GEORG-AUGUST-UNIVERSITÄT
GÖTTINGEN

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Inhaltsverzeichnis

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Fakultät für Agrarwissenschaften:

Die Bekanntmachung der Neufassung des Modulverzeichnisses zur Prüfungs- und Studienordnung für den konsekutiven Master-Studiengang „Sustainable International Agriculture", die am 04.11.2014 in den Amtlichen Mitteilungen II Nr. 37/2014 S. 1955 erfolgt ist, wird für ungültig erklärt. Nachfolgend wird die Neufassung des Modulverzeichnisses zur Prüfungs- und Studienordnung für den konsekutiven Master-Studiengang „Sustainable International Agriculture" bekannt gemacht:

Georg-August-Universität
Göttingen

Directory of Modules

zu der Prüfungs- und Studienordnung für den konsekutiven Master-Studiengang "Sustainable International Agriculture" (Amtliche Mitteilungen I Nr. 6/2011, zuletzt geaendert durch Amtliche Mitteilungen I Nr. 34/2014 S. 1019)

Modules

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Index by areas of study

I. MSc Sustainable International Agriculture (English)

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

1. Specializations

At least 90 C must be succesfully completed within a spezialization.

a. International Agribusiness and Rural Development Economics

aa. Compulsory modules

The following four modules comprising 24 C have to be passed:

bb. Mandatory modules

Out of the following modules five mandatory modules comprising 30 C (of which at least one module is on "learning work methods" with code M) must be completed:

cc. Elective modules

Out of the following modules six elective modules comprising 36 C must be successfully completed. If not completed before, mandatory modules can be chosen:

b. International Organic Agriculture

aa. Compulsory modules

The following preparatory module (P07) and four compulsory modules comprising 30 C must be successfully completed. The preparatory module can be replaced on request by a mandatory module if corresponding modules have been successfully [...]

bb. Mandatory modules

Out of the following modules four mandatory modules comprising 24 C (of which at least one module is on "learning work methods" with Code M and one module is on “economics” with Code E) must be successfully completed:

cc. Elective modules

Out of the following modules six elective modules comprising 36 C must be successfully completed. If not completed before, mandatory modules can be chosen:

c. Tropical Agriculture

aa. Compulsory modules

The following preparatory module (P07) and four compulsory modules comprising 30 C must be successfully completed. The preparatory module can be replaced on request by a mandatory module if corresponding modules have been successfully [...]

bb. Mandatory modules

Out of the following modules four mandatory modules comprising 24 C (of which at least one module is on "learning work methods" with Code M) must be successfully completed: .

cc. Elective modules

Out of the following modules six elective modules comprising 36 C must be successfully completed. If not completed before, mandatory modules can be chosen:

2. Master's thesis

Successful completion of the Master’s thesis equals 24 C.

3. Colloquium for the Master's thesis

Successful completion of the colloquium for the Master’s thesis equals 6 C.

Georg-August-Universität Göttingen **Module M.Agr.0009: Biological control and biodiversity**	6 C 6 WLH

Learning outcome, core skills: Gain an understanding of what biological control is and how it can be used effectively as part of an IPM system and how biodiversity contributes to control of pest populations and other ecosystem services.	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: Biological Control and Biodiversity (Exercise, Lecture, Seminar) *Contents*: Theoretical foundations of biological control Natural enemy behaviour and biological control success Biodiversity and ecosystem services in agroecosystems Practical examples of biological control projects Plant-herbivore-predator-interactions Principles of population dynamics Biological weed control	6 WLH
Examination: Written exam (70%; 45 minutes) and presentation (30%; about 20 minutes) **Examination prerequisites:** Teilnahme an den Vorlesungen und Bearbeitung und Vorstellung eines Seminarbeitrages	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Stefan Vidal
Course frequency: each winter semester; Göttingen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Additional notes and regulations:
Lecture based materials; details provided during lectures.

Georg-August-Universität Göttingen **Module M.Agr.0056: Plant breeding methodology and genetic resources**	6 C 4 WLH

Learning outcome, core skills: Students learn the integration of classical and molecular approaches to solve present problems in plant breeding. Social aspects have to be considered. Students learn, in own presentations, to draw critical conclusions from recent research papers and to communicate these to other students.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Plant breeding methodology and genetic resources (Lecture) *Contents*: Principles of breeding methodology: Response to selection, breeding methods for clonal, line, hybrid and population cultivars. Marker assisted selection for monogenic and polygenic traits. Use of plant genetic resources: wild species, ex-situ and in-situ conservation, on-farm management. Breeding for marginal environments, demonstrated with examples from temperate and tropical regions.	4 WLH
Examination: Written exam (90 minutes, 80%) and presentation (20 minutes, 20%) **Examination prerequisites:** Seminar (Vortrag über 20 Min.); das Seminar ist Voraussetzung für die Prüfung, geht jedoch nicht in die Note ein.	

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) in genetics and plant breeding
Language: German, English	**Person responsible for module:** apl. Prof. Dr. Wolfgang Link
Course frequency: each summer semester	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 25	

Additional notes and regulations:

Literature:

Lecture based material.

Georg-August-Universität Göttingen **Module M.Agr.0086: World agriculture markets and trade**	6 C 6 WLH

Learning outcome, core skills: Theoretical foundations of international trade: Ricardo, Heckscher-Ohlin-Viner; Empirical tests for different trade theories; imperfect competition in international trade; gravity theory; institutions and organisations on world agricultural markets; agricultural trade liberalisation at the multilateral (WTO) and bilateral level; specific policy measures in agricultural trade.	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: World agricultural markets and trade (Exercise, Lecture) *Contents*: This module deals with the situation in the world agricultural markets and with the intervention of agricultural and trade policy in these markets based on an introduction into basics of the international trade theory. The students are able to discern populistic arguments against free-trade. They can estimate if there are reasons to deviate from the from the postulate of free-trade in matters of agricultural products, e.g. in order to reward the positive external effects of the agriculture, to ensure the food supply, to fend off dumping or to correct distorted world prices for agricultural products.	6 WLH
Examination: Oral examination (approx. 30 minutes)	

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge of agricultural economics
Language: English, German	**Person responsible for module:** Prof. Dr. Bernhard Brümmer
Course frequency: each summer semester; Göttingen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 50	

