

# **Module Handbook**

**for the Master's program  
Agriculture, Ecology and Societies**

**at the  
University of Kassel  
Faculty of Organic Agricultural Sciences**

Version: July 31st, 2024

## Inhalt

<b>Compulsory modules</b> .....	4
Food systems governance and agriculture .....	4
Agriculture and ecosystem services .....	5
Interdisciplinary Project.....	7
Master thesis and colloquium .....	8
<b>Bridging modules</b> .....	10
Research methods in social sciences .....	10
History, Societies and Environment.....	11
Research methods and data science in the life sciences .....	13
Organic livestock farming under temperate conditions .....	14
Principles of organic farming .....	16
Soil and plant science .....	17
<b>Compulsory elective modules I: Agriculture and Ecology</b> .....	19
Unconventional livestock and wildlife .....	19
Social-ecology in livestock production systems.....	20
Livestock nutrition and feed evaluation under (sub)tropical conditions .....	22
Livestock-based sustainable land use .....	23
Digitalization in livestock systems.....	25
Grassland-based livestock systems and climate change mitigation .....	27
Innovative sustainable breeding.....	29
Management of (sub-)tropical landuse systems.....	31
Applied statistical modelling.....	32
GIS and remote sensing in agriculture.....	33
Sustainable diets .....	35
Participatory research methods for sustainability.....	36
Modelling climate impacts on agroecosystems .....	38
Organic agriculture in Europe .....	40
Sustainable land-use and climate mitigation.....	41
Biodynamic agriculture .....	43
Food processing .....	44
Ecology and agroecosystems.....	45
Organic cropping systems under temperate and (sub)tropical conditions .....	46
Agrobiodiversity and plant genetic resources in the tropics .....	48
Nutrient dynamics, experimental design and statistical modelling - bilingual .....	49
Digitalization in agriculture .....	50

Biochar for Environmental Management .....	52
Soil-plant interactions.....	53
Water in the soil plant-system .....	55
Nutrient acquisition by plants.....	56
<b>Compulsory elective modules II: Society and environment</b> .....	<b>58</b>
Marketing research.....	58
International organic food markets and marketing.....	59
Strategic management.....	60
Management and management accounting.....	62
Rural sociology.....	63
Critical perspectives on the global food system .....	64
EU policies, organic farming and food system transformation.....	66
Sustainable food systems and management .....	68
Sustainability-oriented environmental social science .....	69
Climate change governance .....	71
Sustainable? Development?.....	72
Environment and health.....	74
Education for sustainable development and agriculture .....	76
One health: human, animal and environmental interactions .....	78
Philosophy of sciences .....	79
Philosophy of environment and society .....	81
Global political economy and development.....	82
Methods of sociology and humanities .....	83
Spatial dimensions of sustainability transitions.....	85
Supply chain management.....	86
Sustainable behaviour and governance .....	87
Decision support tools in sustainability management.....	89

## Compulsory modules

### Food systems governance and agriculture

<b>Module number / code</b>	E46
<b>Module name</b>	Food systems governance and agriculture
<b>Type of module</b>	Compulsory module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students</p> <ul style="list-style-type: none"> <li>• will understand the food system concept and the role of governance and institutions within it against the background of the European Union, and its role for and interactions with diverse production systems worldwide</li> <li>• will obtain an overview of the ways in which the many European food systems and demands for agricultural produce shape local agriculture and rural areas in Europe and worldwide</li> <li>• will obtain an overview of the role of policies, governance arrangements and institutions for the way Europe shapes global food systems and agriculture</li> <li>• will become familiar with a public choice and institutionalist perspective on public policy making</li> <li>• will become familiar with a constitutional, new institutional economic and a critical institutionalist perspective on food system interactions and their change</li> <li>• will reflect on the concepts of the course throughout seminar discussions</li> <li>• will explore analytical tools throughout issue-related discussions with practice partners.</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<p>Agricultural production is nowadays conceived as integral part of global food, feed, fuel, and fibre-related supply systems. The European Union plays a major role in structuring global agriculture, food and supply systems. Policies structuring governance and institutions are core elements shaping economic exchange in the food system and the exploitation of natural resources. The course covers what food and agricultural systems are, what roles policies, governance and institutions play in these, and how the European Union's structure of agricultural production shapes them. To explain policy outcomes, the course relies on a public choice and institutionalist perspective. For analyzing the food system, it further introduces new and critical institutionalist approaches and collective action theory, and illustrates these through case materials and literature discussions. Analytical perspectives will further be explored through the discussion of various European governance issues with practice partners and policy makers.</p>
<b>Title of courses</b>	Food systems governance and agriculture
<b>Teaching and learning methods</b>	Lecture, seminar, group works, virtual and in presence stakeholder meetings, excursions, presentations, readings
<b>Usability in other programs</b>	Obligatory module according to §9(3) Examination Regulations Master AGES

<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Five literature discussions in groups (each appr.. 1500 words) Grade weighting P1: 40% Examination P2: Oral presentation (appr. 20min) or Oral examination (25min) or Written report (appr. 2500 words) Grade weighting P2: 60%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Thiel
<b>Lecturer(s)</b>	Prof. Dr. A. Thiel and staff
<b>Media used</b>	In correspondence with instruction type
<b>Recommended literature</b>	Literature and seminar papers will be circulated to students at the beginning of term

### Agriculture and ecosystem services

<b>Module number / code</b>	I20
<b>Module name</b>	Agriculture and ecosystem services
<b>Type of module</b>	Compulsory module
<b>Learning outcomes, acquired competencies and qualification goals</b>	This course will introduce students into the concepts of ecosystem services and human well-being, with a particular focus on their relevance for agriculture and other land uses. It will foster the ability of students to assume an interdisciplinary research perspective (including ecological, socio-cultural, and economic approaches) and to critically discuss and analyse the concept of ecosystem services in its multiple scientific, political and practical meanings.
<b>Course types</b>	Seminar 60h

<b>Content</b>	<p>Global environmental assessments (e.g., the Intergovernmental Platform on Biodiversity and Ecosystem Services, IPBES) have highlighted that human well-being is critically dependent on ecosystem services – the benefits that nature provides to people. Depending on the particular land-use system and its social-ecological context, agriculture can either degrade or enhance such ecosystem services. This course gives an overview on the rising field of ecosystem services science. Focus will be on:</p> <ul style="list-style-type: none"> <li>• techniques for decision support,</li> <li>• practical applications of the approach in agriculture and other land-use sectors, and</li> <li>• linkages to other sustainability issues (e.g., biodiversity, climate change, water security, poverty).</li> </ul> <p>These topics will be outlined in lectures and deepened in seminars and field exercises, where key issues will be explored and critically discussed.</p>
<b>Title of courses</b>	Agriculture and ecosystem services
<b>Teaching and learning methods</b>	Lecture, seminar
<b>Usability in other programs</b>	Obligatory module according to §9 (3) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	<p>Examination P1: Presentation (appr. 30min)  Grade weighting P1: 50%  Examination P2: Written report (max. 8000 words)  Grade weighting P2: 50%</p>
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. T. Plieninger
<b>Lecturer(s)</b>	Prof. Dr. T. Plieninger and staff
<b>Media used</b>	divers

<b>Recommended literature</b>	Potschin M., Haines Young R., Fish R. and Turner R.K. 2016: Routledge Handbook of Ecosystem Services. Routledge Earthscan; London, New York.
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### Interdisciplinary Project

<b>Module number / code</b>	-
<b>Module name</b>	Interdisciplinary Project
<b>Type of module</b>	Compulsory module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students are able to work independently in a group of limited size and interdisciplinary composition and with some guidance, to answer the inter- or transdisciplinary scientific questions derived from the topic in the field of agricultural and food systems affected by Europe's needs for or supply of food, fibres and biomass,</p> <p>To achieve this goal, they acquire the following competencies:</p> <ul style="list-style-type: none"> <li>• Teamwork</li> <li>• Structuring complex group work towards a common goal</li> <li>• Independent data collection and analysis</li> <li>• Synthesis of group work</li> <li>• In-depth processing of social, humanistic, agronomic or utility animal scientific ecological sub-questions</li> <li>• Literature analysis</li> <li>• Exchange with stakeholders</li> <li>• Presentation and discussion of research and work results</li> </ul>
<b>Course types</b>	Project work 360h
<b>Content</b>	<p>Content related: Students work on an interdisciplinary project optionally in different contexts such as soil, plant, animal, economic and/or social.</p> <p>Supra-content related: Planning, implementation and evaluation as well as presentation of the results of a project (field experiment, laboratory experiment, empirical study or similar).</p>
<b>Title of courses</b>	Interdisciplinary project
<b>Teaching and learning methods</b>	Project work
<b>Usability in other programs</b>	Obligatory module according to §9 (3) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	Summer und winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-

<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	360 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Project report (appr. 10.000 words) Grade weighting P1: 70% Examination P2: Group presentation (appr. 30min) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	12 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Thiel
<b>Lecturer(s)</b>	Two lecturers of Master AGES representing different disciplines
<b>Media used</b>	Depending on theme
<b>Recommended literature</b>	Depending on theme, initial literature provided by lecturers

#### Master thesis and colloquium

<b>Module number / code</b>	-
<b>Module name</b>	Master thesis and colloquium
<b>Type of module</b>	Compulsory module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<ul style="list-style-type: none"> <li>• Independent preparation of a scientific paper in an area of agricultural sciences on a topic of the student's choice.</li> <li>• Students should combine the theories, approaches and methods learned during their studies, document methodological confidence and reflection, generate independent theses and reflect on them against the background of the international research discourse.</li> <li>• Presentation of the planning and progress of the independent research process and its methodological foundations in the study colloquium.</li> <li>• Presentation and professional discussion of the work in the final colloquium.</li> </ul>
<b>Course types</b>	Eigenständiges Projekt, Recherche und Auswertung
<b>Content</b>	The topic and content can be chosen by the student and agreed upon with the supervisor. Some teachers also offer topics.
<b>Title of courses</b>	Master thesis and colloquium
<b>Teaching and learning methods</b>	Own project, research and evaluation
<b>Usability in other programs</b>	Obligatory module according to §10 Examination regulations Master AGES



<b>Duration</b>	22 weeks for thesis
<b>Frequency of module offer</b>	Summer und winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	at least 78 credits according to §9 Examination regulations Master AGES
<b>Student workload</b>	900h, number of contact time varies
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Master thesis (appr. 40.000 words) Grade weighting P1: 75% Examination P2: Colloquium (60min) Grade weighting P2: 25%
<b>Credit points (ECTS)</b>	30 cp
<b>Teaching unit</b>	Landwirtschaft,Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Dr. L. Thiemann
<b>Lecturer(s)</b>	all lecturers of Master AGES
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Scientific publications on the agreed topic in consultation with the supervisors

## Bridging modules

### Research methods in social sciences

<b>Module number / code</b>	F16
<b>Module name</b>	Research methods in social sciences
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>The aims of the module are:</p> <ul style="list-style-type: none"> <li>• To understand the philosophical bases of research in the social sciences;</li> <li>• To foster students' understanding of key techniques for collecting and analysing qualitative and quantitative data and their relative strengths and weaknesses;</li> <li>• To be aware of the linkages between theory, data, analysis and interpretation and of the role and impact of the researcher in the research process;</li> <li>• To improve accessibility of research material, such as, journal articles;</li> <li>• To provide more advanced skills in support of other modules and dissertation research involving quantitative and qualitative analysis.</li> </ul>
<b>Course types</b>	Seminar 30h, Übungen 30h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Principles, practicalities and issues of using qualitative and quantitative research methods typically found in the social sciences;</li> <li>• Concepts (e.g. ontology, epistemology and methodology) and how these form research questions and data analysis;</li> <li>• Techniques for collecting and analysing qualitative data, e.g. interviews and focus groups;</li> <li>• Techniques for collecting and analysing quantitative data, e.g. statistics, hypothesis testing, sample design, multiple regression analysis, multiple analysis of variance, factor analysis, cluster analysis.</li> </ul>
<b>Title of courses</b>	Research methods in social sciences
<b>Teaching and learning methods</b>	Seminar, Übung
<b>Usability in other programs</b>	<p>Bridging module according to §7 (3) Examination Regulations Master IFBC</p> <p>Bridging module according to §10 (5) Examination Regulations Master AGES</p>
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-

<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written report (appr. 750 words) Grade weighting P1: 25% Examination P2: Written test (appr. 120min) Grade weighting P2: 75%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. T. Krikser
<b>Lecturer(s)</b>	Dr. T. Krikser
<b>Media used</b>	various
<b>Recommended literature</b>	Bryman, Alan 2012: Social research methods. 4. ed. Oxford: Oxford Univ. Press. Dillman, Don A.; Smyth, Jolene D.; Christian, Leah Melani 2009: Internet, mail, and mixed-mode surveys. The tailored design method. 3. ed. Hoboken, NJ: Wiley. Field, Andy 2018: Discovering statistics using IBM SPSS statistics. 5th edition. Los Angeles, London, New Delhi, Singapore, Washington DC, Melbourne: SAGE (SAGE edge).

