostic assays. Skills in practical hygiene norms, normative documents and standardized international quality management systems, foodstuff conservation, germ depletion and inactivation as well as in positive influences of bacteria and fungi on foodstuff production.	

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of soil, plant and animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Dr. Claus-Peter Czerny
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Additional notes and regulations:
Literature:

Lecture based materials.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A04: Livestock reproduction physiology**	6 C 4 WLH

Learning outcome, core skills: Strong foundation in reproduction physiology as well as the development of creative potential and the fostering of independent thought are of focus; Other skills students develop include gathering and integrating information on how to solve problems; effective communication skills; self learners; as well as awareness of global issues driving changes in livestock sciences.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Livestock reproduction physiology (Lecture, Excursion, Exercise) *Contents*: Functional anatomy of reproduction; physiology of reproduction in livestock (hormones, growth factors, ovigenesis and fertilization, spermatogenesis, reproductive cycles, mating behaviour, fertilization, gestation, prenatal physiology, parturition, postpartum recovery, lactation); assisted reproductive technologies (artificial insemination, pregnancy diagnosis, preservation of embryos, embryo transfer, in vitro fertilization, sexing, cloning, transgenics); stem cells; ethics. Hafez B., Hafez, E.S.E. 2000: Reproduction in Farm Animals 7th ed. Lippincott Williams & Wilkins Publishing; Bearden, H.J., Fuquay, J.W., Willard, S.T. 2004: Applied Animal Reproduction, 6th ed. Pearson Prentice Hall Publishing; Squires, E.J. 2003: Applied Animal Endocrinology 1st ed. CABI Publishing; Pineda, M.H., Dooley, M.P. 2003: Mc Donald's Veterinary Endocrinology and Reproduction 5th ed. Blackwell Publishing. Senger P.L. (2003): Pathways to pregnancy and parturition (2nd edition). Current conceptions, Inc.	4 WLH
Examination: Oral examination (approx. 30 minutes, 70%) and written report (max. 10 pages, 30%) **Examination requirements:** The examinee should show her/his potential to understand the principles of reproductive physiology and to illustrate profound differences among various livestock species. Special focus will also be laid on the species-specific application of advanced assisted reproductive technologies.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of animal sciences
Language: English	**Person responsible for module:** Prof. Dr. sc. agr. Christoph Knorr
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**

Maximum number of students: 10	

Additional notes and regulations:
After successful conclusion of M.Agr.0069, M.Agr.0070 and B.Agr.0331 students can not complete M.SIA.A04

Literature:

Hafez B., Hafez, E.S.E. 2000: Reproduction in Farm Animals 7th ed. Lippincott Williams & Wilkins Publishing; Bearden, H.J., Fuquay, J.W., Willard, S.T. 2004: Applied Animal Reproduction, 6th ed. Pearson Prentice Hall Publishing; Squires, E.J. 2003: Applied Animal Endocrinology 1st ed. CABI Publishing; Pineda, M.H., Dooley, M.P. 2003: Mc Donald's Veterinary Endocrinology and Reproduction 5th ed. Blackwell Publishing. Senger P.L. (2003): Pathways to pregnancy and parturition (2nd edition). Current conceptions, Inc.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A05: Aquaculture in the tropics and subtropics**	6 C 4 WLH

Learning outcome, core skills: Students get to know basic principles of aquaculture and the ecological and socio- economic aspects of this resource utilization. They see the functions of aquaculture¿in system relationships and know the distinct utilisation variants. They are capable of analysing the advantages and disadvantages of the different aquaculture systems and are able to evaluate the possibilities of a sustainable intensification of such systems in a multidisciplinary approach.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Aquaculture in the tropics and subtropics (Lecture, Excursion, Exercise) *Contents*: This module provides an introduction to aquaculture in the tropics and subtropics with a focus on fresh-water fish farming. This resource can be managed independently or integrated with other ecological and socioeconomic aspects. The module covers: • biological and ecological principles; • aquaculture and aqua-agriculture systems; • tropical fish candidates and their performance in relation to production systems; specific breeding and raising methods; • functions and products of aquaculture. Vorlesungsbegleitende Materialien	4 WLH
Examination: Oral examination (approx. 20 minutes) **Examination requirements:** Knowledge of the biological and ecological aquaculture in the tropics, the various aquaculture systems, as well as integrated agri-aquaculture systems. Knowledge about tropical fish species and their production efficiency in relation to production systems, as well as knowledge of specific breeding and husbandry practices and socio-economic functions and products of aquaculture.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Gabriele Hörstgen-Schwark
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:

Literature:

Lecture based notes.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A06: Global aquaculture production, markets and challenges**	6 C 4 WLH

Learning outcome, core skills: Students get to know the most important aquaculture organisms worldwide as well as their prevalent production systems. They learn which national and international regulatory mechanisms influence trade of aquatic products. Through the work on case studies and their presentations, students obtain the capability to evaluate problems, chances and socioeconomic impacts of a globalized and sustainable aquaculture; they are enabled to independently get acquainted with scientific subjects and to apply the acquired knowledge for the consideration of complex conflicts of interest.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Global aquaculture production, markets and challenges (Lecture, Seminar) *Contents*: The production of the world wide most important aquaculture species and ornamentals (i.e. kelp, water hyacinths, water salad, oysters, clams, carp, tilapia, salmon, trout, Litopenaeus vannamei, Penaeus monodon), their distribution channels; national and international markets and trade with aquatic products; international trading agreements, law and their compliance; national and international legislation for the protection of the aquatic environment; aquatic animal health, trade and transboundary issues. Through case studies: Trends and developments of sector management (influence of national authorities, NGOs, societies, communities); socioeconomic impact of aquaculture; contribution to national food self-sufficiency; energy and resource efficiency in aquaculture; environmental management of aquaculture. *Literature:* Lecture based notes. *Course frequency:* jedes Wintersemester	4 WLH
Examination: Oral examination (approx. 20 minutes) **Examination prerequisites:** Project presentation (ca. 20 minutes) **Examination requirements:** Knowledge of the most important aquaculture organisms, their distribution structures, and the national and international markets and trade of aquatic products. Knowledge of the laws, national and international rules to protect the aquatic environment and the standards of hygiene and fish health in cross-border trade.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of animal sciences and agricultural markets
Language:	**Person responsible for module:**

English	Prof. Dr. Gabriele Hörstgen-Schwark
Course frequency: every 4th semester; Start WS 15/16; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A09: Sustainability in organic livestock production under temperate conditions**	6 C 4 WLH

Learning outcome, core skills: System approach in livestock production Reflection on differences in approaches within livestock production from a scientific and practice-oriented perspective following the aim to establish a farm as a sustainable agro-ecosystem. Animal welfare II Students have an advanced understanding of the ethical and biological basis of animal welfare and of scientific animal welfare concepts and methods, in particular in relation to organic husbandry principles.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Courses:	
1. System approach in livestock production (Seminar) *Contents*: Basics of system theory; how to assess the performances and emergent properties of farm systems; differences between technical and systematic approaches in livestock production with respect to different production goals; possibilities and limitations of a systematic approach to improve animal health and efficiency in the use of limited resources. Appleby, M.C., Hughes, B.O. (eds) 1997: Animal welfare. CAB International, Wallingford; Vaarst, M. et al. (eds.) 2004: Animal health and welfare in organic Agriculture. CAB International, Wallingford UK	2 WLH
2. Animal Welfare II (Seminar) *Contents*: Ethics, scientific concepts in animal welfare research, reflection on the different dimensions of welfare on the basis of current scientific papers and taking into account organic principles Appleby, M.C., Hughes, B.O. (eds) 1997: Animal welfare. CAB International, Wallingford; Vaarst, M. et al. (eds.) 2004: Animal health and welfare in organic Agriculture. CAB International, Wallingford UK.	2 WLH
Examination: Homework (max. 30 pages) or presentation (ca. 20 minutes) (50%) and oral exam (ca. 15 minutes, 50%) **Examination requirements:** Knowledge about the potentials and strategies to improve nutrient efficiency when making use of home-grown and bought-in nutrients and to improve animal health status on the farm level in a systemic approach. Advanced knowledge of the ethical, biological and methodological basis of animal welfare research and of animal welfare in organic husbandry.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Ute Knierim
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:

Literature:

System approach in livestock production

Sundrum, A. (2007): Achievements of research in the field of livestock systems. In: Rosati, A., A. Tewolde, C. Mosconi (eds.). Animal Production and animal science worldwide. WAAP book of the year 2006. Wageningen Academic Publishers, p. 95-106. (available in moodle)

Animal welfare II

Appleby, M.C. et al. (Eds.) (2011): Animal welfare. 2nd ed., CABI, Wallingford; Vaarst, M. et al. (eds.) 2004: Animal health and welfare in organic
Agriculture. CAB International, Wallingford UK.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A10: Livestock nutrition and breeding under (sub)tropical conditions**	6 C 4 WLH

Learning outcome, core skills: Students are able: • to describe the effects of abiotic and biotic environmental influences on behaviour and physiology of different livestock species and to discuss respective adaptation strategies of animals; • to analyse the opportunities and limitations of feeding, management and breeding strategies for an optimization of livestock production under specific agro-ecological settings; • to individually explain and discuss such topics for a selected livestock species or breed in an oral seminar presentation or written essay.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Livestock nutrition and breeding under (sub)tropical conditions (Lecture, Seminar) *Contents*: This module analyses the physiological basis of livestock husbandry in the Tropics and Subtropics. The adaptation of the most widely used livestock species (cattle, small ruminants, camelids, buffalo, poultry, pigs) to the climatic conditions and to qualitatively and quantitatively variable fodder supply is studied. Possibilities to reduce the negative impact of environmental factors on animal production through adapted management strategies are analyzed. Opportunities and limitations of breeding strategies for the improvement of animal production under the given ecological and economic conditions are discussed and evaluated. Allocation of lecturing time: 50% animal nutrition, 50% animal breeding Payne; W.J.A., Wilson, R.T. 1999: An Introduction to Animal Husbandry in the Tropics. Blackwell Science Ltd., Oxford, UK; Van Soest, P.J. 1994: Nutritional Ecology of the Ruminant. Cornell University Press, Ithaca, US; Wiener, G. 1994: Animal Breeding (Tropical Agriculturist). Macmillan Education, Edinburgh, UK [ISBN-13: 978-0333572986].	4 WLH
Examination: Oral exam (ca. 20 minutes, 75%) and homework (max. 5 pages, 25%) **Examination requirements:** Nutrition part (10 minutes, 50% weight): basics of animal nutrition in (sub-)tropical environments; macro- and micro-nutrients, digestive physiology, feed conversion; interdependency between animal nutrition and health, concept of nutritional wisdom. Breeding part (10 minutes, 50% weight): basics of animal breeding in (sub-)tropical environments; production traits, secondary traits, lifetime productivity, heritability, breeding value, methods to determine breeding value; breeding strategies for the most important livestock species in (sub-)tropical counties.	6 C

Admission requirements: none	**Recommended previous knowledge:**

	Basic knowledge (B.Sc. level) of soil, plant and animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Eva Schlecht
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Payne; W.J.A., Wilson, R.T. 1999: An Introduction to Animal Husbandry in the Tropics. Blackwell Science Ltd., Oxford, UK; Van Soest, P.J. 1994: Nutritional Ecology of the Ruminant. Cornell University Press, Ithaca, US; Wiener, G. 1994: Animal Breeding (Tropical Agriculturist). Macmillan Education, Edinburgh, UK [ISBN-13: 978-0333572986].