Additional notes and regulations:

Literature:

Feenstra, R.C. 2004: Advanced international trade: Theory and evidence. Princeton University Press

Georg-August-Universität Göttingen **Module M.Forst.1512: International Forest Policy and Economics**	6 C 4 WLH

Learning outcome, core skills: **Global environmental and forest policy:** The objective is that students get basic knowledge of both the key policies related to forests and the application of the policy analysis on such issues. Students acquire comprehension about global forest related policy processes and factual knowledge about forest actors affecting the policy on a global level. The seminar combines a lead-in to global policy theory and its translation in practical, empirical knowledge about actors and processes of high importance in forestry. The different instruments for international policy formulation and implementation are discussed using case studies. **International forest economics:** The lecture is split in two main areas: 'International Wood Markets' and 'International Environmental and Forest Conservation'. The first part deals with the international trade with wood and wood products. International markets and the consequences of protectionism are analysed. Furthermore, aspects of international wood marketing are shown. In the second part, international environmental problems are described and possibilities as well as constraints for international co-operation are discussed. Finally, relations between environmental conservation and economic development are analysed.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Global environmental and forest policy (Seminar)	2 WLH
Examination: Written examination (60 minutes) **Examination requirements:** • Knowledge about political theories on forest and environmental policies • Application of the policy analysis on forest and environmental policies	3 C

Course: International forest economics (Lecture)	2 WLH
Examination: Written examination (60 minutes) **Examination requirements:** • Knowlegde about international wood markets, international trade with wood, wood products, aspects of international wood marketing and the consequences of protectionism. • Knowlegde about international environmental problems and economic approaches towards their solution as well as knowledge about the relations between forest conservation and economic development.	3 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Christiane Hubo
Course frequency: each winter semester	**Duration:** 1 Semester[s]
Number of repeat examinations permitted:	**Recommended semester:**

cf. examination regulations	
Maximum number of students: not limited	

Georg-August-Universität Göttingen **Module M.Forst.1521: Ecopedology of the tropics and suptropics**	6 C 4 WLH

Learning outcome, core skills: General understanding of the most important aspects of tropical and subtropical soils, their occurrence, genesis, geography, properties and use. Understanding the principles of the international FAO soil profile description and classification.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Ecopedology of the tropics and subtropics (Lecture) *Contents*: Part I: General introduction in soils of the tropics and subtropics, their functions, genesis, geography and properties. Objective: general understanding of the most important aspects of tropical soils, their occurrence, genesis, properties and use. The following topics will be discussed: Introduction; Climate, water and vegetation; Weathering and weathering products, clay minerals; Soil organic matter, C and N dynamic; Soil chemical reactions, variable charge; Soil forming processes and development of soils; Water and nutrient cycling of land use systems; Tropical shield areas (example: Amazon basin); Arid shields and platforms (example: West Africa); Tropical mountain areas (example: Andes); Fluvial and coastal areas in the tropics (example: coastal areas in Asia). Part II: Introduction in the description and classification of soils, using in international system (FAO). Objective: understanding the principles of the FAO soil profile description and classification. The course consists of introductory lectures in which the principles of the FAO soil description and classification will be explained. This knowledge will be practiced using examples of soil profiles from different tropical countries. The second part consists of a practical week during which soil profile descriptions and evaluations will be exercised in the field. We will visit three contrasting sites around Göttingen where a site and soil description will be made. The work will be done in small groups. Students discuss their results in a report.	4 WLH
Examination: Term paper (10 pages) and written exam (2 hours)	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Edzo Veldkamp
Course frequency: each summer semester	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: cf. examination regulations	**Recommended semester:**
Maximum number of students: not limited	

Georg-August-Universität Göttingen **Module M.Forst.1615: Forest growth and tree-based land use in the tropics**	6 C 4 WLH

Learning outcome, core skills: Understanding of forest dynamics and growth research approaches in the tropics. Participants will become familiar with sampling, measurement, and analysis methods for age determination and increment measurement of trees and forest stands. The seminar will enable students to direct discussions on scientific topics.	**Workload:** Attendance time: 28 h Self-study time: 152 h

Course: Forest growth and tree-based land use in the tropics (Exercise, Lecture) *Contents*: The lecture include the following topics: geographical distribution of the tropics and their climatological characterization, dendrological and site characteristics of forests types, structure and dynamics of forests, status of tropical forests and situation of deforestation, climate growth relations of trees and stands, wood anatomical features of selected tree species, implications of growth studies on sustainable management systems and carbon flux estimations in tropical forests. Thes seminar focuses on the impact of natural and human perturbations on tropical forest ecosystems. Disturbances such as fire, harvesting, land-uses change and global warming to tropical forests will be evaluated. Through a series of student-led discussions founded on case studies from the lecture 'Tropical forest ecology and silviculture' and recent literature, we will address the effects of perturbations on ecological characteristics of forests such as net primary productivity, nutrient cycling and plant communities.	4 WLH
Examination: 2 Subexams: Written exam (60 minutes) and term paper (15 pages max.)	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Dr. Sophie Graefe
Course frequency: each winter semester	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: cf. examination regulations	**Recommended semester:**
Maximum number of students: not limited	

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

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 (Exercise, Lecture) *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: 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.	**Workload:** Attendance time: 84 h Self-study time: 96 h

Course: International and tropical food microbiology and hygiene (Exercise, Lecture) *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

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 (Exercise, Lecture, Excursion) *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.	4 WLH
Examination: Oral examination (approx. 30 minutes) **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:

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 (Exercise, Lecture, Excursion) *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.	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.	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: English	**Person responsible for module:** Prof. Dr. Gabriele Hörstgen-Schwark
Course frequency: each winter semester; Göttingen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted:	**Recommended semester:**

twice	
Maximum number of students: 30	

Additional notes and regulations:

Literature:

Lecture based notes.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A07: Unconventional livestock and wildlife-management, utilization and conservation**	6 C