## History, Societies and Environment

<b>Module number / code</b>	K51
<b>Module name</b>	History, Societies and Environment
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students are knowledgeable in historical, sociological and philosophical perspectives on and tentative explanations of the dynamics of European agro-based and food economies. They understand bio-economics in their global contexts and in connection with questions of sustainability (Climate protection, biodiversity, adaption to climate change, social justice, and economic feasibility). Debates on sustainability are not only linked to economic, judicial and ethical aspects, but also to questions on cultural diversity and its suppression. This, in turn, comes with clear systemic implications. Students, thus, gain insights into questions and controversies attached to the linkages of migration and agriculture, education and environment, gender and labor, animal usage and domination.</p> <p>Students reflect on fundamental questions regarding human-nature, human-environment and human-animal relations, ethnicized economies and gender (in)equalities. Thus, the role of nature, the environment and animals in Western and non-Western schools of thought, histories of ideas and societies at large, particularly with view of colonial entanglements, are investigated as are the material interactions between humans and their surrounding environment(s). Students equally reflect on meta narratives such as those on modernity, civilization and North-South dualisms. With</p>

	<p>regard to concrete social practices in diverse fields such as science, economy, labor and agriculture, they are able to understand and analyze long-term developments and transformative processes in their historical contexts and meanings. These include, for example, the history of domestication as economic praxis, the transfusion and production of knowledge on and about “nature”, the socializing impact of animals, the history of agriculture, animal husbandry and food production, as well as of patterns of consumption. Just as important for this kind of analysis is the reflection of these developments as results of a Longue Durée, of epoch-shaping transformative processes, climate change etc. (Keyword: “Anthropocene”).</p> <p>Students learn how to apply central investigative perspectives and categories used by the social sciences, cultural studies and the humanities (gender, class, race, ethnicity, religion, geographical area, species etc.). They draw on approaches provided by, for example, Postcolonial Studies, Gender Studies, Cultural and Historical Anthropology, Critical Sustainability Studies, Human-Animal Studies and Multispecies Studies respectively, as well as Environmental Humanities. By means of working on exemplary topics, students gain insights into methods used by the sociology and history of philosophy, animals and the environment. They also learn how to work in interdisciplinary team. On this basis, students are able to develop their own research questions and to take the necessary methodological and organizational steps to work on them (research and writing skills).</p>
<b>Course types</b>	Seminar 30h
<b>Content</b>	alternates, depending on disciplinary affiliation
<b>Title of courses</b>	History, Societies and Environment
<b>Teaching and learning methods</b>	alternates, depending on disciplinary affiliation
<b>Usability in other programs</b>	Bridging module according to §9(5) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 30 hours contact
<b>Required course work</b>	S1: Maximum of two course projects as directed by the course instructor: presentation, report, protocol, excerpt, essay, interview, source criticism, hosting of a class, simulation, podcast, paper, poster and the like.
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written report (appr. 7.000 words)

<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Gesellschaftswissenschaften
<b>Responsible person</b>	PD Dr. M. Roscher
<b>Lecturer(s)</b>	PD Dr. M. Roscher, Prof. Dr. H. Büschel, Prof. Dr. E. Tuidier, Prof. Dr. B. Langfeldt, Prof. Dr. K. Köchy (FB 02), D. apl. Prof. Dr. D. Stederoth (FB 02), Prof. Dr. C. Neu
<b>Media used</b>	alternates, depending on disciplinary affiliation
<b>Recommended literature</b>	alternates, depending on disciplinary affiliation

### Research methods and data science in the life sciences

<b>Module number / code</b>	I29M
<b>Module name</b>	Research methods and data science in the life sciences
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students have an understanding of the methods of quantitative and qualitative data collection in the life sciences and the different sampling techniques and experimental designs. They are able to apply standard data analysis techniques. They understand the usefulness and limitations of selected multivariate approaches for regressions and pattern recognitions in the data science and learn the concepts of different machine learning approaches. They are able to apply the acquired skills in the analysis of their own MSc (and PhD) datasets.
<b>Course types</b>	Vorlesung 40h, Übungen 20h
<b>Content</b>	<p><i>Research methods and standard analyses in the life sciences:</i></p> <ul style="list-style-type: none"> <li>• Introduction to methods of quantitative and qualitative data collection in the life sciences</li> <li>• introduction to sampling techniques and experimental design</li> <li>• Description and exploration of data, visualization using univariate and bivariate plotting and application of standard statistical techniques (regressions and analyses of variance)</li> </ul> <p><i>Data science in the life sciences:</i></p> <ul style="list-style-type: none"> <li>• Application of multivariate approaches: principal component analysis (PCA) and regression (PCR), cluster analyses, factor analyses</li> <li>• Introduction to machine learning: perceptron, artificial neural networks, regression trees, rule-based models and support vector machine classification and regression</li> </ul>
<b>Title of courses</b>	Research methods and data science in the life sciences
<b>Teaching and learning methods</b>	Lecture, exercisess

<b>Usability in other programs</b>	Compulsory elective module according to §9(5) Examination Regulations Master AGES; Method module Bridging module according to §7(3) Examination Regulations Master IFBC
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Oral test (30 min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. B. Ludwig
<b>Lecturer(s)</b>	Prof. Dr. B. Ludwig and staff
<b>Media used</b>	diverse
<b>Recommended literature</b>	Everitt B., Hothorn T. P. 2011: An Introduction to Applied Multivariate Analysis with R. Springer, New York Glaz, B. Yeater, K.M. 2020: Applied Statistics in Agricultural, Biological, and Environmental Sciences. John Wiley & Sons Holmes D., Moody P., Dine D., Trueman L. 2017. Research Methods for the Biosciences. Oxford University Press Touchon J.C. 2021: Applied Statistics With R: A Practical Guide for the Life Sciences. Oxford University Press Wehrens R. 2020: Chemometrics with R, Springer

### Organic livestock farming under temperate conditions

<b>Module number / code</b>	A14
<b>Module name</b>	Organic livestock farming under temperate conditions
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Animal nutrition and animal health: Students have a basic understanding of farm animal nutrition and health management; they understand the challenges emerging in organic livestock systems

	<p>related to both animal nutrition and animal health and know how to assess, quantify, evaluate and approach these challenges.</p> <p>Animal welfare: Students have a basic understanding of animal welfare, familiarise with different organic husbandry systems, practical problems and scientific concepts including how to assess animal welfare both at farm and system level.</p>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<p><i>Course: Animal nutrition and animal health:</i> Principles and regulations of organic livestock farming in Europe; Nutrition in organic cattle, pigs and poultry; Animal health and production diseases; Production diseases in organic cattle, pigs and poultry; Health management in organic livestock farms</p> <p><i>Course: Animal Welfare:</i> Principles of animal welfare in relation to organic farming; scientific methods of welfare assessment; organic livestock husbandry.</p>
<b>Title of courses</b>	Organic livestock farming under temperate conditions
<b>Teaching and learning methods</b>	Lecturing, self-study, textbook assignments, group work, group discussion, student presentations, excursions.
<b>Usability in other programs</b>	Bridging module according to §9 (5) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge of animal sciences.
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	<p>Examination P1: Written test (120min) Grade weighting P1: 100%</p> <p>Examination P2: Written test (60min) 70% and Oral presentation (appr. 20min) 30% Grade weighting P2: 100%</p>
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. M. Krieger
<b>Lecturer(s)</b>	Dr. M. Krieger, Prof. Dr. U. Knierim
<b>Media used</b>	diverse
<b>Recommended literature</b>	<p>Appleby, M.C., Olsson, I.A.S, Galindo, F. (eds) 2018: Animal welfare. 3<sup>rd</sup> ed., CAB International, Wallingford;</p> <p>Vaarst, M. et al. (eds.) 2004: Animal health and welfare in organic</p>

	<p>Agriculture. CAB International, Wallingford;  Vaarst, M. &amp; Roderick, S. (eds.) 2019: Improving organic animal farming. Cambridge: Burleigh Dodds Science Publishing, <a href="https://doi.org/10.1201/9781351114615">https://doi.org/10.1201/9781351114615</a>  Hynd, Philip I. 2019: Animal Nutrition: From Theory to Practice, CSIRO Publishing. <i>ProQuest Ebook Central</i>, <a href="https://ebookcentral.proquest.com/lib/unikassel/detail.action?docID=5969519">https://ebookcentral.proquest.com/lib/unikassel/detail.action?docID=5969519</a>.</p>
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### Principles of organic farming

<b>Module number / code</b>	F17
<b>Module name</b>	Principles of organic farming
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students are able to describe</p> <ul style="list-style-type: none"> <li>• the principles and structures as well as functions of agricultural ecosystems in general</li> <li>• nutrient cycles and their management in agriculture</li> <li>• systems of land use and their ecological impact</li> <li>• nutrient management as based on cropping techniques in organic agriculture</li> <li>• principles of organic pest management</li> <li>• principles of organic animal husbandry</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Various relevant theories of low-input and intensive organic agriculture</li> <li>• Structures and functions of agricultural ecosystems in general</li> <li>• Development, evaluation and comparison of ecological crop management systems on the background of various natural, economic and socio-cultural circumstances</li> <li>• Principles of pest management and fertilisation in organic agricultural systems</li> <li>• Principles of animal husbandry in organic agricultural systems</li> <li>• The biodynamic approach – an integral basis of organic agriculture and differentiation of organic and conventional food quality on the example of milk and effects on human health</li> </ul>
<b>Title of courses</b>	Principles of organic farming
<b>Teaching and learning methods</b>	Presentations, discussions and conclusions in form of closing sessions in plenum
<b>Usability in other programs</b>	Bridging module according to §9 (5) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester



<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 10min) Grade weighting P1: 40% Examination P2: Written report (appr. 3500 words) Grade weighting P2: 60%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. M. Athmann
<b>Lecturer(s)</b>	Prof. Dr. M. Athmann, Prof. Dr. U. Niggli, Dr. D. Kusche
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Lecture based materials

### Soil and plant science

<b>Module number / code</b>	P07
<b>Module name</b>	Soil and plant science
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Bridging module for students lacking basic knowledge in some agronomy disciplines. With the help of lectures and reading materials students will be enabled to fill in gaps and get updated on state-of-the art knowledge with a special focus on questions pertinent to organic agriculture. Students, having taken this module, will be able to follow advanced courses in the above fields.
<b>Course types</b>	Lecture 60h
<b>Content</b>	Influence of soil formation processes on physical properties (texture, soil water, pore space), chemical properties (buffering, exchange capacity, nutrients), and biological properties (organic matter, edaphon), soil formation and classification. Nutrient availability and 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 defense. Insect physiology, ecology.