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A11: Tropical animal husbandry systems**	6 C 4 WLH

Learning outcome, core skills: Students are able to: understand the impact of the natural and economic environment on the evolution of different types of husbandry systems as well as on their orientation and intensity of production; gain understanding for parameters that have to be considered when aiming at the improvement of livestock husbandry systems within a given framework; individually analyse and present a specific tropical livestock production system.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Tropical animal husbandry systems (Lecture, Seminar) *Contents*: This module provides an extensive overview on the different forms of animal husbandry systems in developing and transformation countries of Africa, Asia and Latin America, ranging from camel nomadism in deserts to beef ranching and intensive dairying in tropical highlands. The system-specific strategies of livestock management are analysed in view of their ecological and economic sustainability. The (potential) interactions of livestock with other components of the farming system are explored, thereby differentiating between market and subsistence oriented systems. The role of additional factors influencing livestock production systems such as cultural, social, economical and political frame conditions are discussed. Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S., Courbois, C. 1999: Livestock to 2020. The next food revolution. FAO Discussion Paper 28, FAO Rome, Italy; Devendra, C., Thomas, D., Jabbar, M.A. and Zerbini, E., 2000: Improvement of Livestock Production in Crop-Animal Systems in Agro-ecological Zones of South Asia. ILRI, Nairobi, Kenya; Falvey, L., Chantalakhana, C. (eds) 1999: Smallholder Dairying in the Tropics. ILRI, Nairobi, Kenya	4 WLH
Examination: Written exam (90 minutes, 75%) and oral seminar presentation (ca. 15 minutes, 25%) **Examination requirements:** abiotic and biotic conditions of animal husbandry in the (sub-)Tropics; characteristics, opportunities/constraints of pastoral, agro-pastoral, silvo-pastoral, aquatic, industrial and urban systems; species-specific management and production (cattle, sheep, goat, camel, yak, pig, poultry).	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of plant and animal sciences or agricultural economics
Language:	**Person responsible for module:**

English	Prof. Dr. Eva Schlecht
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Delgado, C., Rosegrant, M., Steinfeld, H., Ehui, S., Courbois, C. 1999: Livestock to 2020. The next food revolution. FAO Discussion Paper 28, FAO Rome, Italy; Devendra, C., Thomas, D., Jabbar, M.A. and Zerbini, E., 2000: Improvement of Livestock Production in Crop-Animal Systems in Agro-ecological Zones of South Asia. ILRI, Nairobi, Kenya; Falvey, L., Chantalakhana, C. (eds) 1999: Smallholder Dairying in the Tropics. ILRI, Nairobi, Kenya

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A13M: Livestock-based sustainable land use**	6 C 4 WLH

Learning outcome, core skills: To understand the interactions of livestock with the natural resource base and their site- and management specific positive or negative environmental impacts; To get acquainted with and test methodological approaches used in field research on livestock-environment interactions; To learn about simple modelling approaches and the significance of their results.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Livestock-based sustainable land use (Lecture, Exercise) *Contents*: This module highlights the general positive and negative impacts of livestock and livestock management on the natural resources (air, water, soil vegetation), specifically under (sub)tropical conditions, at the plot to the watershed scale. It discusses options for sustainable livestock-based land use, thereby building upon the beneficial impacts of animals on soils and plants. Management options for reducing negative environmental effects of livestock (gaseous emissions, nutrient excretion) are highlighted, and possibilities for consolidating the interests of livestock keepers with international conventions are discussed. The students are introduced, in lectures, own reading and practical field tests to up-to-date quantitative and qualitative methods that are used in studies on animal-environment interactions. Simple modelling approaches that depict animal-environment interactions at the plot level up to the watershed scale are presented and tested by the participants. Steinfeld, H., Gerber, P., Wassenaar, T., Castel, V., Rosales, M., de Haan, C. 2006: Livestock's long shadow. Fao, Rome, Italy; Specific scientific articles, distributed in the course.	4 WLH
Examination: Written examination (90 minutes) **Examination requirements:** Influences of animal husbandry / the individual animal on its environment: soil fertility and soil erosion, pasture vegetation, nutrient transfers, greenhouse gas emissions; livestock keeping versus nature conservation; methods for assessing quality and quantity of pasture vegetation; methods to determine the animal's behavior at pasture and its feed intake.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of soil, plant and animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Eva Schlecht
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]

Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Steinfeld, H., Gerber, P., Wassenaar, T., Castel, V., Rosales, M., de Haan, C. 2006: Livestock's long shadow. Fao, Rome, Italy; Specific scientific articles, distributed in the course.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E02: Agricultural price theory**	6 C 4 WLH

Learning outcome, core skills: Significance of prices from individual and societal viewpoint, agricultural price structure, role of technical change, vertical and spatial price formation, price formation in quota markets, futures and forward contracts.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Agricultural price theory (Lecture) *Contents*: This module is designed to provide students with an introduction to the theory and measurement of price formation on agricultural markets. Students will learn about price formation and price linkages over space and time, and how prices on markets in different locations and/or for products of different levels of processing are linked with one another. They will also learn about special examples of price determination that are unique (land markets) or especially common (markets influenced by quota schemes) in agriculture. A final focus will be placed on future markets and their possible use as a risk management tool in agriculture and agribusiness. Vorlesungsbegleitende Materialien	4 WLH
Examination: Written examination (90 minutes) **Examination requirements:** Knowledge of impact of prices from an individual and macroeconomic point of view, of agricultural price structure as well as the importance of the technical progress, vertical and spatial price formation, price formation in the farm land market and the quoted market, as well as of commodities future markets	6 C

Admission requirements: none	**Recommended previous knowledge:** Background in agricultural markets and policy recommended
Language: English	**Person responsible for module:** Prof. Dr. Bernhard Brümmer
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 60	

Additional notes and regulations:

Literature:

A script and a variety of supplemental reading will be provided.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E05M: Marketing research**	6 C 4 WLH

Learning outcome, core skills: Students (i) are able to outline the steps in a marketing research process; (ii) are able to develop a marketing research design; (iii) know all relevant methods for data collection, analysis and prognosis with their specific advantages and problems; (iv) elaborate written and oral presentations in teamwork.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Marketing researches (Lecture, Seminar) *Contents*: Tasks and management of marketing research; methods of data collection; methods of data analysis, methods of prognoses. - Aaker, D.A., Kumar, V., Day, G.S. (2011): Marketing research. 10thed., Hoboken, NJ: Wiley. - Bryman, A. (2008): Social Research Methods. 3rded., Oxford: Oxford University Press. - Burns, A.C., Bush, R.F. (2006): Marketing Research. 5thed., Upper Saddle River, NJ, et al.: Prentice Hall. - Denzin, N.K., Lincoln, Y.S. (2008): Strategies of qualitative inquiry. 3rded., Los Angeles, CA, et al.: Sage Publications. - Churchill, G.A., Brown, T.J. (2007): Basic marketing research. 6thed., Mason, OH: Thomson South Western. - Dillman, D.A., Smyth, J.D., Christian, L.M. (2009): Internet, mail, and mixed-mode surveys. 3rded., Hoboken, NJ: Wiley. - Greenbaum, T.L. (2000): Moderating focus groups. A practical guide for group facilitation. Thousand Oaks, CA, et al.: Sage Publications. - Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. (2009): Multivariate data analysis, 7thed., Upper Saddle River, NJ, et al.: Prentice Hall. - Malhotra, N.K., Birks, D.F., Wills, P. (2012): Marketing research, 4thed., Harlow, Pearson. - McQuarrie, F. (1996): The marketresearchtoolbox:aconciseguideforbeginners. Thousand Oaks, CA, et al.: Sage Publications. - Ritchie, J., Lewis, J. (2006): Qualitative research practice: A guide for social science students and researchers. London et al.: Sage Publications. - Shao, A.T., Zhou, K.Z. (2007): Marketing research. 3rded., London et al.: Thomson Learning. - Webb, J.R. (2005): Understanding and designing marketing research. 2nded., London: Thomson Learning. - Wooldridge, J.M. (2006): Introductory econometrics – a modern approach. 3rded., Mason, OH, et al.: Thomson South Western.	4 WLH

Examination: Presentation (ca. 20 minutes) with written outline (max. 5 pages) (50%) and oral exam (ca. 30 minutes) (50%) **Examination requirements:** Knowledge of tasks and management of marketing research; methods of data collection; methods of data analysis, methods of prognoses.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge on marketing
Language: English	**Person responsible for module:** Prof. Dr. Ulrich Hamm
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 40	

Additional notes and regulations:

Literature: Aaker, D.A., Kumar, V., Day, G.S. (2013): Marketing research. 11th ed., Hoboken, NJ: Wiley. - Bryman, A. (2008): Social Research Methods. 3rd ed., Oxford: Oxford University Press. - Burns, A.C., Bush, R.F. (2010): Marketing Research. 6th ed., Upper Saddle River, NJ, et al.: Prentice Hall. - Denzin, N.K., Lincoln, Y.S. (2008): Strategies of qualitative inquiry. 3rded., Los Angeles, CA, et al.: Sage Publications. - Churchill, G.A., Brown, T.J. (2007): Basic marketing research. 6thed., Mason, OH: Thomson South Western. - Dillman, D.A., Smyth, J.D., Christian, L.M. (2009): Internet, mail, and mixed-mode surveys. 3rd ed., Hoboken, NJ: Wiley. - Greenbaum, T.L. (2000): Moderating focus groups. A practical guide for group facilitation. Thousand Oaks, CA, et al.: Sage Publications. - Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. (2009): Multivariate data analysis, 7th ed., Upper Saddle River, NJ, et al.: Prentice Hall. - Malhotra, N.K., Birks, D.F., Wills, P. (2012): Marketing research, 4th ed., Harlow, Pearson. - McQuarrie, F. (1996): The market research toolbox: a concise guide for beginners. Thousand Oaks, CA, et al.: Sage Publications. - Ritchie, J., Lewis, J. (2006): Qualitative research practice: A guide for social science students and researchers. London et al.: Sage Publications. - Shao, A.T., Zhou, K.Z. (2007): Marketing research. 3rd ed., London et al.: Thomson Learning. - Webb, J.R. (2005): Understanding and designing marketing research. 2nd ed., London: Thomson Learning. - Wooldridge, J.M. (2006): Introductory econometrics – a modern approach. 3rd ed., Mason, OH, et al.: Thomson South Western.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E06: International markets and marketing for organic Products**	6 C 4 WLH

Learning outcome, core skills: (i) Analysis of international markets for organic products; International trade (ii) Import regulations for organic products in different countries; (iii) Import regulations for agricultural products in the EU; (iv) Export market research and analysis from the viewpoint of developing countries; (v) Marketing strategies for the export of organic products; (vi) Marketing measures for the export of organic products; (vii) Case study for export of organic products from a developing country to the EU.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: International markets and marketing for organic products (Lecture, Seminar) *Contents*: (i) Analysis of international markets for organic products; International trade (ii) Import regulations for organic products in different countries; (iii) Import regulations for agricultural products in the EU; (iv) Export market research and analysis from the viewpoint of developing countries; (v) Marketing strategies for the export of organic products; (vi) Marketing measures for the export of organic products; (vii) Case study for export of organic products from a developing country to the EU Jain, S.C. 2001: International marketing, 6th ed., South Western Thomson Learning, Cincinatti; Kotler, P., Keller, K.L. 2006: Marketing management, 12th ed., Pearson Prentice Hall, Upper Saddle River; Schmid, O., Hamm, U., Richter, T., Dahlke, A. 2004: A guide to successful organic marketing initiatives. Research Institute of Organic Agriculture, Frick/Switzerland; Wilson, R.M.S., Gilligan, C. 2003: Strategic marketing management, 2nd ed., Elsevier Amsterdam.	4 WLH
Examination: Presentation (ca. 20 minutes) with written outline (max. 5 pages) (50%) and oral exam (approx. 30 minutes) (50%) **Examination requirements:** Knowledge of tasks and approaches in market research as well as knowledge of data survey methods, prognosis methods and analysis methods.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge on marketing
Language: English	**Person responsible for module:** Prof. Dr. Ulrich Hamm
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 25	