Learning outcome, core skills: Based on the historical development of agriculture, particularly the domestication of animals, students know the differences between livestock and wildlife and the importance and potential of unconventional livestock and wildlife for rural development and human livelihoods in different regions of the world. Students obtain an overview over the wide variety of unconventional livestock, their adaptive features, biology and ecology and the various production systems under which they are kept. Students familiarize with the variety of wildlife species, their biology, ecology, and population dynamics and the potential of their exploitation. They know the major international conventions pertaining to wildlife conservation and are familiar with the nature and magnitude of human/wildlife conflicts. They know about costs and benefits associated with human-wildlife-co-existence and understand the dilemma between (inter)national conservation objectives and local household livelihood objectives. Students obtain an overview over different terminal and non-terminal options of wildlife utilisation and management and their respective potential contribution to the above conflicting objectives.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Unconventtional livestock and wildlife-management, utilization and conservation (Seminar, Excursion, Block course) *Contents*: History of domestication of livestock. Unconventional livestock in Asia/Oceania, Africa and Latin America: Biology, management and, production systems. Commercial and subsistence products from little known domesticated animal species – such as insects, snails, reptiles, rodents, up to little-used ungulates. Local and national economic potential and contribution to local livelihoods. Wildlife in Asia, Africa and Latin America: Biology, wildlife demography and modelling of population dynamics, human/wildlife conflicts, international conventions on (agro)-biodiversity and conservation, strategies for wildlife conservation through utilisation, different wildlife utilisation concepts, wildlife-based tourism, terminal wildlife utilisation of different intensity ("Hunting/Trophy hunting", "Game-Ranching", "Game Farming", "Feedlot" with beginning domestication), community-based utilisation cum conservation approaches. Contribution of wildlife utilisation to the livelihood of rural communities. Regulations, possibilities and constraints for wildlife conservation.	WLH
Examination: Written exam (90 minutes, 70%) and oral seminar presentation (ca. 20 minutes, 30%) **Examination requirements:** Domestication / taming; unconventional domesticated animals: Biology, management, husbandry, economic potential. Wildlife: Biology, population dynamics, modelling of population dynamics; human-wildlife conflicts, international conventions on biodiversity	6 C

and species conservation. Wildlife utilization: Tourism, game ranching, game hunting, trophy hunting.	

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: SoSe, jedes 2 jahr, alternieernd mit dem Modul M.SIA.A08; Witzenhausen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: not limited	

Additional notes and regulations:

Literature:

Diamond, J. 1999: Guns, Germs, and Steel: The Fates of Human Societies. W.W.Norton and Company, New York, 480 p.; Board on Science and Technology for International Development 1991: Microlivestock Little-Known Small Animals with a Promising Economic Future. National Academy Press, Washington D.C., 449; Bonner, R.. 1993: At the Hand of Man - Peril and Hope for Africa's Wildlife. Alfred A. Knopf Inc., New York, 322 p.; Convention on International Trade in Endangered Species of Wild Fauna and Flora 1973/1979 at http://www.cites.org/ (incl. appendices)

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.A08: Social-ecology in livestock production systems**	6 C 4 WLH

Learning outcome, core skills: Students understand livestock systems as social-ecological systems in which livestock farmers, through their actions, establish, maintain and develop the respective production system. Consequently, these so-called human activity systems are assessed using an actor-oriented approach. Emphasis of this module is on methods that are used to analyse and improve livestock farmers' management. This serves to understand "why livestock farmers do what they do" and "how livestock farmers produce". Students learn how they can make use of the knowledge of livestock farmers to better understand how low external input systems work. Collaborative learning is introduced as methodology to develop human activity systems in a transdisciplinary research approach. They deal with the question of how mutual understanding between livestock farmers and scientists can be achieved despite the different knowledge systems. Students obtain a profound insight into methods for farmer experimentations in which livestock farmers and scientists collaborate, and into using computer models as learning tools for ex-ante assessment of improvement measures in community based approaches. In "what – if" analyses, the change of action rules on the performance of socio-ecological systems is assessed.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Social-ecology in livestock production systems (Lecture, Seminar, Block course) *Contents*: Theoretical background of the social-ecological system view: System theory, 1st and 2nd order cybernetics, complex adaptive systems, human activity systems. Actor-oriented approach to understand and influence low external input systems: Local knowledge and situated practices Methodology for understanding local knowledge: Second order observation and knowledge analysis Collaborative learning: Exchange between knowledge systems, dialogue, action research, livestock farmer experimentation, participatory monitoring and evaluation Modelling of livestock systems as tool for collaborative learning: Bio-economic modelling, multi-agent modelling, role plays.	WLH
Examination: Written exam (90 minutes, 70%) and presentation (ca. 20 minutes, 30%) **Examination requirements:** Social-ecological systems analysis; systems theory, cybernetic, complex adaptive systems, human activity systems. Local knowledge and situated practices; analysis of local knowledge; cooperative learning; modelling of livestock husbandry systems.	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: SoSe, jedes 2 jahr, alternierend mit dem Modul M.SIA.A07; Witzenhausen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 30	

Additional notes and regulations:

Literature:

Kaufmann, B.A. 2007: Cybernetic analysis of socio-biological systems: The case of livestock management in resource poor systems. In: Kommunikation und Beratung, Volume 81, Margraf Publishing; McCown, R.L. 2002: Changing systems for supporting farmers' decisions: problems, paradigms and prospects. Agricultural Systems 74: 179-220; Wiener, N. 1948: Cybernetics or control and communication in the animal and the machine. John Wiley, New York.