<b>Title of courses</b>	Soil and plant science
<b>Teaching and learning methods</b>	Lecture
<b>Usability in other programs</b>	Bridging module according to §9(5) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written test (120min) or Oral test (20min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Dr. H. Saucke
<b>Lecturer(s)</b>	Dr. H. Saucke, Prof. Dr. A. Bürkert, Prof. Dr. G. Backes
<b>Media used</b>	diverse
<b>Recommended literature</b>	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: PlantPathology, 5th edition, Academic Press, New York; Pedigo L.P. 2002: Entomology and Pest Management, 4th edition, Macmillan Pub Co.

## Compulsory elective modules I: Agriculture and Ecology

### Unconventional livestock and wildlife

<b>Module number / code</b>	A07
<b>Module name</b>	Unconventional livestock and wildlife
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	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 utilization and management and their respective potential contribution to the above conflicting objectives.
<b>Course types</b>	Seminar 40h, Exkursion 20h
<b>Content</b>	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 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 utilization 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.
<b>Title of courses</b>	Unconventional livestock and wildlife
<b>Teaching and learning methods</b>	Lecture, seminar, excursion
<b>Usability in other programs</b>	Compulsory elective module according to §9 (7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester, biennial
<b>Frequency of module offer</b>	annually in summer semester

<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge of soil, plant and animal sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 20min) Grade weighting P1: 30% Examination P2: Written test (90min) Grade weighting P2: 70%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Dr. C. Hülsebusch
<b>Lecturer(s)</b>	Dr. C. Hülsebusch
<b>Media used</b>	diverse
<b>Recommended literature</b>	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 <a href="http://www.cites.org/">http://www.cites.org/</a> (incl. appendices)

### Social-ecology in livestock production systems

<b>Module number / code</b>	A08
<b>Module name</b>	Social-ecology in livestock production systems
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students understand livestock farming 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 farmers' management. This serves to understand "why farmers do what they do" and "how farmers produce". Students learn how they can make use of the knowledge of farmers to a) better understand how low external input systems function and b) co-develop innovations that fit to contextual conditions. Collaborative learning is introduced as methodology to operationalise transdisciplinary research and

	deals with the question of how mutual understanding between farmers and scientists can be achieved despite the different knowledge systems. Students obtain a profound insight into methods for stakeholder and gender analysis, knowledge integration and knowledge co-creation Participatory monitoring is introduced as method to learn from application of the co-developed innovations.
<b>Course types</b>	Seminar 60h
<b>Content</b>	Theoretical background of the social-ecological system view: System theory, 1st and 2nd order cybernetics, complex problematic situations, 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
<b>Title of courses</b>	Social-ecology in livestock production systems
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9 (8) Examination Regulations Master AGES
<b>Duration</b>	1 Semester, bienniel
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge of soil, plant and animal sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written test (90min) Grade weighting P1: 70% Examination P2: Oral presentation (appr. 20min) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft,Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	apl Prof. Dr. B.Kaufmann
<b>Lecturer(s)</b>	apl Prof. Dr. B. Kaufmann

<b>Media used</b>	Will be announced in the module
<b>Recommended literature</b>	<p>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;</p> <p>Kaufmann B.A., Arpke H. and A. Christinck 2013: 'From assessing knowledge to joint learning', pp. 115-142 In: Cultivate Diversity! A handbook on transdisciplinary approaches to agrobiodiversity research (edited by A. Christinck and M. Padmanabhan), Margraf Publishers: Weikersheim, Germany, pp.118-120 and 127-129.</p> <p>Christinck A. and B. Kaufmann 2018: Facilitating change – methodologies for collaborative learning with stakeholders. Pp. 171-190. In: Padmanabhan M. (ed.). Transdisciplinary Research and Sustainability: Collaboration, Innovation and Transformation. Routledge, Abingdon/New York.</p>

### Livestock nutrition and feed evaluation under (sub)tropical conditions

<b>Module number / code</b>	A10M
<b>Module name</b>	Livestock nutrition and feed evaluation under (sub)tropical conditions
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students are able to:</p> <ul style="list-style-type: none"> <li>• describe the function of the major digestive systems and processes of domestic livestock species and their consequences for ration formulation</li> <li>• understand the different feeding strategies and nutritional requirements of the main livestock species</li> <li>• assess the quality of feedstuffs through theoretical concepts and practical feed quality analyses</li> <li>• calculate rations for the main livestock species</li> <li>• understand abiotic and biotic environmental influences on the physiology of different livestock species</li> <li>• discuss opportunities and limitations of feeding strategies for an optimization of livestock production under specific agro-ecological settings</li> </ul>
<b>Course types</b>	Lectures 36h, lab practical 20h
<b>Content</b>	<p>Livestock nutrition and feed science: The lecture explains and discusses the nutritional physiology of the globally most important livestock species. The adaptation of the different livestock species to climatic conditions and to qualitatively and quantitatively variable fodder supply is analysed. Possibilities to reduce the negative impact of environmental factors on animal production through adapted feeding strategies and ration formulation are evaluated.</p> <p>Laboratory analyses of feedstuffs: Students are introduced to the main standard methods of feed quality analyses, such as determination of crude protein, macro-minerals, cell wall constituents and tannin content. They apply these methods onto selected tropical feed samples and write an essay on one or more methods, thereby interpreting the related quality of their feed samples.</p>

<b>Title of courses</b>	Livestock nutrition and feed evaluation under (sub)tropical conditions
<b>Teaching and learning methods</b>	In-class lectures, online self-study materials, hands-on lab-practical
<b>Usability in other programs</b>	Compulsory elective module according to §9 (7) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge of animal sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 56 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral exam (appr. 20min) Grade weighting P1: 75% Examination P2: Lab protocol (max. 3.000 words) Grade weighting P2: 25%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. E. Schlecht
<b>Lecturer(s)</b>	Prof. Dr. E. Schlecht
<b>Media used</b>	Classical lectures, videos, articles
<b>Recommended literature</b>	Close W.H., Menke, K.H. (eds.) 1986: Selected topics in animal nutrition. A manual. Deutsche Stiftung für Internationale Entwicklung (DSE), Feldafing, Germany Van Soest P.J. 1994: Nutritional Ecology of the Ruminant. Cornell University Press, Ithaca, US Selected up to date journal articles

#### Livestock-based sustainable land use

<b>Module number / code</b>	A13M
<b>Module name</b>	Livestock-based sustainable land use
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired</b>	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

<b>competencies and qualification goals</b>	in field research on livestock-environment interactions; To learn about simple modelling approaches and the significance of their results.
<b>Course types</b>	Lectures 40h, field exercises 16h
<b>Content</b>	<p>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 (greenhouse gas emissions, nutrient excretion) are highlighted, and possibilities for consolidating the interests of livestock keepers with international conventions of environmental protection are discussed.</p> <p>Through classical lectures, own reading, and practical field exercises, the students are introduced to up-to-date quantitative and qualitative methods that are used in studies on animal-environment interactions.</p> <p>Simple modelling approaches that depict animal-environment interactions at the plot level up to the watershed scale are presented and tested by the participants.</p>
<b>Title of courses</b>	Livestock-based sustainable land use
<b>Teaching and learning methods</b>	Lectures, online self-study materials, hands-on field exercises
<b>Usability in other programs</b>	Compulsory elective module according to §9 (7) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge of soil, plant and animal sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 56 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written test (90min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. E. Schlecht
<b>Lecturer(s)</b>	Prof. Dr. E. Schlecht



<b>Media used</b>	Classical lectures, videos, articles
<b>Recommended literature</b>	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.

### Digitalization in livestock systems

<b>Module number / code</b>	A17
<b>Module name</b>	Digitalization in livestock systems
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<ul style="list-style-type: none"> <li>• Have an overview of the current trends in digital technology for agricultural development with particular emphasis on livestock husbandry.</li> <li>• Be familiar with key terminologies including Precision Agriculture (PA), Precision Livestock Farming (PLF), Precision Pasture Management (PPM), and Digital Livestock Farming (DLF). They should be able to give relevant examples of a range of technologies currently applied to facilitate individual animal management systems.</li> <li>• Identify the opportunities and challenges of PLF for organic agriculture</li> <li>• Be able to critically assess the benefits of digitalisation vis-à-vis the socioeconomic realities of agricultural transformation, especially in low- and middle-income countries</li> <li>• Develop scientific presentation and reporting skills</li> </ul>
<b>Course types</b>	Vorlesung 16h, Seminar 44h
<b>Content</b>	<p>Digitalisation is revolutionising the agricultural sector at an unprecedented pace requiring the building of human resource capacity to conveniently cope with the emerging norms of farming and livestock husbandry practices. In this module, students will be given a broader overview of the changes that have taken place in agricultural development. The concept of digital transformation which is enforcing the adoption of automation, high-tech sensors, cloud computing, decision making algorithms, and the Internet of Things will be introduced, and terminologies such as PA and PLF will be explained. Focusing on PLF, students will be helped to self-study a range of digital tools currently in use for either individual or group intensive and extensive management systems. These may include but not limited to the following:</p> <ul style="list-style-type: none"> <li>• Use of radio frequency identification (RFID) leveraged in other technologies for monitoring feed intake, weight gain etc.</li> <li>• Behavioural monitoring using on-animal motion and pressure sensors</li> <li>• Thermal and biochemical sensors for monitoring disease state</li> <li>• Autonomous animal location management (virtual fencing)</li> <li>• Pasture management using geographical information system (GIS)</li> </ul>

	<p>The students must have a fair understanding of what these tools/systems are, their mode of operation, associated costs, and the pros and cons of usage.</p> <p>As part of the learning process, students will be provided with journal article(s) relevant to the trends in application of digitalisation in PLF. Each student would be required to carefully study/review the article provided, and prepare a 25-page (max.) PowerPoint presentation to be presented in a weekly seminar session. Non-presenting students are also required to attend the weekly seminars and learn from their colleagues.</p>
<b>Title of courses</b>	Digitalization in livestock systems
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to § 9 (7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 25min) Grade weighting P1: 70% Examination P2: Written report (ca. 10 Seiten) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. S. Addo
<b>Lecturer(s)</b>	Dr. S. Addo
<b>Media used</b>	
<b>Recommended literature</b>	de Queiroz DM, Valente DSM, Pinto FAC, Borém A, Schueller JK, eds. <i>Digital Agriculture</i> . Springer; 2022