Additional notes and regulations:

Literature:

Literature: Development of organic agriculture world wide - Lockeretz, W. (ed.) (2007): Organic farming: An international history. CABI, Wallingford/UK. - Willer, H. and Kilcher, L. (eds.) (2012): The world of organic agriculture. Frick/Switzerland. - http://www.soel.de - http://www.ifoam.org - http://www.fao.org - http://www.orgprints.org General political framework for imports of organic products in the EU - http://eur-lex.europa.eu/en/legis/20110301/chap03.htm Marketing concepts - Armstrong, G., Kotler, P., Harker, M. and Brennan, R. (2009): Marketing. An Introduction. 9th ed., Pearson Education, Harlow/England (European version) - Doyle, P. and Stern, P. (2006): Marketing management and strategy. 4th ed., FT Prentice Hall, Hemel Hempstead/UK - Jain, S. C. (2001): International marketing management. 6th ed., South Western, Cincinnati, Ohio/USA - Kotler, P. and Keller, K. L. (2006): Marketing management. 12th ed., Prentice-Hall Pearson, Upper Saddle River, New Jersey/USA - Schmid, O., Hamm, U., Richter, T. and Dahlke, A. (2004): A guide to successful organic marketing initiatives. Organic marketing initiatives and rural development vol. 6, Research Institute of Organic Agriculture, Frick/Switzerland - Wilson, R. M. S. and Gilligan, C. (2005): Strategic marketing management. 3rd ed., Butterworth-Heinemann, Oxford/UK - Zander, K., Hamm, U., Freyer, B., Gössinger, K., Hametter, M., Naspetti, S., Padel, S., Stolz, H., Stolze, M. and Zanoli, R. (2010): Farmer Consumer Partnerships – How to successfully communicate the values of organic food consumers. University of Kassel.http://orgprints.org/17852/1/CORE_FCP_Handbook_en_2010.pdf

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E11: Socioeconomics of rural development and food security**	6 C 4 WLH

Learning outcome, core skills: Students learn concepts of development and problem-oriented thinking in a development policy context. The identification of interdisciplinary linkages is trained. Building on case-study analyses, course participants can pinpoint appropriate economic and social policies and assess their impacts. These qualifications can also be transferred to unfamiliar situations.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Socioeconomics of rural development and food security (Lecture) *Contents*: This module provides students with an overview of socioeconomic aspects of hunger and poverty in developing countries. Apart from more conceptual issues and development theories, policy strategies for rural development and poverty alleviation are discussed and analyzed. Special emphasis is put on problems in the small farm sector. Numerous empirical examples are used to illustrate the main topics.	4 WLH
Examination: Written examination (90 minutes) **Examination requirements:** Concepts and measurement of hunger and poverty; development theory; classification and evaluation of rural development policies	6 C

Admission requirements: none	**Recommended previous knowledge:** Prior knowledge of microeconomics at the BSc level is useful
Language: English	**Person responsible for module:** Prof. Dr. Matin Qaim
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 120	

Additional notes and regulations:

Literature:

Text books, research articles and lecture notes.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E12M: Quantitative research methods in rural development economics**	6 C 4 WLH

Learning outcome, core skills: Students are familiar with empirical, quantitative methods in rural development economics. Thus, they are able to develop and implement their own research projects.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Quantitative research methods in rural development economics (Lecture) *Contents*: This module teaches and trains methodological skills for the analysis of micro data in rural development economics. In particular, farm and household level data are used. Apart from statistical and econometric techniques, approaches of primary data collection are covered (questionnaire development, survey sampling design). These methods are used for concrete examples in the computer lab.	4 WLH
Examination: Written examination (90 minutes) **Examination requirements:** Use and interpretation of descriptive statistics and standard econometric methods; hypothesis testing; data management; sampling design.	6 C

Admission requirements: Familiarity with the contents of the module "Socioeconomics of Rural Development and Food Security" is assumed.	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Matin Qaim
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 40	

Additional notes and regulations:

Literature:

Text books, research articles and lecture notes.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E13M: Microeconomic theory and quantitative methods of agricultural production**	6 C 4 WLH

Learning outcome, core skills: Microeconomic Theory of Agricultural Production Students are familiar with microeconomic approaches and can apply them to analyze issues related to agriculture and rural development. Quantitative Methods in Agricultural Business Economics Students are familiar with quantitative methods used for the analysis and planning of farms and enterprises in the agricultural sector.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Courses:	
1. Microeconomic theory of agricultural production (Lecture) *Contents*: Consumer theory, producer theory, markets, monopoly situations, risk and uncertainty, economics of technical change, farm household models, sharecropping contracts.	2 WLH
2. Quantitative methods in agricultural business economics (Lecture) *Contents*: Budgeting, accounting, annual balance sheets, linear programming, finance, investment analysis	2 WLH
Examination: Written examination (120 minutes) **Examination requirements:** Consumer theory; producer theory; risk; technological progress; farm household models; budgeting and accounting; linear programming; finance; investment analysis	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Matin Qaim
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 40	

Additional notes and regulations:

Literature:

Text books, research articles and lecture notes.

After successful conclusion of M.Agr.0060 students can not complete M.SIA.E13M

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E14: Evaluation of rural development projects and policies**	6 C 4 WLH

Learning outcome, core skills: Students know the major methods for the evaluation of rural development projects and policies. They apply these methods for concrete project examples and thus are able to design and carry out evaluations independently.	**Workload:** Attendance time: 40 h Self-study time: 140 h

Course: Evaluation of rural development projects and policies (Lecture) *Contents*: This module teaches and trains the standard methods for the evaluation of rural development projects and policies. In particular, this includes impact assessment as well as cost-benefit analysis. These methods are used for concrete project and policy examples.	4 WLH
Examination: Written exam (90 minutes, 50%) and presentation (ca. 25 minutes, 50%) **Examination requirements:** Cost-benefit analysis; development project evaluation; impact assessment; targeting of projects and interventions	6 C

Admission requirements: none	**Recommended previous knowledge:** Knowledge of the content of the module "Socioeconomics of Rural Development and Food Security" is required.
Language: English	**Person responsible for module:** Prof. Dr. Matin Qaim
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 65	

Additional notes and regulations:

Literature:

Text books, research articles and lecture notes.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E17M: Management and management accounting**	6 C 4 WLH
Learning outcome, core skills: The main aim of the module is to acquaint students with the theory and practice of management and management accounting/control, and the role of environmental, social and governance issues therein. More specifically, the aims of the module are: • To provide students with insights into different theoretical perspectives; an understanding of the implicit assumptions held by each perspective as well as the implications of these perspectives for management practice and research; • To provide students with the conceptual and practical skills necessary to effectively understand and critically analyse management/corporate practice; • To provide students with practical experience in and knowledge about “managing and accounting for sustainability”; • To enable students to understand why traditional accounting and accountability do not serve managers and other corporate stakeholders well in the light of increasing demands for social accountability, transparency and social responsibility	**Workload:** Attendance time: 60 h Self-study time: 120 h
Course: Management and management accounting (Lecture, Seminar) *Contents*: • The fundamentals of management practice, the roles and functions undertaken by managers; • The development and evolution of management theory; • A critical reflection on the wider responsibilities of management (incl. moral decision-making, managing for sustainability); • An introduction to the traditional accounting and accountability theory and practice; key management accounting and control systems and concepts; performance measurement and management; • The developments in new accounting and accountability tools and their role (and limitations) in supporting managerial decision making and increasing transparency on environmental, social and sustainability performance. Lussier, R.N. 2006: Management fundamentals – Concepts, Applications, Skill Development, Thomson, London, UK; Robbins, S.P., Coulter, M. 2007: Management, 9th edition, Pearson, Upper Saddle River; Drury, C. 2005: Management Accounting for Business, Thomson, London, UK; Atkinson, A.A., Kaplan, R.S., Young, S.M. 2004: Management Accounting, 4th Edition, Upper Saddle River.	4 WLH
Examination: Presentation (ca. 15 minutes, 50%) and written examination (90 minutes, 50%) **Examination requirements:** Students should demonstrate a sound understanding of the management / management accounting concepts and frameworks (written exam). Students are also expected to apply the knowledge acquired in class to a case study company and to present and discuss their findings with others (workshops incl. role play and group work).	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Herzig, Chrstian, Prof. Dr.
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 35	

Additional notes and regulations:

Literature:

Lectures and short lectures combined with facilitated group discussion; seminars include case study-based group work and exercises

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E18: Organization of food supply chains**	6 C 4 WLH

Learning outcome, core skills:	**Workload:**
Students are introduced into various issues of the organizational design of food supply chains and agribusiness firms. Students learn to write a seminar paper and they are also able to independently acquire additional knowledge by advanced literature search. The preparation and presentation of selected topics as well as the contribution to oral discussions during seminar sessions will be examined. The comprehensive overview of various organizational theories enables the students to identify and classify complex organizational problems in food supply chains and develop solutions.	Attendance time: 68 h Self-study time: 112 h

Course: Organization of food supply chains (Seminar) *Contents*: The module introduces into basic concepts of organizational design in food supply chains and the agribusiness sector. The students write a paper based on the combination of a selected organizational theory and a practical example. The students present their papers and discuss the various organizational issues with high importance for the food and agribusiness sector. Key aspects of the lecture are: - Stakeholder management for farms and agribusiness firms - Efficient organizational design of food supply chains: Contracts, open markets, vertical integration - Competitive strategy and the organizational design of food supply chains - Certification schemes from an organizational perspective - Cooperatives and the organization of food supply chains - Transparency of food supply chains The seminar makes use of various organizational theories and provides students with insights into the practical implications of these theories. Vorlesungsbegleitende Materialien	4 WLH
Examination: Homework (max. 15 pages, 65%) and 2 presentations (about 45 min, 20% and about 15 min, 15%), not graded **Examination requirements:** Ability to write a paper based on the combination of a selected organizational theory and a practical example, to present the paper, serve as a discussant of the paper of another group and discuss the various organizational issues with high importance for the food and agribusiness sector. 1. Presentation: ca. 45 minutes presenting the contents of the own homework; 2. Presentation: ca. 15 minutes discussing the homework of another group of participants.	6 C

Admission requirements:	**Recommended previous knowledge:**
none	Basic knowledge food supply chains and agribusiness management
Language:	**Person responsible for module:**
English	Verena Otter

Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 21	

Additional notes and regulations:
Students are not allowed to take the module M.Agr.0053 if they have passed M.SIA.E18.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E19: Market integration and price transmission I**	6 C 4 WLH