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.	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	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	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:	**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:

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.	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: English	**Person responsible for module:** 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.A12M: Multidisciplinary research in tropical production systems**	6 C 4 WLH

Learning outcome, core skills: To learn priority settings for research projects, formulation of problem statement, research objectives and hypotheses; To get acquainted with participatory tools for field research; To learn how to design experiments and analyse field data; To learn how to present research results as a poster at a conference.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Multidisciplinary research in tropical production systems (Exercise, Lecture) *Contents*: This module prepares the students for international agricultural research in the framework of their M.Sc. and Ph.D. theses, the prerequisites of which include the ability to work in a multicultural and interdisciplinary environment as well as the ability to communicate scientific results effectively and efficiently. The module emphasises the practice of research and presentation skills. Participatory tools for field research are introduced and tested, group exercises on how to design experiments and analyse experimental data are carried out. Hereby, the livestock, crop and farm household data is taken from finalized or ongoing research projects of the instructors. The communication of the results in the form of scientific posters is trained.	4 WLH
Examination: Written exam (90 minutes, 50%) and poster presentation and presentation (ca. 20 minutes, 50%) **Examination requirements:** Knowledge on methods, applications, advantages and disadvantages of participatory research tools (Participatory Rural Appraisal, Rapid Rural Appraisal, etc.); critical-innovative mathematical/statistical analysis of field data gained trough participatory approaches and their graphical depiction; evaluation of contents and layout of a scientific poster.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic computer skills
Language: English	**Person responsible for module:** Prof. Dr. Eva Schlecht
Course frequency: each summer semester; Göttingen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 25	

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 (Exercise, Lecture) *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.	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.	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.E03: Ecological economics**	6 C 5 WLH

Learning outcome, core skills: Students are able to assess, evaluate and present the environmental implications of economic activities, the rationales behind them and possible ways to resolve perceived problems.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Ecological economics (Lecture, Seminar) *Contents*: 1. Introduction 2. Basic ideas of environmental and resource economics 3. Facts and figures 4. Eco-footprints 5. Political decision processes 6. Empirical observations in the focus of eco-eco 7. Eco-system services 8. Cost-benefit analysis • Faber M. 1999: Ecological Economics, Springer • OECD (2012): OECD Environmental Outlook to 2050. The consequences of inaction • World Wildlife Fund: The Living Planet Report • FAO (2011): Climate Change, Water and Food Security. FAO Water Reports, Vo. 36. Rome • Elinor Ostrom und James Walker (eds.) (2003): Trust and Reciprocity. Interdisciplinary Lessons for Experimental Research. (Russell Sage Foundation Series on Trust, Band 6). Russell Sage Foundation, New York 2003. • Elinor Ostrom (1990): Governing the Commons: The Evolution of Institutions for Collective Action.Elinor, Cambridge University Press.	5 WLH
Examination: Written exam (120 minutes, 50%) and presentation (ca. 30 minutes) with written outline (max. 5 pages, 50%)	6 C

Admission requirements: none	**Recommended previous knowledge:** Background in agricultural economics and policy
Language: English	**Person responsible for module:** Prof. Dr. Beatrice Knerr
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:

Faber M. 1999: Ecological Economics, Springer

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E04: Changing societies, intercultural management**	6 C 4 WLH

Learning outcome, core skills: Students should become acquainted with the history of agricultural systems and nutritional habits, in order to adequately evaluate and influence the role of (organic) agriculture in the process of accelerated change, characteristic of contemporary western societies. Students are able to successfully perform in contexts where intercultural communication, co-operation and management are in demand. Based on their knowledge about the history of agricultural systems and nutritional habits they are able to adequately evaluate and influence the role of (organic) agriculture in the process of accelerated change, characteristic of contemporary western societies.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Changing societies, intercultural management (Seminar) *Contents*: 1. Intercultural management: Culture and cultural patterns; Processes of cross-cultural adaptation; Intercultural communication and dialogue; Leadership and personality in intercultural contexts; Management of change; Working with conflict and resistance. 2. Changing societies: Patterns of change in western history; The Agricultural Revolution; Intertwining reforms of the nineteenth century: social and agrarian; History of the Organic Movement; Food supply and changing nutrition habits in history. A systematic survey of agents and patterns of change in history is to be combined with a detailed view on the development of European agriculture and food supply, beginning with the history of the early Agricultural Revolution in England.	4 WLH
Examination: Presentation (ca. 10-15 minutes, 30%) and presentation (ca. 10-15 minutes) with written outline (max. 10 pages) (70%) **Examination requirements:** Knowledge about two narrowly defined topics in the context of the whole module. Literature research in limited extent.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** apl. Prof. Dr. Werner Troßbach
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:

Augsburger, I.D.W. 1992: Conflict Mediation Across Cultures. Louisville; Bennett, M. J. (ed.) 1998: Basic Concepts of Intercultural Communication. London; Hodgetts R. M., Luthans F. 2000: International Management. Culture, Strategy and Behavior. Boston; Huntington S. 1996: The Clash of Civilizations. New York; Harris P.R., Moran R. T. 1991: Managing Cultural Differences. Houston; Hall E. T. 1976: Beyond Culture. New York; Overton M. 1996: Agricultural Revolution in England. The Transformation of the Agrarian Economy 1500 – 1850. Cambridge; Conford P. 2001: The Origins of the Organic Movement. Edinburgh; Thirsk J. 1978: Economic Policy and Projects. The Development of a Consumer Society in Early Modern England, Oxford

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.	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 EU-import regulations as well as marketing strategies and -instruments for the export of organic products.	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:

- 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.

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) are able to analyse international markets with statistics; (ii) know the modes of functioning of important import regulations; (iii) are able to outline the steps that are necessary to collect and analyse market data of export markets; (iv) know the factors to consider in defining the marketing problem or opportunity; (v) are able to develop a marketing concept for the export of organic products; (vi) acquire personal skills for oral and written presentations in teamwork	**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	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:

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. 9thed., Pearson Education, Harlow/England (European version)

- Doyle, P. and Stern, P. (2006): Marketing management and strategy. 4thed., FT Prentice Hall, Hemel Hempstead/UK

- Jain, S. C. (2001): International marketing management. 6thed., South Western, Cincinnati, Ohio/USA

- Kotler, P. and Keller, K. L. (2006): Marketing management. 12thed., 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. 3rded., Butterworth-Heinemann, Oxford/UK

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Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.E10: Economics of biological diversity in the tropics and subtropics**	6 C 2 WLH

Learning outcome, core skills: Students acquire basic concepts of biological and economic biodiversity research. The focus is on the socio-economic importance of biological diversity. Students will be able to identify and analyse issues of the utilisation and protection of biological diversity at the level of genes, species and ecosystems. They acquire knowledge on the most important methods of the welfare economic valuation of biodiversity, its elements and the ecosystem services depending on it, and learn how to use this knowledge for analytical purposes. Furthermore, students deepen thier capcacity to (i) identify scientific literature for a given socio-economic biodiversity problem, (ii) analyse the literature in environmental and resource economics terms, and (iii) use the information gained for presentation in a written term paper.	**Workload:** Attendance time: 28 h Self-study time: 152 h