## Grassland-based livestock systems and climate change mitigation


<b>Module number / code</b>	A18
<b>Module name</b>	Grassland-based livestock systems and climate change mitigation
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Grassland-based livestock systems has the following objectives: (i) to learn fundamental relationships between livestock management and forage value of grasslands; (ii) to learn about factors affecting animal performance and animal health; (iii) to become familiar with scientific approaches in animal science and grassland-based systems.</p> <p>Climate change mitigation: (i) understand the basics of greenhouse gas (GHG) emissions and climate change related to livestock; (ii) become familiar with key international climate conventions and agreements; (iii) get acquainted with the methodological approaches used for collecting data and calculating GHG emission from grassland-based livestock systems; (iv) become familiar with policies and mitigation measures for decreasing emissions in these systems.</p>
<b>Course types</b>	Vorlesung 30h, Seminar 30h
<b>Content</b>	<p>Grassland-based livestock systems: Grasslands play a vital role for biodiversity and the climate. Grazing on grasslands has a long tradition in livestock farming and production of high-quality animal products. Today's generations of livestock farmers face increasing challenges because of climate change, invasive plant species, modern animal genetics with high energy and nutrient requirements, and other factors. This sub-module will focus on these challenges from a farmer and animal perspective, looking at various grassland management practices that promote biodiversity and ensure animal health and the production of high-quality livestock products. Participants will learn to differentiate between feed qualities and recognize their effects on animal performance and product quality. Lectures will provide knowledge about selective plants and plant biodiversity in relation to animal health and product quality. The effects of grazing on forage quality and vice versa will be discussed and additional factors such as climate change and plant diversity will be considered.</p> <p>Climate change mitigation: Reducing GHG emissions is paramount to combat climate change globally. Grassland-based livestock systems contribute to climate change but are also affected by it, which means that livestock in these systems can be part of the solution. This sub-module is designed to provide participants with an introduction to the topic of GHG emissions from livestock in grassland-based systems. Key international climate conventions (e.g., the Paris Agreement) and other international commitments envisaged to combat climate change will be discussed. We will explore both qualitative and quantitative aspects needed for understanding, quantifying and mitigating GHG emissions from grassland-based livestock systems. The sub-module will also present different policies and measures (e.g., carbon credits and tax incentives) that can be considered to support a decrease in GHG emissions from livestock in grassland-based systems.</p> <p>The lectures for each sub-module are given by researchers from FB11 at Uni Kassel and invited speakers. In the seminar part, students give a presentation on a topic from this course. Guest lecturers from international</p>

	research institutions and the private sector will be invited for both sub-modules.
<b>Title of courses</b>	Grassland-based livestock systems and climate change mitigation
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to § 9 (7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge (B.Sc. level) of plant and animal sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 20min) Grade weighting P1: 50% Examination P2: Oral test (appr. 15min) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. F. Klevenhusen
<b>Lecturer(s)</b>	Prof. Dr. F. Klevenhusen, Dr. X. Zhang, Dr. C. Bateki, Prof. Dr. E. Schlecht
<b>Media used</b>	diverse
<b>Recommended literature</b>	<p>Fahey, G. C., Jr. (Ed.). 1994: Forage Quality, Evaluation, and Utilization. American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America.</p> <p>Vallentine, J. F. 2000: Grazing Management. Elsevier.</p> <p>Dawson, B., &amp; Spannagle, M. 2009: The complete guide to climate change (pp. 78-88). New York: Routledge.</p> <p>IPCC 2022: Climate Change 2022: Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Lösschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp., doi:10.1017/9781009325844</p> <p>ESCAP, U. 2021: Methodologies for GHG emissions inventories and Paris Agreement reporting: a practical handbook.</p>

<b>Comments</b>	Teaching slides will be provided for each lecture alongside further literature for self-study.
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### Innovative sustainable breeding

<b>Module number / code</b>	A19
<b>Module name</b>	Innovative sustainable breeding
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students</p> <ul style="list-style-type: none"> <li>• understand the complex challenges facing global livestock production, including societal expectations, environmental sustainability, and efficient resource management.</li> <li>• are able to explore and critically evaluate innovative breeding strategies that contribute to sustainable agricultural practices.</li> <li>• gain practical insights into strategic breeding through interactive learning methods such as lectures, seminars, group discussions, and field trips (if feasible).</li> <li>• design a sustainable livestock breeding program that addresses real-world issues, demonstrating an ability to integrate economic viability with social acceptability, animal welfare and environmental health.</li> <li>• contribute meaningfully to policy discussions or practical interventions aimed at promoting sustainability within the livestock sector.</li> </ul>
<b>Course types</b>	Vorlesung 30h, Seminar 30h
<b>Content</b>	<p>In recent years, the paradigm has shifted from prioritizing animal productivity to embracing a more holistic approach in livestock breeding programs that includes animal health, environmental impact, and resource efficiency alongside with economic and production aspects. This course aims to provide students with a comprehensive understanding of these changes and to explore breeding strategies that align with contemporary societal values and international best practices.</p> <p>Students will engage with topics including:</p> <ul style="list-style-type: none"> <li>• Societal expectations and livestock production: Understanding how consumer preferences and societal norms are reshaping livestock breeding objectives.</li> <li>• Sustainable breeding practices: Exploring strategies that balance productivity with animal health, environmental sustainability, and resource efficiency.</li> <li>• Genetic diversity management: Examining the importance of preserving breed diversity as a cultural heritage and as an investment in future resilience to stresses such as zoonotic disease outbreaks and global warming.</li> <li>• Ethical breeding approaches: Investigating ethical considerations in breeding practices that respect animal welfare while meeting farmers' production goals and societal norms.</li> </ul>

	<ul style="list-style-type: none"> <li>Policy implications: Assessing the role of policy in guiding sustainable breeding practices and protecting genetic diversity</li> </ul> <p>Students will develop skills to critically analyze and synthesize literature related to livestock breeding challenges and opportunities, elaborate exemplary breeding approaches for diverse environmental and societal goals, learn to effectively communicate scientific research findings and propose solutions to stakeholders.</p>
<b>Title of courses</b>	Innovative sustainable breeding
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to § 9 (7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written test (90min) Grade weighting P1: 70% Examination P2: Project report (appr. 15 pages) or Oral presentation (appr. 20min) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	PD Dr. R. Rößler
<b>Lecturer(s)</b>	PD Dr. R. Rößler
<b>Media used</b>	
<b>Recommended literature</b>	<p>Spangler, M.L. (ed) 2023: Animal Breeding and Genetics. Encyclopedia of Sustainability Science and Technology Series. <a href="https://doi.org/10.1007/978-1-0716-2460-9">https://doi.org/10.1007/978-1-0716-2460-9</a>  PublisherSpringer New York, NY</p> <p>Literature will be provided to prepare for the lectures and students' assignments / seminars.</p>

## Management of (sub-)tropical landuse systems

<b>Module number / code</b>	I02
<b>Module name</b>	Management of (sub-)tropical landuse systems
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	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.
<b>Course types</b>	Lecture 42h with integrated exercises 6h and student seminars (20%)
<b>Content</b>	Teachers from 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 agroecosystems. Teachers from 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.
<b>Title of courses</b>	Management of (sub-)tropical landuse systems
<b>Teaching and learning methods</b>	Lecture, exercises, seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination Regulations Master AGES, participation limited to 5 students from AGES
<b>Duration</b>	1 Semester, biennial
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Knowledge in plant, soil and animal sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written test (90min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A.Bürkert
<b>Lecturer(s)</b>	Prof. Dr. A. Bürkert, Prof. Dr. E. Schlecht, lecturers of University of Prague

<b>Media used</b>	diverse
<b>Recommended literature</b>	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.

### Applied statistical modelling

<b>Module number / code</b>	I10M
<b>Module name</b>	Applied statistical modelling
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students have a detailed understanding of the concepts of statistical modelling, regression analyses and analyses of variance. They are familiar with the basic concepts of linear models and non-parametric estimation procedures, which now belong to the standard methods in applied statistics. Students are able to practically apply these methods and carry out statistical analyses in soil, plant and animal sciences using the statistical software R. They are able to apply the acquired skills in the analysis of their own MSc (and PhD) datasets.
<b>Course types</b>	Seminar 60h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Review of statistical concepts (boxplots, QQ plots, distributions, classical tests, correlations, analyses of count and proportion data)</li> <li>• General aspects of hypotheses formulation and testing</li> <li>• Basic concepts of experimental design</li> <li>• Standard experimental field designs</li> <li>• Introduction to the software R</li> <li>• Regression (multiple linear, non-linear and logistic)</li> <li>• Statistical modelling, model types and model simplifications</li> <li>• Transformations</li> <li>• Analyses of variance, post-hoc tests</li> <li>• Non-parametric test procedures</li> <li>• Analysis of covariance</li> <li>• Particularities of unbalanced designs</li> <li>• Formulation of statistical models and basic programming in R</li> <li>• Linear mixed models</li> </ul>
<b>Title of courses</b>	Applied statistical modelling
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester



<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge of applied statistics
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written test (120min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. B. Ludwig
<b>Lecturer(s)</b>	Prof. Dr. Bernard Ludwig, Dr. E. Rommelfanger
<b>Media used</b>	diverse
<b>Recommended literature</b>	<p>Crawley M.J. 2012: The R Book, Wiley</p> <p>Dobson A., Barnett A. 2008.: An Introduction to Generalized Linear Models, Chapman &amp; Hall.</p> <p>Field A., Miles J., Field Z. 2012: Discovering Statistics using R, SAGE</p> <p>Mrode R. A. 2005: Linear Models for the Prediction of Animal Breeding Values, CABI Publishing.</p> <p>Welham, S.J., Gezan, S.A., Clark, S.J., Mead, A. 2014. Statistical Methods in Biology. Design and Analysis of Experiments and Regression, CRC Press, Boca Raton.</p> <p>Glaz B., Yeater K.M. 2020: Applied Statistics in Agricultural, Biological, and Environmental Sciences. John Wiley &amp; Sons.</p>

### GIS and remote sensing in agriculture

<b>Module number / code</b>	I14M
<b>Module name</b>	GIS and remote sensing in agriculture
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p><i>GIS:</i> A broad overview of basic GIS functions and related background knowledge should enable students to explore GIS-Software for relevant commands and prepare functional strategies for spatial data management and analysis. Lecture and exercise examples have predominantly agricultural reference.</p> <p><i>Remote Sensing:</i> The lecture will introduce physical principles (reflectance, transmittance, and absorption), sensor techniques (passive and active sensors, satellites, field spectrometer) and methods of analysis (calibration, validation) in remote sensing applications. This technical framework is presented using agricultural examples, as e.g. the generation</p>

	of maps for crop yield and protein, assessment of species composition in mixed vegetation (e.g. grassland), like legume content for a calculation of residual nitrogen and crop rotation effects.
<b>Course types</b>	Seminar 60h
<b>Content</b>	<p><i>GIS:</i> 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 and field data survey with GPS as well as the spatial analysis of site conditions. Finally a particular view on GIS in organic farm management and Precision Farming is given.</p> <p><i>Remote sensing in agriculture:</i> The lecture will introduce physical principles (reflectance, transmittance, and absorption), sensor techniques (passive and active sensors, satellites, field spectrometer) and methods of analysis (calibration, validation) in remote sensing applications. This technical framework is presented using agricultural examples, as e.g. the generation of maps for crop yield and protein, assessment of species composition in mixed vegetation (e.g. grassland), like legume content for a calculation of residual nitrogen and crop rotation effects.</p>
<b>Title of courses</b>	GIS and remote sensing in agriculture
<b>Teaching and learning methods</b>	Lecture, seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 56 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Oral test (30 min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Dr. J. Wijesingha

<b>Lecturer(s)</b>	Dr. J. Wijesingha
<b>Media used</b>	diverse
<b>Recommended literature</b>	Burrough P. A. and R. A. McDonnell 2015: Principles of Geographical Information Systems Campbell J. B. and R. H. Wynne 2011: Introduction to Remote Sensing

### Sustainable diets

<b>Module number / code</b>	I17
<b>Module name</b>	Sustainable diets
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students are able to</p> <ul style="list-style-type: none"> <li>• Evaluate food quality using the criteria of sustainability,</li> <li>• describe nutrition in the context of human health and sustainable development,</li> <li>• describe the impact of a meal/food on nutrition and the environment using concrete indicators,</li> <li>• develop a strategy to optimize a meal/food in terms of sustainability,</li> <li>• name and apply measurement tools to assess sustainability in nutrition,</li> <li>• work and present in groups.</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Culture and cultural patterns of diets</li> <li>• Interactions of food quality and lifestyle on sustainability and human health</li> <li>• Healthy diets within sustainable food systems</li> <li>• Model diets such as Med. Diet and New Nordic Diet</li> <li>• Optimization of a dish/meal according sustainability and nutrition impacts</li> <li>• Role of organic food systems</li> </ul>
<b>Title of courses</b>	Sustainable diets
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge on nutrition, statistics and environmental issues.