Learning outcome, core skills: Students gain insight into the functioning of the price mechanisms on agricultural markets and into the determinants of market integration. They learn to apply econometric analysis methods to the study of horizontal and vertical price transmission processes (time series methods, cointegration, including non-linear cointegration and non-linear error correction models).	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Market integration and price transmission I (Lecture) *Contents*: Theory and empirical analysis of agricultural market integration	4 WLH
Examination: Written examination (60 minutes) **Examination requirements:** Students are able to explain the economic theory of price transmission and market integration (e.g. how can we explain the prevalence of asymmetric price transmission on agricultural markets), and are able to apply the most important methods of empirical price transmission analysis (in particular the econometric estimation of error correction models).	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of econometrics
Language: English	**Person responsible for module:** Prof. Dr. Stephan von Cramon-Taubadel
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:

Literature:

A list of seminar papers (Garnder, Ravallion, Goodwin, Fackler, Barrett) will be circulated to students, together with a list of recent applications.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E21: Rural sociology**	6 C 4 WLH

Learning outcome, core skills: One of the primary objectives of this course is to introduce students to the principles of sociology in general and key concepts of environmental and rural sociology in particular. In addition, we want to provide the analytical tools for understanding the processes inherent to these concepts. Beyond that, the course aims at enhancing students' ability to identify different research perspectives and to critically discuss and analyze research strategies and methods.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Rural Sociology (Lecture, Seminar) *Contents*: As an introduction to environmental and rural sociology, this course is designed to give an overview of the sociological concepts on "nature-society relations", "social structural developments and social problems in rural areas", "social networks and social capital in communities", "social dilemmas and sustainability", "social movements and the environment", and "environmental justice". Lectures outline each of these issues and position them within the context of sociology. We will use seminars to debate key questions raised during lectures and to discuss selected issues based on academic publications. Geeignete Quellen werden in der Vorlesung vorgestellt; Lehrbuchkapitel liefern Grundlagenmaterial und werden durch Artikel aus wissenschaftlichen Fachzeitschriften ergänzt.	4 WLH
Examination: Term Paper (max. 20 pages) **Examination requirements:** Darstellung von und kritische Auseinandersetzung mit Theorien, Konzepten und Methoden im Bereich der Umweltsoziologie sowie Land- und Agrarsoziologie.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:**
Course frequency: each summer semester; not 2014 Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 25	

Additional notes and regulations:
Literature:

Adequate literature is presented in the lecture; text book chapters supply basic knowledge and are complemented by scientific publications.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E23: Global agricultural value chains and developing countries**	6 C 4 WLH

Learning outcome, core skills: The students will become familiar with the application of these models through empirical examples and the discussion of journal articles.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Global Agricultural Value Chains and Developing Countries (Lecture) *Contents*: This lecture deals with the impacts of restructured and globalized agricultural markets on small-scale farmers and traders in developing countries. Current developments and changes on agricultural markets are analyzed and the implications for developing countries discussed. Approaches of the value chain analysis and the promotion of pro-poor value chains are explained. Emphasis will be laid on the roles of institutions for the performance of markets in developing countries, especially against the background of recent developments. Models of contract theory, institutional and transaction costs economics are conveyed and used to analyze the situation in developing countries.	4 WLH
Examination: Presentation (ca. 30 minutes, 50%) and written exam (45 minutes, 50%) **Examination requirements:** Specific knowledge of contract theory, economics of transaction costs and institutions as well as the application of the concepts to current aspects with the context of developing countries. Understanding of the role of institutions regarding the mechanism of agricultural markets.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Meike Wollni
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Selected articles from academic journals and book chapters

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E24: Topics in rural development economics I**	6 C 4 WLH

Learning outcome, core skills: The objective of this course is to acquaint Master students with the reading and understanding of scientific journal articles on relevant topics of rural development economics. Student should learn how to develop a scientific research question, choose appropriate research methods and strucutre a scientific article.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Topics in Rural Development Economics I (Lecture) *Contents*: This course will provide Master Students with an overview of relevant topics in rural development economics, which will also enable them to develop own research questions and study approaches in this field. The module is structured as a reading course, building on selected articles from relevant international journals. Students are required to read announced articles before the classroom sessions, in order to enable a critical debate in class. The articles selected for the course are clustered around key topics relevant to rural development economics, such as listed below. Tentative Topics 1. The food system transformation and smallholder farmers 2. Rural livelihood strategies and income diversification 3. Adoption and impact of modern agricultural technology 4. Economics of nutrition and health 5. Gender and intra-household resource allocation Master students will have to write a summary of a selected journal article. Furthermore, the course should enable them to develop own research questions and study approaches in the field of rural development economics.	4 WLH
Examination: Presentation (ca. 45 minutes, 40%) and homework (max. 8 pages, 60%) **Examination requirements:** Constructive participation in the discussion during the lectures, which requires the reading of the articles indicated. In both the written and the oral assignments, students are supposed to demonstrate that they are able to identify the most relevant aspects of the articles and to critically evaluate the research questions, the methods and the results of the studies .	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Meike Wollni
Course frequency:	**Duration:**

each summer semester; Göttingen	1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:
Literature:

Selected articles from academic journals and book chapters

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E28: Regional modelling**	6 C 4 WLH

Learning outcome, core skills: This module will teach the students the basic and advance knowledge of secondary data bases. Students will gain knowledge and experience in static as well as in system dynamic regional modelling	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Regional Modelling (Lecture, Exercise) *Contents*: This lecture will teach basic and advanced knowledge on how to analyse regional effects of development instruments and investments. In the exercises accompanying the lectures, students will practice the basics of modelling with a number of examples. Bryden, J.M. et al., 2010. Towards Sustainable Rural Regions in Europe Exploring Inter-relationships between Rural Policies, Farming, Environment, Demographics, Regional Economies and Quality of Life using System Dynamics, London: Routledge	4 WLH
Examination: Presentation (ca. 20 minutes, 50%) with written outline (max. 20 pages, 50%) **Examination requirements:** Grund- und fortgeschrittene Kenntnisse der Analyse von Regionalen Effekten von Investitionen und der Entwicklung von Regionen.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of regional economics and regional statistical data bases
Language: German, English	**Person responsible for module:** Dr. sc. agr. Holger Bergmann
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Additional notes and regulations:
Literature:

Bryden, J.M. et al., 2010. Towards Sustainable Rural Regions in Europe Exploring Interrelationships between Rural Policies, Farming, Environment, Demographics, Regional
Economies and Quality of Life using System Dynamics, London: Routledge

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E30M: Social research methods**	6 C 4 WLH

Learning outcome, core skills: • are able to independently plan and design their research. • are able to independently design questionnaires for qualitative and quantitative research. • know the principles of transcribing and coding qualitative data and the principles of data preparation of quantitative data • know the principles of data collection and interviewer and interviewee relationship • know the relevant qualitative and quantitative social research methods • are aware of the differences of qualitative and quantitative research methods • are able to implement qualitative and quantitative methods in a mixed methods research design • know fundamentals of qualitative and quantitative data analyses • acquire skills to independently conduct qualitative and quantitative social research methods	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Social Research Methods (Lecture, Seminar) *Contents*: This course is designed to lay the foundations of good empirical research in the social sciences. The seminar will first focus on the fundamentals of social research, including: the logic of scientific inquiry, developing qualitative and quantitative questionnaires, sampling, and measurement. This seminar will expose you to the diverse methods available to social scientists, including survey, qualitative interviews, qualitative comparative analysis, and discuss their strengths and weaknesses. Students become acquainted with a variety of approaches to research design, and are helped to develop their own research projects and to evaluate the products of qualitative and quantitative research.	
Examination: Written examination (90 minutes, 60%) and presentation (30 minutes, 40%) **Examination requirements:** Knowledge of current qualitative and quantitative methods. Background of current forms of data analysis. Profound knowledge of the relevant terms of qualitative and quantitative research. Skills in the application of methods and knowledge of the interpretation of data. Students should be able to understand and explain qualitative and quantitative research processes and read and explain tables and figures.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Thomas Krikser
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]

Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E31: Strategic management**	6 C 4 WLH

Learning outcome, core skills: The aims of the module are: • To deepen the students' understanding of the unique aspects of food and agricultural production, processing, distribution, wholesaling and markets and their relationship with strategy; • To familiarise students with the development of strategies within a changing environment, to meet stakeholders' interests; • To provide students with the knowledge and confidence to make strategic business decisions; • To raise critical awareness of strategic decision-making in agrifood organisations.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Strategic management (Lecture, Seminar) *Contents*: • Concepts and frameworks used in strategic management; • The importance of values and purpose in defining an organisation's strategic goals; • The analysis of the complex environment of agrifood organisations and how it shapes the strategic behaviour of members of the value chain and an organisation's competitive environment; • A critical review of strategic frameworks (e.g. Porter's five forces, life cycle analysis); • The analysis of the internal environment (value creating activities, capabilities and resources); • An introduction to organisational and business strategies; • The management of stakeholder relations; • The relationship between organisation and strategy; • The management of strategic change and the role of strategic leadership.	
Examination: Presentation (ca. 15-20 minutes) with hand-out (max. 2 pages) (30%) and written report (max. 30 pages, 70%) **Examination requirements:** Students should demonstrate a sound understanding of the strategic management concepts and frameworks. Further requirements include: development of a research design to contribute to the development of a scenario analysis; collection and analysis of data in groups.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Herzig, Christian, Prof. Dr.
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]

Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:
Lectures and short lectures combined with facilitated group discussion; seminars include research based learning elements such as case studies and research activities involving students (e.g. scenario analysis).

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E33: Responsible and sustainable food business in global contexts**	6 C 4 WLH

Learning outcome, core skills: The aims of the module are: • To deepen the students' understanding of the role of food business in society and the social responsibility and accountability issues that arise in a global business setting; • To familiarise students with the concepts and frameworks used in responsible and sustainable food business, the development of business principles for responsible food businesses, to meet stakeholders' interests; To provide students with the knowledge and confidence to critically reflect corporate practice; • To raise awareness for different perspectives which provide contrasting and competing ways of making sense of responsible food business practices.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Responsible and sustainable food business in global contexts (Lecture, Seminar) *Contents*: This module explores issues related to responsible and sustainable food business in global contexts. Individual themes include: • The process of globalisation and its impact on the agrifood sector; • Corporate social responsibility, governance and accountability; • The role of transparency of products and markets in the context of an increasingly globalised world; • The scope, nature and types of international operations (and their managerial implications); • The management of global supply chains in the agrifood sector; • The management and reporting of environmental and social information in complex organisational settings (such as multinational food businesses); • The contrasting perspectives in social responsibility and accountability of business across borders.	4 WLH
Examination: Written report (in the form of a learning journal; 60%) and oral presentation (40%)	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Christian Herzig
Course frequency: each winter semester; Witzenhausen/Kassel	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**

Maximum number of students: 35	

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E34: Economic valuation of ecosystem services in developing countries**	6 C 4 WLH

Learning outcome, core skills: Students get introduced to the essential concepts and methods of interdisciplinary Ecosystem Services (ES) research. Special emphasis will be put on the integrated and systematic assessment of ES, including their dependencies of and impacts on biodiversity, climate change and development. Students will familiarize themselves with common methods of economic valuation of ES and learn about different examples of practical implementation in developing countries. Within the scope of a presentation and a term paper, students will review and evaluate selected scientific literature, process the findings in an environmental-economic analysis and compile results and derived policy recommendations for better maintenance, sustainable use and integration of ES into development planning.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Economic Valuation of Ecosystem Services in Developing Countries (Lecture, Seminar) *Contents*: • Integrated and interdisciplinary analysis of ES • Dynamic linkages between ES, biodiversity, climate change and development • Methods and applications of economic valuation of ES • Implementation examples from developing countries • Integration of ES in development planning (entry points to the policy cycle) • Practical application in a case study (literature work, monetary quantification)	4 WLH