Course: Economics of biological diversity in the tropics and subtropics (Lecture, Seminar) *Contents*: Socio-economic importance of biodiversity, threats to it and its protection at the genetic, species and ecosystem level; design of analytic procedures for an economic quantification of the importance of biodiversity and its application to a chosen real-world case.	2 WLH
Examination: Home work (max. 15 pages, 50%) and constitutive home work (max 20 pages, 50%) **Examination requirements:** For an agreed upon topic, suitable environmental and resource economics strategies for analysis must be identified, and implemented using self-identified and self-analysed scientific literature and/or data. Regularly, knoweldge imparted during the lecture component of the course will have to be used. Writing the term paper will require that the fundamental techniques of literature-based scientific research are mastered.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Rainer Marggraf
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:

no a priori prescribed literature

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: Oral examination (approx. 20 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: 40 h Self-study time: 140 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 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. Moreover, students develop their own short research proposal.	4 WLH
Examination: Written exam (60 minutes, 50%) und project report (ca. 5-7 pages, 50%) **Examination requirements:** Use and interpretation of descriptive statistics and standard econometric methods; hypothesis testing; data management; sampling design; development of a research proposal	6 C

Admission requirements: none	**Recommended previous knowledge:** Contents of the lecture: Socioeconomics of Rural Development and Food Security
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:	**Workload:**
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.	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:	**Recommended previous knowledge:**
none	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.

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: 40	

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.	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: 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 seminary sessions will be examined. The comprehensive overview of organizational theories and methods enables the students to identify and classify complex problems and develop solutions.	**Workload:** 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 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.	4 WLH
Examination: Presentation (ca. 45 minutes, 35%) and homework (max. 25 pages, 65%)	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Ludwig Theuvsen
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.E20: Agricultural policy seminar**	6 C 4 WLH

Learning outcome, core skills: Students apply economic concepts and methods to selected issues in the field of agricultural policy and agricultural market analysis. By writing and orally presenting a seminar paper, the students practise how to carry out literature searches, properly and independently write a scientific paper and improve presentation skills.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Agricultural policy seminar (Seminar) *Contents*: The focus of the seminar changes each year.	4 WLH
Examination: Presentation (ca. 45 minutes, 50%) and written paper (max. 15 pages, 50%) **Examination requirements:** The focus topic of this seminar course changes each year, but agricultural policy and its impact on consumers and producers in selected countries is always the main topic. Students write, present and discuss seminar papers on specific topics and demonstrate that they are able to write an analytical, scientific paper and communicate its contents.	6 C

Admission requirements: none	**Recommended previous knowledge:** Introductory economics at the Bachelors level recommended.
Language: English	**Person responsible for module:** Prof. Dr. Stephan von Cramon-Taubadel
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:

Appropriate sources and an effective literature search strategy are discussed with each student individually, depending on the topic that he/she will be writing on. Chapters from textbooks provide background material and are supplemented by journal articles and other more detailed studies.

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.	4 WLH
Examination: Term Paper (max. 20 pages)	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:** Jun.-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 PhD students will present one assigned article in class and prepare the related discussion. Furthermore, one session of the course will be dedicated to train students in writing scientific reviews of research manuscripts. As a homework assignment, PhD students will also have to write a review of a particular paper given to them. 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. 10 minutes, 50%) and homework (max. 4 pages, 50%) **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 .	

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

Language: English	**Person responsible for module:** Jun.-Prof. Dr. Meike Wollni
Course frequency: each summer 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.E27: Labour mobility, migration, and rural development**	6 C

Learning outcome, core skills: The course presents theoretical and empirical knowledge about the causes and consequences of labour mobility, with a special view on the context of rural regions. Besides different forms of geographical mobility (national and international migration) it also covers associated aspects like mobility through multi-functionality, off-farm work and vertical mobility. As part of the labour migration phenomenon, remittances (financial, human capital, social) are considered. Causes and consequences are analyzed at the international, national, regional, community and household level. On that basis, the students will be able to assess and evaluate the causes and consequences of different forms of labour mobility and remittances and to assess policy implications in terms of their impact on labour mobility and associated resource flows.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Labour Mobility, Migration, and Rural Development (Lecture, Seminar, Block course) *Contents*: 1. The global context of rural out-migration – facts and figures 2. Causes of rural-urban and rural-international labour migration 3. Co-development - theoretical background 4. Consequences of rural out-migration: Loss of labor force and inflow of remittances 5. Causes and consequences of different forms of remittances (monetary, human capital, social) 6. Role of migration in economic growth 7. Role of migration in poverty reduction 8. Environmental-induced migration 9. Multifunctionality as an alternative strategy 1. De Haas, Hein (2008): Migration and development. A theoretical perspective. IMI (International Migration Institute) Working Paper No. 9. University of Oxford / GB 2. Knerr, Beatrice (ed.) (2012): Transfers from International Migration: A Strategy of Economic and Social Stabilization at National and Household Level. Kassel University Press. 3. Lucas, Robert E.B. (2007): Migration and rural development. electronic Journal of Agricultural and Development Economics. Agricultural Development Economics Division (ESA) FAO. Vol. 4, No. 1, 2007, pp. 99-122. available online at www.fao.org/es/esa/eJADE	

4. Vargas-Lundius, Rosemary, Guillaume Lanly, Marcela Villarreal and Martha Osorio (2008): International migration, remittances and rural development. Enabling poor rural people to overcome poverty. IFAD Policy Division. 5. World Bank (2009): Reshaping Economic Geography	
Examination: Term research paper (max. 20 pages) **Examination requirements:** The following topic areas are to be mastered: • Global context of out-migration from rural areas; • Theories of migration, of remittances impact and of economic development; • Causes of rural-to-urban migration; • International out-migration from rural regions; • The phenomenon of „co-development“; • Economic and social consequences of rural out-migration (loss of labour force, inflow of remittances); • Relationships between migration and poverty; • Migration and economic growth	

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in economics
Language: English	**Person responsible for module:** Prof. Dr. Beatrice Knerr
Course frequency: each summer 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:

Weil, D.N. 2005: Economic Growth. Addison- Wesley; Todaro, M.P. 2007: Economic Development. FT Prentice Hall; selected journal articles.