<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (ca. 10min) Grade weighting P1: 75% Examination P2: Group presentation (max. 15 p) Grade weighting P2: 25%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. L. Stefanovic
<b>Lecturer(s)</b>	Dr. L. Stefanovic
<b>Media used</b>	Short videos (Internet-based); published reports; interactive tools
<b>Recommended literature</b>	<p>Renner B., Arens-Azevêdo U., Watzl B., Richter M., Virmani K., and Linseisen J. for the German Nutrition Society (DGE) 2021: DGE position statement on a more sustainable diet. In: <i>ErnährungsUmschau</i>, Vol. 68, No. 7, pp. 144–54.</p> <p>Steffen W., Richardson K., Rockstrom J., Cornell S. E., Fetzer I., Bennett E. M., Biggs R., Carpenter S. R., Vries W. de, Wit C. A. de, Folke C., Gerten D., Heinke J., Mace G. M., Persson L. M., Ramanathan V., Reyers B. and Sorlin S. 2015: Sustainability. Planetary boundaries: guiding human development on a changing planet. In: <i>Science</i>, Vol. 347, No. 6223, p. 1259855.</p> <p>The Lancet 2019: Food Planet Health. Healthy Diets From Sustainable Food Systems. Summary Report of the EAT-Lancet Commission.</p> <p>von Koerber K., Waldenmaier J. and Cartsbur, M. 2020: Nutrition and the guiding principle sustainability. Global challenges and problem-solving approaches on a national and international, UN level.</p> <p><i>ErnährungsUmschau</i> international, Vol. 67, No. 2, pp. 32–41.</p> <p>Willett W., Rockström J., Loken B., Springmann M., Lang T., Vermeulen S., Garnett T., Tilman D., DeClerck F., Wood A., Jonell M., Clark M., Gordon L. J., Fanzo J., Hawkes C., Zurayk R., Rivera J. A., Vries W. de, Majele Sibanda L., Murray C. J. L. 2019: Food in the Anthropocene: the EAT–Lancet Commission on healthy diets from sustainable food systems. In: <i>Lancet</i>, 393(10170), 447–492. DOI: 10.1016/S0140-6736(18)31788-4</p>

### Participatory research methods for sustainability




<b>Module number / code</b>	I19M
<b>Module name</b>	Participatory research methods for sustainability
<b>Type of module</b>	Elective module


<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>This course will look at the importance of place-based, participatory and transdisciplinary research methods in sustainability science. Students will learn different participatory methods to capture the knowledge and aspirations of the different agents that operate in agricultural landscapes and will be able to integrate this knowledge in practical outcomes for sustainable land management.</p> <p>After successfully completing this module students should:</p> <ul style="list-style-type: none"> <li>• comprehend the fundamentals of participatory research</li> <li>• be familiar with the different types of participatory research methods</li> <li>• be able to design and implement participatory processes</li> </ul> <p>This module contributes to the following skills:</p> <ul style="list-style-type: none"> <li>• performance of transdisciplinary processes</li> <li>• integration of knowledge and aspirations of different agents towards sustainable land management</li> <li>• data collection and analysis using participatory methods</li> <li>• group work techniques (organization of working schedule, team work)</li> <li>• presentation skills and communication of main research results</li> </ul>
<b>Course types</b>	Lecture 30h, seminar 30h
<b>Content</b>	<p>The course is structured in three parts. An introductory part focuses on research principles of sustainability science, paying particular attention to the role of transdisciplinarity and ethics in the participation processes.</p> <p>A second part showcases a broad suite of different participatory research methods (e.g. photo-voice, participatory mapping, storytelling) for sustainable landscapes management and land-use conflict resolution. The full research process is addressed, from participatory process design, the approaching and involvement of participants and the organisation and facilitation of participatory activities, to the analysis, integration and presentation of the outcomes.</p> <p>In the third part of the course, students have the opportunity to choose and design a protocol for a participatory study, applied to a specific geographical location and a specific problem, and share the insights of the process with the class. The first part will be outlined in lectures, the second part will take the form of seminars and the third part will consist of group work with a final presentation to the class where the different experiences will be critically discussed.</p>
<b>Title of courses</b>	Participatory research methods for sustainability
<b>Teaching and learning methods</b>	Lecture, seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch

<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 30min) Grade weighting P1: 50% Examination P2: Written report (appr. 8.000 words) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. T. Plieninger
<b>Lecturer(s)</b>	Prof. Dr. T. Plieninger and staff
<b>Media used</b>	diverse
<b>Recommended literature</b>	Bergmann M. et al. 2012: Methods for Transdisciplinary Research: A Primer for Practice. Campus Verlag;  Course materials to be provided.

### Modelling climate impacts on agroecosystems

<b>Module number / code</b>	I24
<b>Module name</b>	Modelling climate impacts on agroecosystems
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	The students have an overview of models used to capture climate change impacts on different agroecosystems and the effects of climate adaptation measures. The module teaches climate change impacts on various agroecosystems, adaptation measures and how these aspects can be captured by different types of statistical and process-based agricultural models. With this knowledge, the students are able understand and develop agricultural models to assess climate impacts, risks and resilience. In the last section, adaptation measures to climate change are modeled, discussed and evaluated using various methods and indicators.
<b>Course types</b>	Seminar 60h
<b>Content</b>	The course gives an overview of climate change impacts across different agroecosystems, a solid understanding of climate and agricultural models and the projected climate impacts on the agricultural production, resilience and adaptation. In addition, short term climate and weather risks are discussed in the course. The lecture

	is in parallel with an exercise, where the students rebuild and develop own models in the statistic software R.
<b>Title of courses</b>	Modelling climate impacts on agroecosystems
<b>Teaching and learning methods</b>	Lecture, seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	First experience with the statistic software R is valuable.
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral examination (appr. 30min) Grade weighting P1: 50% Examination P2: Written report (max. 7.500 words) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. C. Gornott
<b>Lecturer(s)</b>	Prof. Dr. C. Gornott
<b>Media used</b>	diverse
<b>Recommended literature</b>	Shukla, Gleixner, Yalew, Schauburger, Sietz, Gornott 2021: Dynamic vulnerability of smallholder agricultural systems in the face of climate change for Ethiopia, Environmental Research Letters. Laudien, Schauburger, Makowski, Gornott 2020: Robustly forecasting maize yields in Tanzania based on climatic predictors, Nature Scientific Reports. Iizumi T., Hirata R., Matsuda R. 2019: Adaptation to Climate Change in Agriculture, Springer, ISBN 9789811392351  Bryant C.R., Sarr M.A., Délusca K. 2020: Agricultural Adaptation to Climate Change, Springer, ISBN 9783319313924  Torquebiau E. 2016: Climate Change and Agriculture Worldwide, Springer, ISBN 9789401774628  Castro P., Azul A.M., Leal Filho W., Azeiteiro U.M. 2019: Climate Change

	Resilient Agriculture and Agroforestry, Springer, ISBN 9783319750040 
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### Organic agriculture in Europe

<b>Module number / code</b>	I30
<b>Module name</b>	Organic agriculture in Europe
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students understand the situation of organic agriculture in different European countries. Students are able to discuss and judge standards of organic agriculture.
<b>Course types</b>	Seminar 60h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Comparison of standards of organic agriculture (IFOAM, EU, within EU).</li> <li>• Situation of organic production, processing and markets in different European countries.</li> <li>• Organic agriculture in European Universities: current research projects, teaching activities.</li> <li>• Necessary measures on all levels in the coming future to transform agriculture production in different countries to organic agriculture.</li> </ul>
<b>Title of courses</b>	Organic agriculture in Europe
<b>Teaching and learning methods</b>	Online lectures, discussions, group work
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 40h contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	




<b>Module examination(s)</b>	Examination P1: Individual written report (appr. 15 p.) or group student presentation and individual report (appr. 25min, 10 p.) Grade weighting P1: 80% Examination P2: Oral examination (15min) Grade weighting P2: 20%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. G. Backes/H. Mittelstraß
<b>Lecturer(s)</b>	ENOAT (European network of organic agriculture teachers): Prof. Dr. G. Backes/H. Mittelstraß (DE), Prof. Dr. E. Rembalkowska (PL), Dr. C. Vogl (AT), Dr. R. Georgieva/Prof. I. Manolov (BG), Prof. Dr. J. Moudrý (CZ), Dr. A. Vincent (FR), Dr. A. Divéky?Ertse (HU), Prof. Dr. R. Mancinelli (IT), E. Aplocina/Dr. D. Kreismane (LV), Dr. M. Bavec/Prof. Dr. F. Bavec (SL), Dr. T. Briz/Dr. B. Urbano (ES), Dr. R. Chongtham Iman (SE), Prof. Dr. M. Grabovskyi (UKR)
<b>Media used</b>	Video conference
<b>Recommended literature</b>	FIBL and IFOAM (ed.) 2022: The world of organic agriculture. Frick/Switzerland

### Sustainable land-use and climate mitigation


<b>Module number / code</b>	I31
<b>Module name</b>	Sustainable land-use and climate mitigation
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Upon successful completion of the module students</p> <ul style="list-style-type: none"> <li>• will be able to understand key scientific concepts around climate change and its mitigation.</li> <li>• have deep knowledge on land-based mitigation options, their potentials, interplays and side-effects</li> <li>• will understand the scientific principles of the interplay between climate mitigation and other sustainable development targets</li> <li>• will be able to develop interdisciplinary and holistic viewpoints on sustainable land management including land-based mitigation</li> <li>• will obtain an overview of models used to assess mitigation pathways</li> <li>• will be able to understand land-use models and Integrated Assessment Models that are used to derive future pathways</li> <li>• will become familiar with international assessment bodies such as IPCC or IPBES</li> <li>• develop critical thinking of the scenarios used in international assessments such as IPCC and IPBES</li> <li>• will explore analytical tools such as scenario explorers and land-use models</li> <li>• will reflect on the concepts of the course throughout seminar presentations and discussions</li> </ul>
<b>Course types</b>	Vorlesung 15h, Seminar 15h, Exkursion 30h