Examination: Homework (max. 20 pages, 70%) and oral presentation (approx. 30 minutes, 30%) **Examination requirements:** For a given case study students will develop appropriate analytical strategies and implement them with the help of identified scientific literature. Methodological knowledge provided during the lectures will be essential for the case work. Most relevant results will be summarized in a presentation. The compilation of the term paper requires basic techniques of scientific literature research.	6 C

Admission requirements: none	**Recommended previous knowledge:** M.Agr.0079 Environmental Economics and Policy or similar skills
Language: English	**Person responsible for module:** Prof. Dr. Meike Wollni
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**

Maximum number of students: 30	

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E35: Institutional ecological economics**	6 C 4 WLH

Learning outcome, core skills: • Will become familiar with the basic understandings of ecological economics and their relation to the role of institutions and governance • Will become familiar with mainstream and critical approaches related to understandings of collective action and co-production involving higher levels of state authority in relation to regulating social ecological systems • Will be aware of prominent research designs and methods for analyzing the role of institutions in social-ecological systems (SES) • Will be able to illustrate their capacities in the context of discussing and developing research on the role of institutions and governance in empirical settings	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Institutional Ecological Economics (Lecture, Excursion, Seminar) *Contents*: The regulation of stocks and flows is core in Ecological Economics in order to maintain economies sustainable. This module engages specifically with regulations containing institutions and governance that shape collective action and co-production in relation to complex adaptive Social-ecological Systems. The module starts out with introducing the ecological economic model of the economy. In a detailed fashion it introduces the perspective of the Bloomington School of Political Economy for the analysis of institutions and governance of social-ecological systems. Core aspects here are the determinants of success and failure in collective action and co-production and related perspectives of co-management, collaborative management, polycentricity, adaptive governance, resilience, etc.. Subsequently, it treats some of the main criticisms of these kinds of approaches before it introduces the principal research designs and methods for analysing the role of institutions and governance in complex-adaptive social-ecological systems. Finally, knowledge is brought together in the context of developing research proposals addressing concrete empirical issues that are introduced by students or the excursion.	4 WLH
Examination: Term Paper (max. 12 pages) and presentation (about 10 minutes) (40%) and Term Paper (max. 17 pages) (60%) **Examination requirements:** • Basic understandings of ecological economics and their relation to the role of institutions and governance • Understanding and reflection of mainstream and critical approaches related to understandings of collective action and co-production involving higher levels of state authority in relation to regulating social ecological systems • Knowledge of prominent research designs and methods for analyzing the role of institutions in social-ecological systems (SES)	6 C

Admission requirements: none	**Recommended previous knowledge:**

	Background in agricultural and environmental policy and economics
Language: English	**Person responsible for module:** Prof.Dr. Andreas Thiel
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:
Further examination prerequisites:

Participation in the excursion and its preparation and evaluation

Literature:

Ostrom, E., 2005. Understanding institutional diversity. Princeton Univ. Press, Princeton, NJ.; further seminar papers will be circulated to students

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E36: Institutions and the food system**	6 C 4 WLH

Learning outcome, core skills: • Will become familiar with the role of institutions and governance in the food system • Will be familiar with public choice and political science approaches to the analysis of constitutions and policies and their change • Will be familiar with theories of decentral and central institutional change in the traditions of economics, political science and sociology • Will apply this conceptual knowledge concerning the role, performance and change of institutions and governance of a variety of aspects of food systems in different countries in and outside Europe • Will review global drivers of change of food and agricultural production systems	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Institutions and the food system (Lecture, Excursion, Seminar) *Contents*: Institutions are core elements structuring economic exchange in the food system. The course starts out with a discussion of what institutions are and what roles a stratified, multi-disciplinary concept of institutions has in food and agricultural systems and their change. Approaches will cover the study of institutions in classical and new institutional economics, in evolutionary economics, in economic sociology and in political sciences. Subsequently, discussions will be organized along public choice and constructivist approaches to understanding centrally driven institutional change on the one hand and economic and constructivist approaches to understanding decentral institutional change on the other. Discussions of the role of institutions for performance of the food and agricultural sectors and their change will be illustrated through ample recourse to examples drawn from studies of the food and agricultural production systems in and outside of Europe. That way, principal drivers of the change of food systems will be reviewed. In this regard, as far as possible examples will be drawn from one particular cultural, national or regional context. Ending the module, potentials and limits of researching the role of institutions in the food and agricultural sectors will be evaluated and corresponding research designs will discussed.	4 WLH
Examination: Oral exam (about 25 min., 60%) and term paper (max. 15 pages, 40%) **Examination requirements:** • Understanding of the role of institutions and governance in the food system • Knowledge of public choice and political science approaches to the analysis of constitutions and policies and their change • Knowledge of theories of decentral and central institutional change in the traditions of economics, political science and sociology • Application of conceptual knowledge concerning the role, performance and change of institutions and governance to a variety of aspects of food systems in different countries in and outside Europe • Knowledge of global drivers of change of food and agricultural production systems	6 C

Admission requirements: none	**Recommended previous knowledge:** Background in agricultural and environmental policy and economics
Language: English	**Person responsible for module:** Prof. Dr. Andreas Thiel
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Further examination prerequisites:

Participation in the excursion/ thematic day and its preparation/ evaluation

Literature:

Literature and seminar papers will be circulated to students at the beginning of term

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E37: Agricultural policy analysis**	6 C 4 WLH

Learning outcome, core skills: • Students get an overview on EU institutions and the history of the EU's common agricultural policy (CAP) • Students learn different theories and methods for the analysis of agricultural policies • Students learn how to analyse different policy measures and instruments and evaluate them	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Agricultural policy analysis (Lecture) *Contents*: **1. Introduction into Economic Policy and Economic Theory** Definition of agricultural policy, Analytical framework of economic analysis, Objectives, measures, institutions, The coordination process, a model for the economic process **2. Market Failure** Public Goods & externalities, Market power & monopolistic behavior, State intervention due to Instability of markets, State intervention & government failure, principal-agent theory **3. The European Union – A short introduction** History of the EU, the importance of the agricultural sector in the EU, institutions and political structure of the EU, decision-process in the EU, **4. The EU's common agricultural policy: Description and Analysis** The history and analysis of the Common Agricultural Policy (CAP) of the EU **5. Introduction into Environmental policy** Objectives, measures and analysis and interaction with agricultural policy **Literatur**: B. Hill (2013): Understanding the Common Agricultural Policy, Earthscan A. Cunha & A. Swinbank (2011): An Inside View of the CAP Reform Process, Oxford University Press A. Oskam, G. Meester & H. Silvis (2011): EU policy for agriculture, food and rural areas, Wageningen, University Press Swinnen, Johan F.M. (2008): The Perfect Storm – the political Economicy oft he Fischler Reforms oft he Common Agricultural Policy, Centre for European Policy Studies, Brussels Krugman, P.R., M. Obstfeld & M.J. Melitz (2011), International Economics (9.Ed.), Pearson	
Examination: Written examination (90 minutes)	6 C

Examination requirements: • Fundamental knowledge of EU institutions and the EU’s common agricultural Policy (CAP) • Knowledge of different theories and methods to analyze agricultural policies • Analysis of different measures and instruments of the EU’s common agricultural policy (CAP)	

Admission requirements: none	**Recommended previous knowledge:** Microeconomics
Language: English	**Person responsible for module:** Dr. Sebastian Lakner
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I02: Management of (sub-)tropical landuse systems**	6 C

Learning outcome, core skills: Enable students to understand the functioning and bio-physical limitations of (subtropical agro-pastoral land use systems, to argue for the need of interdisciplinary approaches to overcome these and to apply current research methods in land use systems analysis.	**Workload:** Attendance time: 28 h Self-study time: 152 h

Course: Management of (sub-)tropical landuse systems (Block course, Lecture) *Contents*: Witzenhausen: Plant-animal interactions, diet selection and nutritional wisdom, impact of grazing on pastures; statistical approaches to measure and cope with short-distance variability in crop growth; measurement techniques for nutrient fluxes in different agro-ecosystems. Prague: Land-use management: farm and family income in different farming systems, soil conservation technologies for smallholder farming systems, conservation tillage systems, potential use of waste-stream products to enhance soil productivity in tropical peri-urban and rural areas, crop diversity in tropical agricultural systems. Altieri, M. 1995: Agroecology, Westview Press, USA; Martius, C. 2002: Managing Organic Matter in Tropical Soils: Scope and Limitations. Kluwer Academic Publishers; Van Soest, P. 1994: Nutritional ecology of the ruminant. Cornell University Press, London, UK; Provenza, F.D. 1995: Post-ingestive feedback as an elementary determinant of food preference and intake in ruminants. Journal of Range Management, 48: 2-17.	
Examination: Written examination (90 minutes) **Examination requirements:** Knowledge about: the ability of animals to select feed; animal-plant interactions; effects of grazing on grasslands and pastures; statistical methods and measurements material flows in various agroecosystems; landuse management; incomes in different operating systems; soil conservation measures for smallholders and soil conservation systems; potential use of waste products to increase productivity and the significance of agrobiodiversity.	6 C

Admission requirements: none	**Recommended previous knowledge:** Knowledge in plant, soil and animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Andreas Bürkert
Course frequency: WiSe 13/14, einmal in 2 jahren, alternierend mit Modul I07; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**

Maximum number of students: 25	

Additional notes and regulations:

Literature:

Altieri, M. 1995: Agroecology, Westview Press, USA; Martius, C. 2002: Managing Organic Matter in Tropical Soils: Scope and Limitations. Kluwer Academic Publishers; Van Soest, P. 1994: Nutritional ecology of the ruminant. Cornell University Press, London, UK; Provenza, F.D. 1995: Post-ingestive feedback as an elementary determinant of food preference and intake in ruminants. Journal of Range Management, 48: 2-17.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I03: Food quality and organic food processing**	6 C 4 WLH

Learning outcome, core skills: Students will be able to define food quality and quality systems in agriculture and food industry discuss principles of organic food production (agriculture, processing) according to EEC 2092/91) discuss and evaluate food processing techniques and quality assessment methods	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Food quality and organic food processing (Lecture) *Contents*: European and international legislation for organically produced agricultural commodities (focussing : Annex II, Annex VI EEC 2092/91; contracting, quality standards, product handling) Quality standard setting and the Organic Guarantee System Certification systems for organic and conventional products (overview, principles, concept, certification) Accreditation and accreditation agencies Process and product orientated food quality concepts and assessments; “holistic” quality definitions Processing techniques for organic food processing (different product groups) Quality assessment methods for small and medium-size enterprises Florkowski et al. 2000: Integrated View of Fruit and Vegetable Quality, Technomic; Welti-Chanes et al. 2001: International Congress on Engineering and Food, Volume I and II, Technomic; Luning et al. 2002: Food quality management, Wageningen Pers; Lawless et al. 1999: Sensory evaluation of Food, Kluwer; Kent et al.1994: Technology of cereals, Pergamon; Bidlack et al. 2000: Phytochemicals as bioactive agents, Technomic; Linden et al. 1994: New ingredients in food processing, CRC; Souci et al. 2000: Nutrition Tables, Medpharm	4 WLH
Examination: Presentation (ca. 20 minutes, 50%) and project work (max. 20 pages, 50%) **Examination requirements:** Knowledge about the quality of food in terms of concepts and criteria with focus on organic production. Insides in processing and management of organic food according the guidelines, standards and practices. Basic knowledge in the concepts of HACCP and QACCP.	6 C