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 (Exercise, Lecture) *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.	4 WLH
Examination: Presentation (ca. 20 minutes, 50%) with written outline (max. 20 pages, 50%)	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.E29: Selected Topics on International Development Economics and Rural Development**	6 C 4 WLH

Learning outcome, core skills: The aim of this module is to acquaint students with scientific work and research activities in the field of international development economics, with a focus on rural development related to multifunctionality, agrarian production, natural resources, rural-urban linkages and labour mobility. Based on that, they will be in a position to assess the quality and scope of publications on different topics, to write their own proposals, and to compose well-founded research papers.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Selected Topics on International Development Economics and Rural Development (Seminar) *Contents*: The seminar consists of two parts: first, the students will be introduced into various research projects of which they receive an abstract of five to 10 pages for critical review and a presentation 20 to 30 minutes which they are expected to comment. In the second part of the seminar they write their own research paper on a selected topic, which will be closely monitored by the supervisor. Ideally at the end of the seminar we will have a draft of a research paper created a team work of the participants.	4 WLH
Examination: Presentation (ca. 50 minutes, 40%) and research paper (max. 6 pages, 60%) **Examination requirements:** Knowledge about scientific working in the field of economic and socioeconomic. Competence in the analysis of scientific publications and in literature and data research.	6 C

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Prof. Dr. Beatrice Knerr
Course frequency: each winter 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.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.E32: International management**	6 C 4 WLH

Learning outcome, core skills: The module aims: • To deepen the students' understanding of global perspectives in agrifood business; • To prepare students for operating and managing agrifood businesses in an increasingly multinational business environment; • To familiarise students with the key issues and topics in international agrifood business, taking into account major drivers such as responsiveness and competitiveness; To enable students to appreciate differences in political, economic and socio-cultural systems in different parts of the world and to consider how they impact on and are reflected in international agrifood business activities.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: International management (Lecture, Seminar) *Contents*: • The process of globalisation and its impact on the agrifood sector; • 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 concepts and frameworks used in international management; • The management of global supply chains in the agrifood sector; • The management of stakeholder relations in an international context; • Theoretical and critical perspectives of the multinational company; • The management and reporting of information in complex organisational settings (such as multinational food businesses); • The role of environmental, social and governance issues that arise in a global food business setting; • The contrasting perspectives in social responsibility and accountability of business across borders.	
Examination: Written report (max. 30 pages, 60%) and oral examination (ca. 10 minutes, 40%). **Examination requirements:** Students should demonstrate a sound understanding of the international management concepts and frameworks as well as the global perspectives in agrifood business. Students are expected to apply the knowledge acquired in class to a food business company and to collect their notes, observations and thoughts in form of a written report ("learning journal"). The growing understanding of managing international food business should guide them in the development of an organisational policy for the respective	6 C

company. Students will be evaluated based on their ability to explain, justify and discuss their thoughts and suggestions.	

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Herzig, Christian, 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:
Lectures and short lectures combined with facilitated group discussion; seminars include research based learning elements (e.g. case studies) and guest speakers.

Georg-August-Universität Göttingen **Universität Kassel/Witzenhausen** **Module M.SIA.I01M: Ecological modelling and GIS**	6 C 4 WLH

Learning outcome, core skills: Ecological modeling: Basic understanding of the mathematics used in ecological modelling (e.g. ordinary and partial differential equations, state and time events, including numerical aspects); basic experiences in modelling and simulation; knowledge about the possibilities and limits of modelling and simulation in ecology. GIS: The course gives an introduction to Geographical Information Systems (GIS). Starting from geodetical background information, a wide range of different GIS- methods and -functions are presented using agricultural examples (e.g. data import, georeferencing, aggregation, (re)classification, interpolation, overlays and image analysis). The students have the opportunity to carry out exercises on the computer themselves for some important GIS-procedures. A special focus is given on data capturing using maps, field data survey with GPS and remote sensing images as well as the spatial analysis of site conditions. Finally a particular view on GIS in organic farm management and Precision Farming is given.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Courses:	
1. GIS (Geographical Information Systems) (Lecture) *Contents*: Principles of geodetics; georeferencing; data types, -import and -management; methods of data manipulation and analysis (aggregation, (re)classification, interpolation, buffers, overlays, network analysis, image analysis; remote sensing techniques; practical exercises with GIS and GPS, explained under consideration of applications in (organic) farm management and precision farming.	2 WLH
2. Ecological Modelling (Lecture) *Contents*: Introduction to common mathematical concepts used in ecology; basic steps of modelling (conceptual modelling, translation of ecological knowledge into mathematical concepts, implementation, verification; concepts of simulation, specific methods (nonlinear parameter estimation, sensitvity analysis); introduction to modelling and simulation packages; modelling of important ecological processes: Transport, nutrient cycles, dynamics of soilwater, growth, population dynamics.	2 WLH
Examination: Oral exam (2x ca. 15 minutes) or presentation (ca. 30 minutes)	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in ecology, mathematics and computer science
Language: English	**Person responsible for module:** Dr. Thomas Fricke

Course frequency: each winter semester; Witzenhausen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 15	

Additional notes and regulations:

Literature:

Lecture notes, online tutorials.

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 (Lecture, Block course) *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.	
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	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: none	**Recommended previous knowledge:** 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.	4 WLH
Examination: Project work (max. 20 pages) **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:** Prof. Dr. Elke Pawelzik
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, Seminar, Excursion) *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:** Protokoll (Tagesbericht) max. 2 Seiten **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.I08: Organic farming under European conditions**	6 C 4 WLH

Learning outcome, core skills: Students understand and are able to evaluate farming systems and their underlying multifunctional objectives. Students are able to discuss and judge standards of organic agriculture.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Organic farming under European conditions (Lecture, Seminar) *Contents*: • Presentation and discussion of selected literature • Definition of farming systems, multifunctional objectives • Methods for testing and improving the set of objectives • Comparison of standards of organic agriculture (IFOAM, EU, AGOEL)	4 WLH
Examination: Oral exam (ca. 20 minutes, 50%) and presentation (ca. 15-20 minutes, 50%)	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in soil and plant sciences
Language: English	**Person responsible for module:** apl. Prof. Dr. Peter von Fragstein
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:

Lecture based materials.