<b>Content</b>	<p>Land-based climate mitigation measures have gained significant attention and importance in public and private sector climate policies.</p> <p>To start with, this course provides an overview on climate change and its mitigation in general, focusing on the land-use sector. It will highlight the contributions of land use to as well as its potentials for mitigating climate change. Hereby, the course will help to increase the understanding of the needs, opportunities, potentials, interplays of different land-based mitigation options as well as their interaction with other sustainable development targets such as biodiversity protection. The course continues introducing international assessment bodies such as IPCC and IPBES being one of the major scientific basis of public and private sector decision making. Moreover, the scenarios as well as the tools applied for developing these scenarios will be assessed and discussed. Students then work on selected current topics of Land-Based Climate Mitigation from different perspectives which are accompanied by the lecturers. At the end of the semester, all students present their outcomes.</p> <p>Part of the module will take place at the Potsdam Institute of Climate change.</p>
<b>Title of courses</b>	Sustainable land-use and climate mitigation
<b>Teaching and learning methods</b>	Vorlesung, Seminar, Exkursion
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester, jährlich
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	<p>Examination P1: Oral presentation (appr. 15min) Grade weighting P1: 40%</p> <p>Examination P2: Oral exam (15min) Grade weighting P2: 60%</p>
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Popp
<b>Lecturer(s)</b>	Prof. Dr. A. Popp
<b>Media used</b>	verschiedene

<b>Recommended literature</b>	<p>Various scientific publications specified in the description of the respective course</p> <p>Leimbach, M. et al. 2011: Integrated assessment models -the interplay of climate change, agriculture, and land use in a policy tool. In: Dinar, A., Mendelsohn, R. (eds.): Handbook on Climate Change in Agriculture. Edward Elgar, Cheltenham, UK. (Chapter 10)</p> <p>Dietrich, J. et al 2019: MAgPIE 4 -A modular open source framework for modeling global land-systems. Geoscientific Model Development. 12, 1299-1317.</p> <p>Pörtner, H.O. et al 2021: IPBES-IPCC co-sponsored workshop report on biodiversity and climate change; IPBES and IPCC.</p> <p>DOI:10.5281/zenodo.4782538 </p> <p>IPCC 2019: Climate Change and Land: an IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [P.R. Shukla, J. Skea, E. Calvo Buendia, V. Masson-Delmotte, H.-O. Pörtner, D. C. Roberts, P. Zhai, R. Slade, S. Connors, R. van Diemen, M. Ferrat, E. Haughey, S. Luz, S. Neogi, M. Pathak, J. Petzold, J. Portugal Pereira, P. Vyas, E. Huntley, K. Kissick, M. Belkacemi, J. Malley, (eds.)]. In press.sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems. IPCC. <a href="https://www.ipcc.ch/srccl/">https://www.ipcc.ch/srccl/</a></p>
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### **Biodynamic agriculture**

<b>Module number / code</b>	I32
<b>Module name</b>	Biodynamic agriculture
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Learn to know basic principles of biodynamic agriculture (in Germany and worldwide), critical discussion of practical examples and scientific studies on the topic, as well as insight into practice on a biodynamic farm and into research work on the issue.
<b>Course types</b>	Seminar 45h, Exkursion 15h
<b>Content</b>	Introduction to the basics of biodynamic agriculture with practical examples from Germany and around the world. The areas of animal husbandry, plant breeding and product quality as well as the underlying principles of biodynamic agriculture will be discussed. With a focus also on scientific studies on the subject and current concepts like one health. The course includes a 3-day excursion to a biodynamic farm and a research institution.
<b>Title of courses</b>	Biodynamic agriculture
<b>Teaching and learning methods</b>	Seminar, Exkursion
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester, jährlich
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch

<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 30min) Grade weighting P1: 50% Examination P2: Oral exam (appr. 30min) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. D. Kusche
<b>Lecturer(s)</b>	Dr. D. Kusche
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Brock et al. 2019: Research in biodynamic food and farming - a review. Open Agriculture <a href="https://doi.org/10.1515/opag-2019-0064">https://doi.org/10.1515/opag-2019-0064</a> 

## Food processing

<b>Module number / code</b>	I33
<b>Module name</b>	Food processing
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students can: <ul style="list-style-type: none"> <li>• Describe the basic processes and systems of food processing</li> <li>• Derive quality-relevant steps, raw material and product properties</li> <li>• Discuss the differences between industrial and artisanal production</li> <li>• Classify the production of food in the wider context of sustainable development</li> </ul>
<b>Course types</b>	Vorlesung 45h, Seminar 15h
<b>Content</b>	General definitions of food quality, special emphasize on organic food quality, Sensory evaluation techniques in quality assessment, general methods of food analysis Practical Part: Examples of Sensory and analytical Quality assessment.

<b>Title of courses</b>	Food processing
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Bridging module according to §7 (3) Examination Regulations Master IFBC Mandatory module according to §10 (7) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basics in chemistry
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Klausur (ca. 90min) 100% oder Fachgespräch (ca. 20min) 100%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. F. Weber
<b>Lecturer(s)</b>	Prof. Dr. F. Weber
<b>Media used</b>	diverse
<b>Recommended literature</b>	

### Ecology and agroecosystems

<b>Module number / code</b>	P01
<b>Module name</b>	Ecology and agroecosystems
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students are able to define site-specific conditions of sustainability, identify key constraints to the productivity and sustainable use of agroecosystems, assess the scope of human (management) interventions, determine the causes of productivity decline and chose approaches to strengthen sustainability
<b>Course types</b>	Vorlesung 50h, Seminar 10h
<b>Content</b>	Case-study based analysis and discussion of ecological framework conditions (limitations) in different arid and sub-humid agroecosystems 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 agroecosystems will be presented.
<b>Title of courses</b>	Ecology and agroecosystems
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge in plant, soil and animal science, willingness to analyse agro-ecosystems quantitatively
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written test (90min) Grade weighting P1: 70% Examination P2: Oral presentation (appr. 25min) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Bürkert
<b>Lecturer(s)</b>	Prof. Dr. A. Bürkert
<b>Media used</b>	diverse
<b>Recommended literature</b>	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.

#### Organic cropping systems under temperate and (sub)tropical conditions

<b>Module number / code</b>	P05
<b>Module name</b>	Organic cropping systems under temperate and (sub)tropical conditions
<b>Type of module</b>	Elective module

<b>Learning outcomes, acquired competencies and qualification goals</b>	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.
<b>Course types</b>	Lecture 40h, Excursion 10h, Seminar 10h
<b>Content</b>	Visits of organic farms; History of organic farming, current developments; 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.
<b>Title of courses</b>	Organic cropping systems under temperate and (sub)tropical conditions
<b>Teaching and learning methods</b>	Lecture, excursion, seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral Examination (15 min) Grade weighting P1: 70% Examination P2: Oral presentation with outlet (appr. 20min, 10 p.) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Bürkert
<b>Lecturer(s)</b>	Prof. Dr. A. Bürkert, Prof. Dr. M. Finckh and staff
<b>Media used</b>	-
<b>Recommended literature</b>	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; Kristiansen et al. 2006: Organic agriculture – global perspective, CSORO Publishing, Collingwood, Australia; Current scientific literature
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### Agrobiodiversity and plant genetic resources in the tropics

<b>Module number / code</b>	P13
<b>Module name</b>	Agrobiodiversity and plant genetic resources in the tropics
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	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.
<b>Course types</b>	Seminar 60h
<b>Content</b>	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.
<b>Title of courses</b>	Agrobiodiversity and plant genetic resources in the tropics
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Basic knowledge in plant and soil sciences
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral test (15 min) Grade weighting P1: 60%



	Examination P2: Oral presentation (appr. 20min) Grade weighting P2: 40%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. G.Backes
<b>Lecturer(s)</b>	Prof. Dr. G. Backes, Prof. Dr. A. Bürkert and staff
<b>Media used</b>	-
<b>Recommended literature</b>	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. Smithsonian Books, Washington, USA; Wood D., Lenne J.M. 1999: Agrobiodiversity: Characterization, utilization and management. CABI Publishing, Wallingford, UK.

### Nutrient dynamics, experimental design and statistical modelling - bilingual

<b>Module number / code</b>	P27M
<b>Module name</b>	Nutrient dynamics, experimental design and statistical modelling - bilingual
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students understand the advantages and disadvantages of different experimental designs in agricultural experiments. For each design, they are able to carry out correct data analyses using combined regression and analysis of variance or linear mixed effects models in R. Based on their understanding of soil nutrient dynamics and experimental designs they are able to evaluate and critically assess the significance of field and laboratory experiments for studying C, N and P dynamics and to consider all influencing variables.
<b>Course types</b>	Lecture 40h, exercises 20h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Description of the dynamics of C, N and P (forms, transformations and availability) in arable soils</li> <li>• Experimental designs in agricultural experiments: completely randomized design, randomized complete block design, Latin square design, split-plot design and balanced incomplete block design</li> <li>• Statistical modelling: combined regression and analysis of variance and linear mixed effects models</li> <li>• Modelling of the turnover of soil organic matter using the SoilR package in R</li> <li>• Application of the statistical software R for a description of C and N dynamics</li> </ul>
<b>Title of courses</b>	Nutrient dynamics, experimental design and statistical modelling - bilingual
<b>Teaching and learning methods</b>	Lecture, exercises
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES; Method module

<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Oral test (30min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. B. Ludwig
<b>Lecturer(s)</b>	Prof. Dr. B. Ludwig and colleagues
<b>Media used</b>	diverse
<b>Recommended literature</b>	Crawley M.J. 2012: The R book. 2nd edition, Wiley Everitt B., Hothorn T. P. 2011: An Introduction to Applied Multivariate Analysis with R. Springer, New York Welham S.J., Gezan S.A., Clark S.J., Mead A. 2014: Statistical Methods in Biology. Design and Analysis of Experiments and Regression, CRC Press, Boca Raton Glaz B., Yeater K.M. 2020: Applied Statistics in Agricultural, Biological, and Environmental Sciences. John Wiley & Sons

### Digitalization in agriculture

<b>Module number / code</b>	P28
<b>Module name</b>	Digitalization in agriculture
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	The participants will have gained a holistic understanding of the machine vision, image processing and machine learning, data classification and pattern recognising and prediction methodologies around agricultural and animal farming stuffs.
<b>Course types</b>	Lectures 20 h, seminar/practical 35 h, field exercise 5 h
<b>Content</b>	<i>Machine vision and image processing</i> <ul style="list-style-type: none"> <li>Introduction to digital images in agricultural science</li> </ul>

	<ul style="list-style-type: none"> <li>• Application and principle of optical and infrared technology for monitoring of agricultural and animal products</li> <li>• Machine vision and image processing in agricultural context</li> <li>• Developing image processing algorithms in MATLAB® software</li> </ul> <p><i>Machine learning and data processing</i></p> <ul style="list-style-type: none"> <li>• Basic techniques and functions of matrices in MATLAB®</li> <li>• Computer programming in MATLAB®</li> <li>• Development of machine learning algorithms</li> <li>• Training, validation and test set selection in machine learning models</li> <li>• Pattern recognition and object detections algorithms</li> <li>• Development of data classification and pattern forecasting models in agricultural and livestock farming datasets</li> <li>• Introduction to deep learning and artificial intelligence in agriculture</li> </ul>
<b>Title of courses</b>	Digitalization in agriculture
<b>Teaching and learning methods</b>	Lectures, seminar, practical, field exercise
<b>Usability in other programs</b>	Compulsory elective module according to § 9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written report (max. 8 pages) Grade weighting P1: 50% Examination P2: Projekt work Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. A. Nasirahmadi
<b>Lecturer(s)</b>	Dr. A. Nasirahmadi
<b>Media used</b>	verschiedene

<b>Recommended literature</b>	Gonzalez R.C., Woods R.E. and S.L. Eddins 2010: Digital Image Processing using MATLAB. New Delhi: Tata McGraw Hill Education; Stafford S. (ed.) 2019: Precision agriculture for sustainability. Cambridge, UK: Burleigh Dodds Science Publishing
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### Biochar for Environmental Management