Admission requirements:	**Recommended previous knowledge:**
none	Basic knowlegde in chemistry

Language: English	**Person responsible for module:** Dr. Nicolaas Busscher
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 40	

Additional notes and regulations:

Literature:

Florkowski et al. 2000: Integrated View of Fruit and Vegetable Quality, Technomic; Welti-Chanes et al. 2001: International Congress on Engineering and Food, Volume I and II, Technomic; Luning et al. 2002: Food quality management, Wageningen Pers; Lawless et al. 1999: Sensory evaluation of Food, Kluwer; Kent et al.1994: Technology of cereals, Pergamon; Bidlack et al. 2000: Phytochemicals as bioactive agents, Technomic; Linden et al. 1994: New ingredients in food processing, CRC; Souci et al. 2000: Nutrition Tables, Medpharm

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I06M: Exercise on the quality of tropical and subtropical products**	6 C 4 WLH

Learning outcome, core skills: Students are able (i) to analyze and discuss experimental data considering economics and consumer expectations, (ii) to work with scientific primary literature, (iii) to elaborate written presentations in teamwork, (iv) to exchange their opinions about sensorial evaluation.	**Workload:** Attendance time: 40 h Self-study time: 140 h

Course: Exercise on the quality of tropical and subtropical products (Exercise) *Contents*: Exercises on quality properties of wheat, rice, potatoes, fruits and vegetables: Starch and protein quality of baking wheat; dough and baking properties of wheat, sensors of baking goods, rheological properties of rice flour and other starch containing products, cooking and frying properties of potatoes; consumer acceptance of potatoes; Marketing properties of fruits and vegetables; texture, ripeness, inner quality properties of fruit and vegetable (e.g. sugar/acid ratio, nitrate in leaf vegetable), sensors of fruit and vegetable juices. Belitz, Grosch, Schieberle 2004: Food Chemistry, 3rd rev. ed., Springer Berlin.	4 WLH
Examination: Project work (max. 40 pages) **Examination prerequisites:** Participation in all introductory meetings and at all experimental laboratory work **Examination requirements:** Knowledge about quality parameter of wheat, rice and starch containing products, potatoes, fruits and vegetables. Knowledge about starch and protein quality of baking wheat, sensoric properties of bread and bakery products, rheological properties of rice flour and other starch containing products, consumer acceptance of potatoes, marketing of fruits and vegetables, texture analysis, intrinsic quality parameter of fruits and vegetables and sensoric proerties of fruits and vegetables.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge on agriculture production and chemistry
Language: English	**Person responsible for module:** Dr. Inga Smit
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 24	

Additional notes and regulations:

Literature:

Belitz, Grosch, Schieberle 2004: Food Chemistry, 3rd rev. ed., Springer Berlin.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I07: International land use systems research - an interdisciplinary study tour**	6 C 8,5 WLH

Learning outcome, core skills: To gain multi- and interdisciplinary insights into (international) approaches towards opportunities and challenges of agro-silvo-pastoral production systems, sustainable resource use and agricultural development interventions. To familiarize participants with theoretical and practical questions of field research in an international contexts	**Workload:** Attendance time: 119 h Self-study time: 61 h

Course: International land use systems research - an interdisciplinary study tour (Lecture, Excursion, Seminar) *Contents*: Through the combination of one semester of preparatory impulse lectures and student seminars and the 12-14 day excursion to a (sub)tropical country, this module provides participants with interdisciplinary insights into the bio-physical and socio-economic components of agro-silvo-pastoral systems in the global context. The small- to large-size farm enterprises, processing plants and marketing organisations to be visited during the excursion exemplify the opportunities and challenges of agricultural activities in their specific context, whereby particular attention is paid to aspects of sustainability and environmental safety. The excursion targets regions where the two universities conduct research programmes, and also includes visits to partner universities and (inter)national research institutions. This will allow the MSc students to gain a first impression on how field research is organized and carried out in (sub)tropical countries. Up-to-date research approaches are presented to the participants, and questions targeting the sustainable use of natural resources as well as questions of development cooperation are discussed in an international and interdisciplinary context.	8,5 WLH
Examination: Oral exam (ca. 20 minutes, 50%) and oral seminar presentation (ca. 20 minutes) with written outline (max. 4 pages) (50%) **Examination prerequisites:** Day protocol of the excursion (max 2 pages) **Examination requirements:** The module and excursion contents are reviewed in an oral exam whereby two examiners are putting forward questions to the below topics (10 minutes each): A) Aspects of soil, plant, crop and forestry sciences pertaining to the regions and enterprises/farms visited during the excursion. B) Aspects of animal husbandry and socio-economic issues pertaining to the regions and enterprises/farms visited during the excursion.	6 C

Admission requirements: none	**Recommended previous knowledge:** Study focus on international agriculture and development policy

Language: English	**Person responsible for module:** Prof. Dr. Eva Schlecht
Course frequency: Winter semester, every second year, alternating with Module I02; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 25	

Additional notes and regulations:

Literature:

Specific general and scientific articles dealing with the excursion country, distributed in the course.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I09: Sustainable nutrition**	6 C 6 WLH

Learning outcome, core skills: Students are able to describe the role of nutrition in human health use databases for RDA describe the influence of nutrition (from farm to fork) on environmental parameters (soil, water, atmosphere, biodiversity) understand tools to measure “sustainability” in nutrition systems.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Sustainabe nutrition (Lecture, Excursion) *Contents*: • Culture and cultural patterns of nutrition • Interactions of food quality and lifestyle on human health • Recommended Dietary Allowances (RDA), tools to evaluate nutritional and health status • Product flow in the food supply chain (world wide and from farm to fork) • Databases and tools to describe nutrition systems (e.g. Life cycle assessment) • Greenwashing or real green? Logos, guidelines, legal aspects	6 WLH
Examination: Presentation (ca. 15 minutes, 50%) with written outline (max. 15 pages, 50%) **Examination requirements:** Kenntnis von Ernährungsstilen und Lebensmittelqualität (in ausgewählten Ländern) Kenntnis von Methoden zur Erfassung von umweltrelevanten Parametern entlang der Lebensmittelkette (von der Landwirtschaft bis zum Verbraucher) Kenntnis rechtlicher Vorgaben zur Kennzeichnung von Lebensmitteln sowie Vorgaben zur Verarbeitung von nachhaltig produzierten Lebensmitteln und Marketing	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge on biochemistry, statistics and environmental issues
Language: English	**Person responsible for module:** Prof. Dr. agr. Angelika Ploeger
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 40	

Additional notes and regulations:
Literature:

Will be provides via the system2teach platform.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I10M: Applied statistical modelling**	6 C 4 WLH

Learning outcome, core skills: The aim of the course is to make students familiar with the basic concepts of 'linear models', the 'Generalized linear models' and 'non-parametric estimation procedures', which now belong to the standard methods in applied statistics. Furthermore, the practical application of the methods are taught using the statistical software package R.	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: Applied statistical modelling (Lecture, Exercise) *Contents*: Statistical analysis in the agricultural sciences are based primarily on the use of linear models rer. They cover a wide range of applications concerning the distribution of the data and model assumptions, and ultimately allow the simultaneous estimation of fixed and random effects in mixed-th models. The understanding and application of mixed linear model implies detailed knowledge of matrix algebra, which will begin the course. The students are at the beginning of the course put in a position to formulate statistical models. Furthermore, the who-teaches the basics of programming in R, which is used for homework exercises used. Different types of linear models are built up gradually and learn how regression models, classification models, and finally mixed models with fixed and random effects. Other questions focus on multicollinearity, model selection criteria and the same model experiments, the corrected estimate mean values and the testing of hypotheses. Linear models are developed for generalized linear mixed models with link function for categorical distributed data or data that follow a Poisson distribution (count variable). Similarly, knowledge about non-parametric test procedures are taught. A variety of examples and exercises to deepen the theory learned permanently. Students are motivated on the basis of sample data sets to work on problems independently. This module generates a substantial understanding and basic knowledge about statistical Datenanalyse, which can be used for future scientific work in the context of master's or doctoral theses.	4 WLH
Examination: Written exam (90 minutes, 50%) and home work (max. 5 pages, 50%) **Examination requirements:** Knowledge in linear and generalized linear modeling as well as in non-paremetric estimation procedures. Ability for applying theoretical methods and modeling to real data by using the software package R.	6 C

Admission requirements: none	**Recommended previous knowledge:** Mathematics (linear algebra), Statistics
Language: English	**Person responsible for module:** Prof. Dr. Sven König
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]

Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 25	

Additional notes and regulations:

Literature:

Lecture notes

Searle S. R. (1982) Matrix Algebra Useful for Statistics, Wiley Series in Probability and Statistics.

Mrode R. A. (2005) Linear Models for the Prediction of Animal Breeding Values, CABI Publishing.

Dobson A. & Barnett A. (2008) An Introduction to Generalized Linear Models, Chapman & Hall.

Wood S. (2006) http://www.amazon.co.uk/Generalized-Additive-Models-Introduction-R/dp/1584884746/ref=sr_1_6?ie=UTF8&s=books&qid=1228725710&sr=1-6Generalized Additive Models: An Introduction with R , Chapman & Hall..

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I11M: Free Project**	6 C

Learning outcome, core skills: Students are able to plan and carry out a scientific project. This includes critical evaluation of publications and the ability to apply acquired knowledge to problems in the field or in economic or social sciences. Students are also able to present results and discuss them on the basis of their knowledge.	**Workload:** Attendance time: 0 h Self-study time: 180 h

Course: Free project *Contents*: A topic for a project is chosen in agreement with the instructor. The aim of the project is to gain profound scientific knowledge on the chosen topic. This can include experimental work. The result of the project can be a written thesis, an oral presentation and/ or an electronically stored result.	
Examination: Project work (roughly 15 pages or 4000 words) **Examination requirements:** In agreement with the instructor. Generally project work (roughly 15 pages or 4000 words).	6 C

Admission requirements: Written agreement with instructor on topic, form and time frame for the project.	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Stephan von Cramon-Taubadel
Course frequency: each semester; Göttingen oder Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Scientific publications on the topic agreed upon with the instructor.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I12: Sustainable international agriculture: basic principles and approaches**	6 C 4 WLH

Learning outcome, core skills: Students • are able to describe the main bio-physical and socio-economic drivers shaping agricultural production systems and land and resource use strategies; • have knowledge of relevant ecological, economic and social indicators • can describe and apply integrated approaches of indicator use for the evaluation of a system's sustainability	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Sustainable International Agriculture: basic principles and approaches (Lecture) *Contents*: In view of global change spanning from population growth, migration, and urbanization to climate change, land degradation and water scarcity, the sustainable use of human and natural resources for the continued provision of quantitatively and qualitatively adequate food poses a major challenge to all stakeholders involved in agricultural production worldwide. This module therefore addresses the basic concepts and principles of sustainability and sustainable agriculture, in its ecological, economic and social dimensions. Approaches to determine the bio-physical and socio-economic sustainability of a land use systems and of agricultural value chains are evaluated, and possibilities to implement sustainable management strategies along the continuum of water, soils, plants, animals, producers and consumers are discussed, thereby also accounting for relevant temporal and spatial scales.	4 WLH
Examination: Written examination (90 minutes) **Examination requirements:** **Barkmann (Soc-Econ):** general definitions and indicators for sustainable development; strong and weak sustainability; the substitution-paradigm and its limits; carrying capacity and critical natural capital; economic growth models; economic approaches for the quantification of sustainable development; SNA / green accounting; cost-benefit analysis. **Bürkert (Nat Sci):** concepts of sustainability; agroforestry systems; shifting cultivation; effects on soil fertility and sustainability. **NN (Soc-Econ):** dimensions of social sustainability; utilization of communal resources; McDonaldisation of agriculture; agriculture and social justice. **Ludwig (Nat Sci):** soils: textures; minerals; types; organic matter; functions and forms; N-dynamics. Water erosion; wind erosion: processes and rates; counteracting measures. Emissions of greenhouse gases (GHG) and ammonia: sources and processes; options of minimizing emissions. **Möller (Soc-Econ):** multi-functionality and farm-management; realization of sustainability concepts in the farm enterprise; agro-ecological systems and sustainable	6 C

farm management; indicators for enterprise sustainability; controlling of sustainability; profitability of organic farming; collective forms of farming. **Schlecht (Nat Sci):** sustainability of livestock husbandry; environmental effects of animal keeping and their avoidance: a) GHG emissions and environmental pollution from animal holdings; b) overgrazing.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Eva Schlecht
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Lecture notes and reading materials distributed during the module;