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%)	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 (Exercise, Lecture) *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

Admission requirements: none	**Recommended previous knowledge:** none
Language: English	**Person responsible for module:** Alle 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: 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.P02: Energetic and technical use of agricultural crops**	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.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Energetic and technical use of agricultural crops (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. Vegetable oil, biodiesel. Processing of alcohol esters from triglycerides and free-fatty-acids. Ethanol fermentation process, distillation and dehydration, thermo-chemical processes. Gasification, Fischer-Tropsch-Process. Management of agricultural crops for technical use. Technologies of processing biomasses to produce technical raw materials (fibres, colours, proteins, lipids, etc.). Benefits and restrictions by the replacement of fossil fuel-based materials through biomass-based products.	4 WLH
Examination: Oral examination (approx. 30 minutes) **Examination requirements:** Basic and theme specific deepened knowledge on the energetic and technical use of agricultural biomass.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowlege in soi land 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.P03: Ecological soil microbiology**	6 C 4 WLH

Learning outcome, core skills: Students learn to use microbiological methods and to interpret the obtained data. Students develop a consciousness for the complexity of soil fertility and soil quality and see the difficulties in diagnosing it.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Ecological soil microbiology (Lecture, Seminar, Excursion) *Contents*: Introduction to, and application of important up-to-date methods in soil-microbiology to determine the activity, biomass and community structure of soil- microorganisms. The complete operational sequence of a research project is simulated: (1) sampling, (2) sample preparation, (3) measurements and data collection (application of methods), (4) data processing, (5) statistics and (6) drafting a manuscript. Up-to-date literature is presented and discussed by the students.	4 WLH
Examination: Project work (max. 12 pages) **Examination prerequisites:** Zwei Präsentationen, Referate oder Korreferate je ca. 20 Minuten	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in biology, chemistry, and soil sciences. To do an experimental Master's thesis in soil sciences or plant nutrition this module is compulsory.
Language: English	**Person responsible for module:** Prof. Dr. R.G. Jörgensen
Course frequency: each winter semester; Witzenhausen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:**
Maximum number of students: 12	

Additional notes and regulations:

Literature:

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; papers to be presented in the course are provided.

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,) *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 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, Seminar, Excursion) *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. 20 minutes, 60%) and presentation (15-20 minutes, 40%)	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge in plant, soil and animal sciences
Language: English	**Person responsible for module:** apl. Prof. Dr. Peter von Fragstein
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 are able to critically evaluate soil and water problems and the limits of natural resources.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Soil and water (Exercise, Lecture) *Contents*: Soil quality, processes and functions (Org. matter turnover, interactions between soil organisms, soil fertility) Soil degradation and conservation (erosion, acidification, compaction, contamination), soil and water salinity Water management (basics of water ecology and landscape water household, evaluation and development of waters) in national and international context Water lifting and conveyance, surface irrigation, sprinklers, micro-irrigation	4 WLH
Examination: Oral examination (approx. 20 minutes)	6 C

Admission requirements: none	**Recommended previous knowledge:** Module Soil and plant science or equivalent, Fundamentals on water ecology and management
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:

Wild, A. 1993: Soils and the Environment. Cambridge University Press; Achtnich, W. 1998: Bewässerungslandbau. Ulmer Verlag, Germany; 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; Lampert, W. 1997: Limnoecology. Oxford University Press; Naiman, R.J. (ed.) 1998: River Ecology and Management. Springer; Wetzel, R.G. 1983: Limnology. Saunders College Publishing.

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.	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: each winter semester; Witzenhausen	**Duration:** 1 Semester[s]
Number of repeat examinations permitted:	**Recommended semester:**

twice	
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.	6 WLH
Examination: Written exam (60 minutes, 67%) and presentation (ca. 20 minutes, 33%) **Examination prerequisites:** Seminarvortrag	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: 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 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.P12: Crops and production systems in the tropics**	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: Crops and production systems in the tropics (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.	4 WLH
Examination: Written exam (90 minutes) or oral exam (ca. 30 minutes) **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:** Dr. sc. agr. Ronald Franz Kühne
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

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 (ca. 15 Minuten, 60%) and presentation (ca. 20 Minuten, 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:** Dr. Alexandra Zum Felde
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 (Exercise, Lecture, Excursion) *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.P16M: Crop modelling for risk management**	6 C 4 WLH

Learning outcome, core skills: Teamwork based and independent development, reporting, presentation and discussion of a simulation experiment depicting selected problems from climate change, land-use planning, agro-ecological zoning, or optimization of input factor productivity.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Crop Modelling for Risk Management (Exercise, Lecture, Seminar) *Contents*: Overview on important modelling concepts of crop growth and development. Introduction to mathematical, statistical and process-oriented modelling approaches of plant growth. Extension of basic approaches to develop interfaces for plot- and landscape based modelling of soil-plant-systems. Exercises in work groups on the use of DSSAT and CERES-MAIZE software with students' netbooks or laptops.	4 WLH
Examination: Presentation (ca. 20 minutes, 50%) and report (max. 20 pages, 50%) **Examination requirements:** Independent design, implementation, interpretation and discussion of a simulation experiment on risk management in tropical crops using a crop modeling software.	6 C

Admission requirements: none	**Recommended previous knowledge:** Basic knowledge (B.Sc. level) of soil and plant sciences, computer literacy
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, software manuals.