<b>Module number / code</b>	P31
<b>Module name</b>	Biochar for Environmental Management
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>The students obtain basic knowledge in the areas of the production of biochar and activated carbon from residual biomass, as well as their use in agricultural and environmental applications. They develop a deeper understanding of pyrolytic processes and procedures, as well as different technological conversion processes for the production of biochar and activated carbon from biomass. They understand relationships between biomass composition, physico-chemical characteristics of biochar and activated carbons, and their potential applications.</p> <p>The students develop the ability to evaluate thermo-chemical conversion processes of biomasses, as well as to identify relevant influencing parameters on the quality and possible applications of biochar and activated carbon.</p> <p>The students have basic knowledge regarding the advantages and limitations of a material and energetic utilization of residual biomasses to produce biochar and activated carbon, as well as their use in the agricultural and environmental sector for a sustainable environmental and resource management.</p>
<b>Course types</b>	Vorlesung 20h, Seminar 20h, Übungen 20h
<b>Content</b>	<p>Theoretical basics of thermo-chemical conversion (pyrolysis) of biomasses to produce biochar, with a focus on the use of (agricultural) residual biomasses for sustainable resource use, as well as the production of biogenic activated carbons for the substitution of fossil activated carbons in environmental applications. Fundamentals of possible treatment processes of grass and herbaceous residual biomasses for pyrolytic utilization. Possible uses of biochar and activated carbon in agricultural and environmental applications. Material and energetic balances of thermo-chemical processes. Requirements for purity and quality of biochar and activated carbon for different fields of application.</p> <p>Production of biochar and activated carbon from residual biomass (incl. treatment) on laboratory scale using different processes.</p> <p>Laboratory work for basic analytical characterization of the produced biochar and activated carbon and evaluation of their performance for environmental management.</p>
<b>Title of courses</b>	Biochar for Environmental Management
<b>Teaching and learning methods</b>	Lecture, laboratory work, seminar

<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral test (30min) Grade weighting P1: 60% Examination P2: Oral presentation (appr. 20min) Grade weighting P2: 40%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. K. Kätzl
<b>Lecturer(s)</b>	Dr. K. Kaetzl
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Johannes Lehmann and Joseph Stephen (Eds.) 2015: Biochar for Environmental Management: Science, Technology and Implementation. Routledge Jay Shankar Singh and Chhatarpal Singh (Eds.) 2020: Biochar Applications in Agriculture and Environment Management. Springer. Harry Marsh and Francisco Rodríguez Reinoso (Eds.) 2006: Activated Carbon. Elsevier Science. Balwant Singh, Marta Camps-Arbestain, and Johannes Lehmann (Eds.) 2017: Biochar: A Guide to Analytical Methods. Csiro Publishing. Peter Quicker and Kathrin Weber (Eds.) 2016: Biokohle: Herstellung, Eigenschaften und Verwendung von Biomassekarbonisaten. Springer Vieweg

### Soil-plant interactions

<b>Module number / code</b>	P32M
<b>Module name</b>	Soil-plant interactions
<b>Type of module</b>	Elective module

<b>Learning outcomes, acquired competencies and qualification goals</b>	Students will conduct a small research project related to an agricultural topic and learn the relevant involved steps of the process.
<b>Course types</b>	Lecture 8h, Seminar 8h, Excursion 4h, Laboratory 40h
<b>Content</b>	<p>Introduction to and application of relevant up-to-date methods in plant-soil interactions in response to abiotic stress. The complete operational sequence of a research project is simulated:</p> <ul style="list-style-type: none"> <li>• sampling</li> <li>• sample preparation,</li> <li>• measurements and data collection (application of methods)</li> <li>• data processing</li> <li>• statistics and</li> <li>• drafting a manuscript</li> </ul> <p>Up-to-date literature is presented and discussed by the students.</p>
<b>Title of courses</b>	Soil-plant interactions
<b>Teaching and learning methods</b>	Lecture, Seminar, Excursion, Laboratory work
<b>Usability in other programs</b>	Mandatory module according to §9 (7) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	<p>Examination P1: Work report (app. 15 p)  Grade weighting P1: 50%  Examination P2: Project presentation (appr. 20min)  Grade weighting P2: 50%</p>
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. J. Simon
<b>Lecturer(s)</b>	Prof. Dr. J. Simon and staff
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	<p>Parker R. 2009: Plant &amp; Soil Science: Fundamentals &amp; Applications (Editor: Delmar)</p> <p>Literature will be provided in the framework of the course</p>

## Water in the soil plant-system

<b>Module number / code</b>	P33M
<b>Module name</b>	Water in the soil plant-system
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students will be able to understand and model energy, water and nutrient flows in the soil-plant-atmosphere system. The main focus is on methods for working with models.
<b>Course types</b>	Vorlesung 30h, Übungen 30h
<b>Content</b>	<p>The course focuses on the basic methods for working with process models. physical processes in the soil-plant-atmosphere system. The course consists of roughly equal parts lecture content and computer-based exercises.</p> <p>In the lecture part, the most important concepts for modeling the relevant soil and plant growth processes are explained, and in a second part, a detailed introduction to the agroecosystem simulation model Expert-N is given.</p> <p>Computer exercises are carried out in which students perform simulations on the following topics:</p> <ul style="list-style-type: none"> <li>• Water flow in agroecosystems</li> <li>• Water extraction and distribution, surface irrigation, sprinkler irrigation, drip irrigation</li> <li>• Carbon and nitrogen turnover in soils</li> <li>• Climate change and crop production</li> </ul>
<b>Title of courses</b>	Water in the soil plant-system
<b>Teaching and learning methods</b>	Lectures, exercises
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	S1: Presence in the exercises
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Oral test (30min)

<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. T. Weber
<b>Lecturer(s)</b>	Prof. Dr. T. Weber
<b>Media used</b>	diverse
<b>Recommended literature</b>	Reichardt, Klaus; Timm, Luis Carlos 2020: Soil plant and atmosphere. Concepts, Processes and applications. Springer. Bitelli, Marco; Campbel, Gaylon; Tomei, Fausto 2015: Soil physics with python - transport in the soil-plant-atmosphere system: Oxford University Press. Moene, Arnold F.; van Dam, Jos C. 201): Transport in the Atmosphere-Vegetation-Soil Continuum: Cambridge University Press. Ahuja, L.; Kersebaum, Kurt Christian; Wendroth, Ole (Hg.) 2022) Modeling processes and their interactions in cropping systems. Challenges for the 21st century. 1st. Madison: ACSESS

### Nutrient acquisition by plants

<b>Module number / code</b>	P34
<b>Module name</b>	Nutrient acquisition by plants
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students obtain a more detailed knowledge on how nutrients, especially nitrogen and phosphorus, are acquired by plants.
<b>Course types</b>	Vorlesung 10h, Seminar 50h
<b>Content</b>	<p>Topics include e.g. different mechanism of plants to acquire nitrogen, phosphorus (e.g. prior/after mineralization processes, via support by bacteria &amp; fungi), and also micronutrients, competition for nutrients between plants and soil microbes, rhizodeposition, dependence on abiotic factors, influence of invasive species.</p> <p>Other skills:</p> <ul style="list-style-type: none"> <li>• Presenting a lecture on a specific topic</li> <li>• Moderating a discussion</li> <li>• Scientific writing of a mini-review (incl. literature search, citing correctly)</li> </ul>
<b>Title of courses</b>	Nutrient acquisition by plants
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(7) Examination regulations Master AGES
<b>Duration</b>	1 Semester



<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 30min) Grade weighting P1: 60% Examination P2: Written report (appr. 20 pages) Grade weighting P2: 40%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. J. Simon
<b>Lecturer(s)</b>	Prof. Dr. J. Simon and staff
<b>Media used</b>	various
<b>Recommended literature</b>	Näsholm et al 2009: Uptake of organic nitrogen by plants. New Phytologist 182, 31-48  For the specific oral presentations, literature search is conducted by the students.

## Compulsory elective modules II: Society and environment

### Marketing research

<b>Module number / code</b>	E05M
<b>Module name</b>	Marketing research
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students</p> <ul style="list-style-type: none"> <li>• are able to describe how marketing research relates to the marketing concept</li> <li>• are able to outline the steps in the marketing research process and show how the steps are interrelated</li> <li>• know the factors to consider in defining the marketing problem or opportunity</li> <li>• are able to develop a research design</li> <li>• are able to state the specific advantages of the most important methods of data collection</li> <li>• know the different types of statistical analysis techniques</li> </ul>
<b>Course types</b>	Vorlesung 30h, Seminar 30h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Tasks and management of marketing research</li> <li>• Methods of data collection</li> <li>• Methods of data analysis</li> <li>• Presentation of market research results for decision support</li> <li>• Methods of development prognoses</li> </ul>
<b>Title of courses</b>	Marketing research
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective "Business" according to §7(3) Examination regulations Master IFBC Compulsory elective according to §9(8) Examination regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	

<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written test (90min) or Oral examination (30min) Grade weighting P1: 60% Examination P2: Oral presentation with outlet (appr. 20min, 2.000 words) Grade weighting P2: 40%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. K. Zander
<b>Lecturer(s)</b>	Prof. Dr. K. Zander
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Aaker, D.A., Kumar, V., Leone, R.P., Day, G.S. 2013: Marketing research. 11th ed., Hoboken: Wiley; Hair, J.F., Black, W.C., Babin, B.J., Anderson, R.E. 2014: Multivariate data analysis, 7th ed., Harlow: Pearson Education; Malhotra, N.K., Birks, D.F., Wills, P. 2012: Marketing research, 4th ed., Harlow: Pearson Education.

### International organic food markets and marketing

<b>Module number / code</b>	E06
<b>Module name</b>	International organic food markets and marketing
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students <ul style="list-style-type: none"> <li>• are able to describe international markets for organic food</li> <li>• know about international organic regulations</li> <li>• are able to outline the steps for developing a marketing strategy</li> <li>• know how to develop a marketing concept on international markets</li> <li>• acquire personal skills for oral and written presentations in teamwork.</li> </ul>
<b>Course types</b>	Vorlesung 30h, Seminar 30h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Analysis of international markets for organic products</li> <li>• Organic regulations</li> <li>• Basics of food marketing for exporters</li> <li>• Oral and written presentation of marketing topic</li> </ul>
<b>Title of courses</b>	International organic food markets and marketing
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Obligatory module according to §7 (3) Examination Regulations Master IFBC

	Mandatory module according to §9 (8) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written test (90min) or Oral examination (30min) Grade weighting P1: 60% Examination P2: Oral presentation and written report (appr. 20min and 2000 words) Grade weighting P2: 40%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. B. Jahnke
<b>Lecturer(s)</b>	Dr. B. Jahnke
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Armstrong, G, Kotler, K., Opresnik, M.O. 2016: Marketing: An Introduction, 13th ed., Pearson, Harlow, UK. Hollensen, S., Opresnik, M.O. 2015: Marketing: A Relationship Perspective. Vahlen, Munich

### Strategic management

<b>Module number / code</b>	E15
<b>Module name</b>	Strategic management
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>The aims of the module are:</p> <ul style="list-style-type: none"> <li>• To deepen the students' understanding of the unique aspects of food and agricultural production systems, processing, distribution, wholesaling and markets and their relationships with strategy and sustainability;</li> <li>• To familiarize students with the development of strategies within a changing environment, to meet stakeholders' interests;</li> <li>• To provide students with the knowledge and process competencies to make strategic business and sustainability decisions and reflect them;</li> </ul>