Bell, S. & Morse, S., 2003. Measuring sustainability: learning by doing; Earthscan, London, UK. Bell, S. & Morse, S., 2008. Sustainability indicators: measuring the immeasurable? Earthscan, London, UK.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I13: Issues and methods in food business research**	6 C 4 WLH

Learning outcome, core skills: The aims of the module are: • To develop students' ability to analyse and evaluate management practices and discourses in the food sector according to multiple theoretical perspectives; • To appreciate contrasting perspectives; • To develop students' critical skills and to enable them to engage with current debates in food business research; • To introduce students to empirical research in the field of international food business; • To support students in the development of their dissertation and project work (e.g. constructing research questions about food business).	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Issues and methods in food business research (Seminar) *Contents*: In this module, we address the more contemporary debates and developments of food business theory and research. We explore, examine and discuss contrasting perspectives of contemporary issues of food business, from a practical and policy-oriented perspective, as well as from a theoretical point of view. We also investigate the research methods applied in food business studies. A particular interest lies in the advancement of knowledge in responsible and sustainable food business.	
Examination: Presentation (45 minutes) with hand-out (max. 2 pages) (50%) and written report (max. 4 pages, 50%) **Examination requirements:** Students should be able to critically engage in current debates about food business (with a particular focus on responsible and sustainable business) and reflect on the usefulness and limitations of methods applied in food business research. Students should demonstrate that they are able to identify, explain and discuss the key aspects of the literature investigated.	6 C

Examination requirements: ECTS-Bedingungen de	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Alle Herzig, Christian, Prof. Dr.
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted:	**Recommended semester:**

twice	
Maximum number of students: 35	

Additional notes and regulations:
Lectures and group discussion

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P01: Ecology and agroecosystems**	6 C 4 WLH

Learning outcome, core skills: Students are able to define site-specific conditions of sustainability, identify key constraints to the productivity and sustainable use of agro-ecosystems, assess the scope of human (management) interventions, determine the causes of productivity decline and chose approaches to strengthen sustainability	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Ecology and agroecosystems (Lecture, Seminar) *Contents*: Case-study based analysis and discussion of ecological framework conditions (limitations) in different arid and sub-humid agro-ecosystems of tropical and temperate zones with a particular focus on marginal soils and/or difficult infrastructural conditions where effective nutrient cycling, integration of cropping and animal husbandry systems as well as the use of biodiversity for income generation at the farm level is of particular importance. The potential/role of organic agriculture will be discussed and a more general discussion of the potential of organic agriculture to strengthen the resilience of agro-ecosystems will be presented.	4 WLH
Examination: Oral exam (approx. 15 minutes, 60%) and presentation (approx. 20 minutes, 40%) **Examination requirements:** Students should be able to explain the function and biophysical limits of (sub)tropical agro-pastoral land use systems, to justify the need to establish interdisciplinary approaches and to describe current research methods in land use systems analysis.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in plant, soil and animal science, willingness to analyse agro-ecosystems quantitatively
Language: English	**Person responsible for module:** Prof. Dr. Andreas Bürkert
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:
Literature:

Altieri, M. 1987: Agroecology: the scientific basis of alternative agriculture. Westview Press, Boulder, Colorado, USA; Gliessman, S.R. 1998: Agroecology: ecological processes in sustainable agriculture. Ann Arbor Press, Michigan, USA.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P04: Plant nutrition in the tropics and subtropics**	6 C 4 WLH

Learning outcome, core skills: Based on knowledge of principles of plant nutrition the students are able to find solutions for specific problems with regard to plant nutrition in the tropics.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Plant nutrition in the tropics and subtropics (Lecture, Practical course) *Contents*: Lecture: Dynamics and availability of nutrients in acid, highly weathered soils, alcaline soils, and paddy soils. Nutrient deficiency and toxicity in plants. Problems with Al-toxicity and salinity. N-fertilization, N2-fixation. Nutrient cycling in special cropping systems like shifting cultivation, intercropping, agroforestry, paddy rice. Laboratory course: Investigations about P availability, P uptake, and P efficiency mechanisms. Performing a complete experiment including the necessary chemical analyses and data evaluations.	4 WLH
Examination: Oral examination (approx. 20 minutes) **Examination prerequisites:** Oral exam (20 minutes) **Examination requirements:** Knowledge of basic principles of plant nutrition and tropical plant nutrition in particular. Knowledge of cropping systems and their influence on soil fertility and nutrient cycles. Special aspects of plant nutrition in paddy rice.	6 C

Admission requirements: Prerequisite for admission to examination is the attendance at the laboratory course.	**Recommended previous knowledge:** Baisc knowledge in soil and plant sciences
Language: English	**Person responsible for module:** Dr. Bernd Steingrobe
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:
Literature:

Will be given during the lecture.

Laboratory course: blocked in a week at the beginning of the semester break.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P05: Organic cropping systems under temperate and (sub)tropical conditions**	6 C 4 WLH

Learning outcome, core skills: Students are able to describe the principles and functions of agro-ecosystems, understand nutrient cycles and options for their improvement as an important basis of organic farming, evaluate systems of land use with a particular focus on organic modes of production and their role in agro-ecosystems, assess the role of livestock for nutrient cycling and with respect to the conservation of plant and animal biodiversity in (sub-)tropical settings.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Organic cropping systems under temperate and (sub)tropical conditions (Lecture, Excursion, Seminar) *Contents*: Visits of organic farms; case studies of livestock-oriented organic farming under different environmental conditions and constraints; development, evaluation and comparison of land use management systems under diverse natural, economic and socio-cultural conditions; nutrient cycling in plant-animal systems; site-specific contributions of legumes to N supply; P availability, P recycling and use of rock phosphates; modes of P supply in farming systems; EC, Australian, Japanese and North American regulations for organic farming – problems and opportunities.	4 WLH
Examination: Oral exam (ca. 15 minutes, 75%) and presentation (15 minutes, 25%) **Examination requirements:** Each individual test has to be passed. Kenntnisse von ökologischen Pflanzenanbausystemen, vom Management von Nährstoffkreislaufsystemen, von gezielter Nutzung von Leguminosen für die standortgerechte N-Versorgung sowie Kenntnisse über die Grundlagen der P-Verfügbarkeit, der P-Rückführung und der Nutzung von Rohphosphaten. Wissen über die Möglichkeiten der P-Versorgung in verschiedenen Anbausystemen, über die Unterschiede und Probleme bei den Ökostandards in EU, Japan, Australien und USA sowie Wissen über den Beitrag der Tierhaltung zur Nachhaltigkeit ökologischer Anbausysteme.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in plant, soil and animal sciences
Language: English	**Person responsible for module:** Prof. Dr. Andreas Bürkert
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students:	

not limited	

Additional notes and regulations:

Literature:

Altieri, M. 1987: Agroecology: the scientific basis of alternative agriculture. Westview Press, Boulder, Colorado, USA; Willer, H. et al. 2008: The World of Organic Agriculture - Statistics and Emerging Trends 2008, IFOAM, Bonn, Germany.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P06: Soil and water**	6 C 4 WLH

Learning outcome, core skills: Students understand soil - water - plant relations and basic soil physical, soil hydrological and soil (micro)biological processes. They are able to critically evaluate soil and water problems and limits of soils as a natural resource and judge soil management options for sustainable land use.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Soil and water (Lecture, Exercise) *Contents*: Fundamental physical and hydrological processes; Soil water storage and transport; Physicochemical properties, Soil water in relation to mechanical processes (e.g. workability, deformation, soil strength); Soil – Water - Plant Relations (root water uptake, root growth, transpiration, soil-plant-atmosphere continuum); Field water cycle and management effects (e.g. mulching, tillage, irrigation); Irrigation principles and practices; Soil degradation and conservation (e.g. soil salinisation, compaction, acidification, contamination); Edaphon and its functions; Mycorrhiza; Rhizobia; Methods in soil biology; Indicators of soil fertility; Turnover of the soil microbial biomass; Habitat protection and ecotoxicology; Soil biology and fertility of tropical soils.	4 WLH
Examination: Oral examination (approx. 30 minutes) **Examination requirements:** Kenntnisse über die Bodendegradation und Bodenerhaltung, das Wassermanagement in nationalem und internationalem Kontext, die Bodenqualität, Prozesse und Funktionen sowie über die Wassergewinnung und –verteilung, Flächenbewässerung, Beregnung, Tropfbewässerung.	6 C

Admission requirements: none	**Recommended previous knowledge:** Fundamentals of soil science; Module Soil and Plant Science or equivalent.
Language: English	**Person responsible for module:** Peth, Stephan, Prof. Dr.
Course frequency: each summer semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

N.C. Brady & R. R. Weil, 2008. The Nature and Properties of Soils. 14th ed., Pearson International Press; Hillel, D. (1998): Environmental Soil Physics. Academic Press; Jury, W. & Horton, R. (2004): Soil Physics.