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 to critically evaluate the underlying ecological processes. Based on their understanding of soil nutrient dynamics they are able to evaluate and critically assess the significance of long-term experiments and considering all influencing variables.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Course: Nutrient dynamics: long-term experiments and modelling (Exercise, Lecture) *Contents*: • Explanation of the dynamics of C, N and P in arable soils • Presentation of the results of existing long-term experiments with emphasis on the variables and variants influencing these results • Modelling of the turnover of soil organic matter and soil nitrogen using the models "Rothamsted Carbon Model" and "DNDC" • Simulation of pH buffering and nutrient transport in soils using the model "PHREEQC"	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 and the structure of the Rothamsted Carbon Model and the DNDC model.	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 (Exercise, Lecture, 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	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.P20: Plant Nematology**	6 C 4 WLH

Learning outcome, core skills: Students will gain advanced insight in plant nematology, nematode interactions with other plant pathogens, and management strategies; hands-on training will be provided on nematode sampling, processing, identification and disease evaluation Students having taken this module will be able to detect nematode damage and identify plant-parasitic nematodes to genus.	**Workload:** Attendance time: 60 h Self-study time: 120 h

Course: Plant Nematology (Exercise, Lecture, Seminar) *Contents*: Introduction: History (first records, evolution, phylogeny), General function of nematodes (nutrient cycling, beneficial nematodes, parasites of plants and animals), Biology (anatomy, classification, life cycle, reproduction, feeding behaviour, parasitism strategies), Ecology (spread, population dynamics, distribution in soil, survival strategies, worldwide occurrence, interaction with other pathogens), Symptoms (aboveground/ belowground,), Plant-Nematode Interactions (feeding sites, plant defence mechanisms, nematode survival), Economic importance (quantitative/qualitative yield losses, main damaging genera, most vulnerable crops) Methodology: Sampling procedures (sampling depth, number of cores per sample, total sample volume), Sample processing for (a) cysts from soil (Fenwick can, centrifugal/ flotation, elutriation), for (b) mobile stages from soil (Baermann funnel, sieving, flotation, elutriation), for (c) mobile stages from plant material (Baermann funnel, direct preparation, mistifier), Staining of nematodes (in roots, egg masses), Scoring root damage (gall index) Nematode identification: fishing of nematodes, fixation, mounting, permanent slides, identification keys, preparation of vulval cones (cyst nematodes) and perineums (root-knot nematodes) Management: Threshold levels, Quarantine, Crop rotation (hosts, non-host-plants, trap crops, antagonistic crops, fallow), Resistance/tolerance (classical breeding, molecular approaches), Organic amendments (compost, green manure), Biological Control (antagonistic microorganisms, suppressive soils), Physical Control (heat, steam, flooding, radiation), Chemical control (nematicides, fumigants)	4 WLH
Examination: Oral exam (ca. 20 minutes) or written exam (120 minutes) (50%) and presentation (ca. 15 minutes, 50%) **Examination requirements:** General and special biology of nemtodes, especially plant parasitic nematodes. Metnodologies in nematology and identification, general management of nematodes.	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. 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: 15	

Additional notes and regulations:

Literature:

Perry, N.R., Moens, M. 2006: Plant Nematology, CAB International. Luc. M., Sikora, R.A., Bridge, J. 2005: Plant parasitic nematodes in subtropical and tropical agriculture, 2nd edition. Ciancio, A., Mukerji, K.G. 2008: Integrated Management and Biocontrol of Vegetable and Grain Crops Nematodes, Springer-Verlag. Perry, R.N., Moens, M., Starr, J.L. 2009: Root-Knot Nematodes, CAB International. Agrios, G.N. 2005: Plant Pathology, 5th edition. Berg, R.H., Taylor, C.G. 2009: Cell Biology of Plant Nematode Parasitism. Springer-Verlag. Ferraz, L.C.C.B., Brown, D.J.F. 2002: An Introduction to Nemtaodes: Plant Nematology, Pensoft. Weischer, B., Brown, D.J.F. 2000: An Introduction to Nematodes: General Nematology, Pensoft, Shurtleff, M.C., Averre III, C.W. 2000: Diagnosing plant diseases caused by nematodes, APS Press

Georg-August-Universität Göttingen **Module M.WIWI-QMW.0004: Econometrics I**	6 C 4 WLH

Learning outcome, core skills: This lecture provides a detailed introduction and discussion to the theory of several topics of econometrics. In a practical course the students will apply the methods discussed to real economic data and problems using the statistical software packages Eviews and R.	**Workload:** Attendance time: 56 h Self-study time: 124 h

Courses:	
1. Econometrics I (Lecture) *Contents*: Multiple linear regression model: Estimation, Inference and Asymptotics. Maximum likelihood modeling. Generalized least squares. Stochastic regressors. Intrumental variable estimators. Generalized method of moments, likelihood based inference. Dynamic models, weak exogeneity, cointegration, stochastic integration.	2 WLH
2. Econometrics I (Tutorial)	2 WLH
Examination: Written examination (90 minutes)	6 C

Examination requirements: Linear regression models, generalized linear regression models. OLS, GLS, EGLS estimation. Multiplikative heteroskedasticity, autocorrelation. LM specification testing, Durbin Watson test. Convergence in probability, convergence in distribution. Asymptotics (consistency, asymptotic normality) of OLS estimators. IV estimation, GMM estimation.	

Admission requirements: None	**Recommended previous knowledge:** Notwendige: Mathematik (lineare Algebra), Statistik. Erwünscht: Einführung in die Ökonometrie (oder vergleichbare Vorlesung)
Language: English	**Person responsible for module:** Prof. Dr. Helmut Herwartz
Course frequency: each semester	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 2 - 3
Maximum number of students: not limited	

Georg-August-Universität Göttingen **Module M.WIWI-VWL.0008: Development Economics I**	6 C 4 WLH

Learning outcome, core skills: Expose students to macroeconomic issues in economic development, including how economic growth, trade, inequality, aid, capital flows, and population issues affect economic development. They understand historical roots of underdevelopment and acquire knowledge of current economic models and empirical approaches in these topic areas.	**Workload:** Attendance time: 42 h Self-study time: 138 h

Courses:	
1. Tutorial	2 WLH
2. Lecture	2 WLH
Examination: Written examination (90 minutes)	6 C

Examination requirements: The students demonstrate a good understanding of key theories and models of economic development. They are able to critically present these theories and models, are able to interpret empirical results that relate to these models, and are able to crucially draw relevant policy conclusions coming out of these models and empirical assessments.	

Admission requirements: None	**Recommended previous knowledge:** Knowledge of macroeconomics and econometrics at BA level is highly desirable.
Language: English	**Person responsible for module:** Prof. Stephan Klasen
Course frequency: each winter semester	**Duration:** 1 Semester[s]
Number of repeat examinations permitted: twice	**Recommended semester:** 1 - 3
Maximum number of students: not limited	