Wiley & Sons; Lal, R. & Shukla, M.K. (2004): Principles of Soil Physics, Marcel Dekker Inc.; Ehlers, W. & Goss, M. (2003): Water Dynamics in Plant Production, CABI Publishing; Kirkham, M. B. (2005): Principles of Soil and Plant Water Relations, Elsevier; Coyne, M. S. (1999). Soil microbiology: an exploratory approach, Thomson Press; Paul, E.A., Clark, F.E. (1996). Soil microbiology and biochemistry, 2nd ed., New York Academic Press.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P07: Soil and plant science**	6 C 4 WLH

Learning outcome, core skills: 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.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Soil and plant science (Lecture, Seminar) *Contents*: Influence of soil formationprocesses 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 WLH
Examination: Written exam (120 minutes) or oral exam (ca. 20 minutes) **Examination requirements:** 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

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Helmut Saucke
Course frequency:	**Duration:**

each winter semester; Witzenhausen	1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

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.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P08: Pests and diseases of tropical crops**	6 C 6 WLH

Learning outcome, core skills: Students should become familiar with the causes of diseases (abiotic & biotic diseases), with the taxonomy of disease agents (bacteria, fungi, virus) and insect pests, with basics of integrated pest management (approaches, economic threshold, epidemiology), and biological, cultural control (cultivars, crop rotation, planting term, manual control), and chemical control options (toxicology, fungicides, insecticides) of the main crops in subtropical and tropical regions	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: Pests and diseases of tropical crops (Lecture, Seminar) *Contents*: Pests and diseases of selected crops are treated together for each crop including approaches to integrated control. The following crops will be presented: rice, maize, cotton, cocoa, coffee, cassava, phaseolus beans, bananas, and others. For each crop, a short introduction to botanical and agronomic features (as far as they concern disease or pest control) is given, together with an overview of the main diseases world-wide. The economic importance of diseases and pests in different geographical areas is discussed. The most important diseases and pests of die crop are treated in detail and die possibilities for integrated control are discussed. Short introductions (reviews) on basic subjects of plant protection are given, these include: causes of diseases (abiotic & biotic diseases), taxonomy of disease agents (bacteria, fungi, viruses) and insect pests, integrated pest management (approaches, economic threshold), biological control (diseases, pests), cultural control (varieties, crop rotation, planting term, manual control), and chemical control (toxicology, fungicides, insecticides). Students will give seminars on related topics. Vorlesungsbasierte Literatur	6 WLH
Examination: Written exam (60 minutes, 67%) and presentation (ca. 20 minutes, 33%) **Examination prerequisites:** Seminar speech **Examination requirements:** Knowledge on the most important pests and diseases of tropical and subtropical crops; chemical and biological control options, phytosanitary approaches, and sustainable cropping systems for tropical crops.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) in agricultural entomology, plant diseases and plant production
Language: English	**Person responsible for module:** Prof. Dr. Stefan Vidal
Course frequency:	**Duration:**

each summer semester; Göttingen	1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:

Literature:

Lecture based materials; details provided during lectures.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P10: Tropical agro-ecosystem functions**	6 C 4 WLH

Learning outcome, core skills: Knowledge of the processes of soil degradation as well as of the measures for their control or prevention in selected land use systems of the tropics and subtropics; knowledge of ecological system functions and their synthesis in agronomic concepts for the adaptation to unfavourable climatic and pedological conditions in the tropics and subtropics.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Tropical agro-ecosystem functions (Lecture, Seminar) *Contents*: Introduction to and overview of agronomy-based land use systems in the tropics and subtropics taking into account ecological points of view. Analysis of the sustainability of plant production under special consideration of the physical, chemical and biological soil quality as well as the efficient water use in the seasonal tropics.	4 WLH
Examination: Presentation (ca. 30 minutes, 50%) and oral exam (ca. 30 minutes, 50%) **Examination requirements:** Knowledge about the processes of soil degradation and the measures taken to control or prevent in selected land use systems in the tropics and subtropics; knowledge of ecosystem functions and their synthesis in agronomic concepts to adapt to unfavorable climatic and pedological conditions in the tropics and subtropics.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of soil and plant sciences
Language: English	**Person responsible for module:** Dr. sc. agr. Ronald Franz Kühne
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 15	

Additional notes and regulations:

Literature:

Lecture notes and handouts, selected chapters from textbooks; copies of PowerPoint presentations

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P13: Agrobiodiversity and plant genetic resources in the tropics**	6 C 4 WLH

Learning outcome, core skills: Students are able to understand the role of agrobiodiversity in tropical agro-ecosystems, to present approaches of functional biodiversity analysis and to discuss the needs and strategies of on-farm (in situ) and off-farm conservation of plant genetic resources.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Agrobiodiversity and plant genetic resources in the tropics (Lecture, Seminar) *Contents*: Case-study based analysis of the role of biodiversity for selected crops in different agro-ecosystems from the arid to the humid climate zones; importance of biodiversity for the stability / sustainability of smallholder (subsistence) versus commodity-oriented commercial agriculture in the Tropics, assessment and utilization of diversity, principles and practices in conservation of genetic resources, role of homegardens and indigenous wild fruit trees for in situ conservation of biodiversity, causes and consequences of genetic erosion, approaches of germplasm collection.	4 WLH
Examination: Oral exam (about 15 minutes, 60%) and presentation (about 20 minutes, 40%) **Examination requirements:** Students should be able to understand the role of agrobiodiversity in tropical agroecosystems, to present basic approaches to functionally analyse biodiversity and to discuss the need of and strategies for *in* and *ex situ* conservation of genetic resources.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in plant and soil sciences
Language: English	**Person responsible for module:** Prof. Dr. Gunter Backes
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Altieri, M. 1987: Agroecology: the scientific basis of alternative agriculture. Westview Press, Boulder, Colorado, USA; Eyzaguirre, P.B., Linares, O.F. 2004: Home gardens and agrobiodiversity. Smithsonia

Books, Washington, USA; Wood, D., Lenne, J.M. 1999: Agrobiodiversity: Characterization, utilization and management. CABI Publishing, Wallingford, UK.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P15M: Methods and advances in plant protection**	6 C 4 WLH

Learning outcome, core skills: 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.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Methods and advances in plant protection (Lecture, Excursion, Exercise) *Contents*: 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 WLH
Examination: Written exam (120 minutes) or oral exam (ca. 20 minutes) (70%) and work reports (max. 3 pages) or seminar speech (ca. 10 minutes) (30%) **Examination requirements:** Advanced knowledge in plant protection (Entomology and Pathology) Methodology and evaluation methods in plant protection based on case studies.	6 C

Admission requirements: Introductory course in plant protection (entomology and pathology, at least 6 ECTS or equivalent) or bridging module M.SIA.P07 Soil and Plant Science	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Maria Renate Finckh
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

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.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P17M: Nutrient dynamics: long-term experiments and modelling**	6 C 4 WLH

Learning outcome, core skills: Students are able to use established models and the statistical software R for a study and description of ecological processes in arable soils. Based on their understanding of soil nutrient dynamics they are able to evaluate and critically assess the significance of long-term and laboratory experiments for studying C, N and P dynamics and to consider all influencing variables.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Nutrient dynamics: long-term experiments and modelling (Lecture, Exercise) *Contents*: • Description of the dynamics of C, N and P (forms, transformations and availability) in arable soils • Presentation of the results of existing long-term experiments with emphasis on the variables and variants influencing these results • Introduction to modelling, including statistical modelling • Application of the statistical software R for a description of C dynamics (linear and non-linear regression) • Modelling of the turnover of soil organic matter and soil nitrogen using the models "Rothamsted Carbon Model" and "DNDC"	4 WLH
Examination: Oral examination (approx. 30 minutes) **Examination requirements:** Knowledge of biological and chemical processes in soils and of the C and N dynamics. Basic knowledge of modelling, including statistical modelling, and the structure of the Rothamsted Carbon Model and the DNDC model. Verständnis bodenkundlicher Prozesse, insbesondere der C- und N-Formen und Kreisläufe, Grundverständnis der Modellierung (einschließlich statistischer Modellierung), Kenntnisse der Modelle Rothamsted Carbon Model und DNDC.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of soil and plant sciences
Language: English	**Person responsible for module:** Prof. Dr. Bernard Ludwig
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**

Maximum number of students: 20	

Additional notes and regulations:

Literature:

Blume H.-P. et al. 2002: Lehrbuch der Bodenkunde, 15. Auflage, Spektrum, Heidelberg; Merbach, W. et al. 2000: The long-term fertilization experiments in Halle (Saale), Germany - introduction and surveys. Journal of Soil Science and Plant Nutrition 163. 629-638; Coleman, K., Jenkinson, D.S 1996: RothC-26.3 - A model for the turnover of carbon in soil. In: Powlson, D.S., Smith, P., Smith J.U. (eds.): Evaluation of soil organic matter models. Springer, Berlin; Li, C. 1996: The DNDC model. In: Powlson, D.S., Smith, P. Smith, J.U. (eds.) 1996: Evaluation of Soil Organic Matter Models. Springer, Berlin

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P19M: Experimental techniques in tropical agronomy**	6 C 4 WLH

Learning outcome, core skills: Knowledge of the botanical, ecological and agronomic facts of the introduced crop plants and multiplication techniques, scientifically correct interpretation and discussion of results from a greenhouse experiment, limitations and potentials of the interpretation of measuring procedures for the description of physiological state variables in tropical crop plants.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Experimental Techniques in Tropical Agronomy (Lecture, Exercise, Seminar) *Contents*: Principles and practice of vegetative and generative propagation techniques in the greenhouse of the division. Introduction to statistical experimental design and analysis of greenhouse experiments. Theory and practice of eco-physiological measurement methods for the water balance and status, as well as gas exchange / photosynthesis rates in tropical crop plants **Literatur** Kopien von Powerpoint-Präsentationen, ausgewählte Kapitel von Lehrbüchern.	4 WLH
Examination: Presentation (ca. 30 minutes, 50%) and protocol (max. 20 pages, 50%) **Examination requirements:** Knowledge of botanical, ecological and agronomic facts of the presented crop plants; scientifically correct planning, implementation, evaluation, description and discussion of the results of a greenhouse experiment; limits and possibilities of interpretation of measurement methods for describing the physiological state variables of tropical crop plants.	6 C

Admission requirements: M.SIA.P12	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of plant sciences
Language: English	**Person responsible for module:** Dr. sc. agr. Ronald Franz Kühne
Course frequency: each summer semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 15	

Additional notes and regulations:
Literature:

Copies of PowerPoint presentations, selected chapters from textbooks

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P21: Energetic use of agricultural crops and Field forage production**	6 C 4 WLH

Learning outcome, core skills: Based on the data presented, students are able to identify and calculate potentials and limits of energy and raw material production from renewable plant resources. Furthermore students are able to classify and to assess the importance of field forage production for organic cropping systems.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Energetic use of agricultural crops and Field forage production (Lecture, Excursion) *Contents*: Management of agricultural crops for energetic use. Energy scenario and potentials, emission of greenhouse gases, sources of energy from biomass and waste material, selecting and processing biomass as a fuel. Biogas, fermentation process and plant technology. Gasification, Fischer-Tropsch-Process. Benefits and restrictions by the replacement of fossil fuel-based materials through biomass-based products. *The importance of field forage production (ffp) for organic cropping systems; basics of ffp – plant species; integration of ffp in crop rotation systems ;environmental impact of ffp, quality aspects; nutrient-dynamics*	4 WLH
Examination: Oral examination (approx. 30 minutes) **Examination requirements:** Basic and theme specific deepened knowledge on the energetic use of agricultural biomass and on the presented aspects of field forage production.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowlege in soil and plant sciences, physics and chemistry
Language: English	**Person responsible for module:** Prof. Dr. Michael Wachendorf
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 20	

Additional notes and regulations:

Literature:

Klass, D. 1998: Biomass for Renewable Energy, Fuels, and Chemicals, Academic Press; Sims, R. 2002: The Brilliance of Bioenergy. James & James, London, UK; Rosillo-Calle, F. 2007: The Biomass Assessment Handbook. Earthscan; London, UK

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.P22: Management of tropical plant production systems**	6 C 4 WLH

Learning outcome, core skills: 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.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Management of tropical plant production systems (Lecture) *Contents*: 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. **Literatur** Rehm, S., Espig, G. 1991: The Cultivated Plants of the Tropics and Subtropics. Verlag Josef Margraf. Weikersheim, Germany; lecture notes	4 WLH
Examination: Written exam (90 minutes) or oral exam (ca. 30 minutes) **Examination prerequisites:** Crops and production systems in the tropics **Examination requirements:** 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

Admission requirements: Basic knowledge on plant production (BSc-level)	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Reimund P. Rötter
Course frequency: each winter semester; Göttingen	**Duration:** 1 semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:
exam on the first examination, oral exam on the second examination

Literature:

Rehm, S., Espig, G. 1991: The Cultivated Plants of the Tropics and Subtropics. Verlag Josef Margraf. Weikersheim, Germany; lecture notes