	<ul style="list-style-type: none"> <li>To raise critical awareness of strategic decision-making in agrifood organisations.</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<ul style="list-style-type: none"> <li>The contents and framework of strategic management;</li> <li>An introduction to organisational &amp; business strategies;</li> <li>The importance of values and purpose in defining organisation's strategic goals;</li> <li>The management of stakeholder relations;</li> <li>Performance management and strategic control;</li> <li>The management of strategic change;</li> <li>Strategy-as-practice.</li> <li>Sustainability strategy and practise</li> <li>Strategy and sustainability as process</li> </ul>
<b>Title of courses</b>	Strategic management
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §7(3) Examination regulatins Master IFBC; Business module
<b>Duration</b>	1 Semester, annually
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation with outline (appr. 15min, 600 words) Grade weighting P1: 40% Examination P2: Written exam (90min) Grade weighting P2: 60%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. B. König
<b>Lecturer(s)</b>	Prof. Dr. B. König and staff
<b>Media used</b>	Lecture slides, multimedia, case studies, guest lectures
<b>Recommended literature</b>	A reading list will be provided on the e-learning platform

## Management and management accounting

<b>Module number / code</b>	E17M
<b>Module name</b>	Management and management accounting
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Die Studierenden</p> <ul style="list-style-type: none"> <li>• können zentrale Theorien, Konzepte und verschiedene Praxisbeispiele des Managements/Management Accounting erklären und die damit verbundenen ökologischen, ökonomischen und sozialen Aspekte zuordnen und diskutieren.</li> <li>• können verschiedene theoretische Perspektiven des Managements und des Management Accountings einschließlich der impliziten Annahmen dieser einzelnen Perspektiven und deren Implikationen für die Managementpraxis und -forschung unterscheiden.</li> <li>• wenden konzeptuelle und praktische Kompetenzen und Fähigkeiten an, um die Unternehmenspraxis und Managemententscheidungen zu verstehen und kritisch zu analysieren.</li> <li>• erweitern und nutzen ihre Kenntnisse des Nachhaltigkeitsmanagements und der nachhaltigen Rechnungslegung, um aktuelle Beispiele zu analysieren, zu erklären und Lösungen zu entwickeln. verstehen, warum die traditionelle Rechnungslegung und Rechenschaftspflicht Managern und anderen Unternehmens-Stakeholdern nur bedingt hilft, der Nachfrage nach gesellschaftlicher Verantwortung, Rechenschaftslegung und Transparenz nachzukommen.</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<p>The main aim of the module is to acquaint students with the theory and practice of management and management accounting, with a focus on the role of environmental, social and governance issues therein.</p> <p>Further aims of the module include:</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• To provide students with the conceptual and practical skills necessary to effectively understand and critically analyse management/corporate practice;</li> <li>• To provide students with practical experience in and knowledge about “managing and accounting for sustainability”;</li> <li>• 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.</li> </ul>

<b>Title of courses</b>	Management and management accounting
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Bridging module according to §7 (3) Examination Regulations Master IFBC Elective module according to §9 (8) Examination Regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation with written outlet (ca. 15min, ca. 600 words) Grade weighting P1: 40% Examination P2: Written test (90 min) or Oral test (30min) Grade weighting P2: 60%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. B. König
<b>Lecturer(s)</b>	Prof. Dr. B. König
<b>Media used</b>	Lecture slides, multimedia, case studies, guest lectures
<b>Recommended literature</b>	A reading list will be provided on the e-learning platform

### Rural sociology

<b>Module number / code</b>	E21
<b>Module name</b>	Rural sociology
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	One of the primary objectives of this course is to introduce students to the principles of sociology in general and key concepts of 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 analyse research strategies and methods.

<b>Course types</b>	Seminar 60h
<b>Content</b>	As an introduction to rural sociology, this course is designed to give an overview of the sociological concepts of “demographic change”, “social structural developments and social problems in rural areas” (deprivation, rural poverty): 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.
<b>Title of courses</b>	Rural sociology
<b>Teaching and learning methods</b>	Lecture, Seminar
<b>Usability in other programs</b>	Compusory elective module according to §9(8) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 56 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 30min) Grade weighting P1: 50% Examination P2: Written report (appr. 8000 words) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. C.Neu
<b>Lecturer(s)</b>	Prof. Dr. C.Neu
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Adequate literature is presented in the lecture; text book chapters supply basic knowledge and are complemented by scientific publications.

### Critical perspectives on the global food system

<b>Module number / code</b>	E39
<b>Module name</b>	Critical perspectives on the global food system



<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students</p> <ul style="list-style-type: none"> <li>• will be aware of development trends of the global food system</li> <li>• will be aware of political ecology (PE) and critical agrarian studies (CAS) as approaches to analyze the food system and natural resource extraction</li> <li>• will be familiar with food regime theory to conceptualize the global food system</li> <li>• will be familiar with different conceptions of society-nature relationships</li> <li>• will have an overview of relevant methods of CAS and PE</li> <li>• will be able to critically evaluate and apply the corresponding approaches</li> <li>• will be knowledgeable about a contextual assessment of agri-environmental change and related implications</li> <li>• will be acquainted with transition and transformation studies, including “Commoning” approaches in the food systems</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	The course provides an overview of influential critical approaches to understanding the development and problems of the global food system. At the macro level, it reflects on global food system trends from the viewpoint of food regime theory and critical agrarian studies. It continues introducing the contextual approaches and ideas of political ecology and critical agrarian studies and it exemplifies and allows critical discussion of these approaches through case illustrations and presentations. Moreover, the methods applied in political ecology and critical agrarian studies will be introduced and their application discussed. To round off the course, trending approaches to transforming the global food system are discussed and evaluated.
<b>Title of courses</b>	Critical perspectives on the global food system
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compusory elective module according to §9 (8) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Background in agricultural and environmental policy and economics
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	

<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 20min or 3 * 5-10min) Grade weighting P1: 40% Examination P2: Work report (max. 2500 words) Grade weighting P2: 60%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. L. Thiemann
<b>Lecturer(s)</b>	Prof. Dr. L. Thiemann
<b>Media used</b>	diverse
<b>Recommended literature</b>	

### EU policies, organic farming and food system transformation

<b>Module number / code</b>	E41
<b>Module name</b>	EU policies, organic farming and food system transformation
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	The students deal with selected key issues of food-related European agricultural, environmental and health policies that are relevant to the sustainability transformation of food systems and farming. A particular focus will be on organic agriculture and relevant support measures. They work on these policies in a project-oriented way and apply concepts and methods of knowledge integration, policy process analysis and conceptualizations of the science-policy interface. This enables them to transfer the knowledge that they have also acquired in agricultural policy and governance courses to concrete issues and to link them to particular European and international contexts. At the same time, the aim of the course is to make students from Europe and beyond familiar with the relevance of these dimensions for their future professional life and to understand European organic agriculture and food system policies through discussions from the perspectives of different regional contexts.
<b>Course types</b>	Lecture 14h, seminar 12h, excursion 24h
<b>Content</b>	Increasingly, agricultural production is being considered as part of larger food systems. Policies and governance play a core role in the structuring of these food systems and should therefore also be of core relevance to their transformation.  To start with, the lecturers introduce the food system concept and the role policies and governance play in this and how these aspects are analyzed. A focus will be on organic support policies. Students then work on selected current affairs issues of European Food System governance and transformation from different perspectives in topic-related small groups which are accompanied by the lecturers. Each group first develops the project concept (definition of a research question, methodological approach). These project concepts are presented by the different groups and discussed in the plenary before the small group projects are

	<p>implemented. At the end of the semester, all groups present and produce a report on their project results. Finally, the project results are discussed from both the European and the international perspective.</p> <p>Parallel to working on these key issues, students learn about methods of knowledge integration (e.g. system analysis, multi-criteria analysis), and policy process analysis and they are able to apply these methods.</p> <p>A central part of the course is the excursion to Brussels where the current affairs issues addressed during the session will be discussed with stakeholders. It enables students to get to know different perspectives and gain deeper insights for their own project work.</p>
<b>Title of courses</b>	EU policies, organic farming and food system transformation
<b>Teaching and learning methods</b>	Lecture, project-oriented group work supervised by lecturers, excursion
<b>Usability in other programs</b>	Compulsory elective module according to § 9 (8) PO Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Students ideally attend at least one of the Master level courses of the Section of International Agricultural Policy and Environmental Governance before they attend this course.
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Group presentation (ap. 30min) Grade weighting P1: 50% Examination P2: Group report (appr. 2500 words per person) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. J. Sanders
<b>Lecturer(s)</b>	Dr. J. Sanders
<b>Media used</b>	diverse
<b>Recommended literature</b>	Literature und publications will be provided for the course; Vedung, E. 1997: Public policy and program evaluation. Transaction Publishers, New Brunswick, London; Scholz, R.W., Tietje, O. 2002: Embedded case study methods: Integrating quantitative and qualitative knowledge. Sage Publications, Thousand Oaks.

## Sustainable food systems and management

<b>Module number / code</b>	E47
<b>Module name</b>	Sustainable food systems and management
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>The aims of the module are:</p> <ul style="list-style-type: none"> <li>• To deepen the students' understanding of the role of food business and other actors in the food system in society and the social responsibility and accountability issues that arise in a global business setting;</li> <li>• To familiarize students with the concepts and frameworks used in responsible and sustainable food business, to meet stakeholders' interests;</li> <li>• To provide students with the knowledge and confidence to critically reflect corporate practice and companies' use of different sustainability concepts and claims;</li> <li>• To raise awareness for different perspectives which provide contrasting and competing ways of making sense of sustainable food systems and responsible food business practices therein.</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Food systems and societies;</li> <li>• Intercultural aspects and outcomes of food systems;</li> <li>• Organisation types and sustainability in food systems;</li> <li>• Corporate social responsibility, governance and accountability;</li> <li>• International developments in and governance of environmental and social reporting;</li> <li>• The management of global value chains in the agri-food sector;</li> <li>• Social and environmental responsibility in supply chain management;</li> <li>• The management and reporting of environmental and social information in different complex organisational and interorganisational settings);</li> <li>• The contrasting perspectives in social responsibility and accountability of business across borders.</li> </ul>
<b>Title of courses</b>	Sustainable food systems and management
<b>Teaching and learning methods</b>	Lecture, seminar, group work
<b>Usability in other programs</b>	Compulsory elective module according to §7(3) Examination regulations Master IFBC Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch

<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation with outlet (appr. 15min, 600 words) Grade weighting P1: 40% Examination P2: Written report (appr. 6000 words) or Oral test (appr. 30min) Grade weighting P2: 60%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. B. König
<b>Lecturer(s)</b>	Prof. Dr. B. König, Dr. E. Kissi
<b>Media used</b>	Lecture slides, multimedia, case studies, guest lectures
<b>Recommended literature</b>	A reading list will be provided on the e-learning platform

### Sustainability-oriented environmental social science

<b>Module number / code</b>	K01
<b>Module name</b>	Sustainability-oriented environmental social science
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students learn basic concepts of (environmental) social science. This will enable them to understand issues at the human-environment interface from a social science perspective as well. Learned qualification goals are:</p> <ul style="list-style-type: none"> <li>• Basic understanding of social scientific thinking</li> <li>• Basic understanding of social theory</li> <li>• Competencies in the psychology of environmental behavior</li> <li>• Competencies in environmental social psychology</li> <li>• Competencies in environmental sociology</li> <li>• Basic understanding of important models</li> <li>• Learning of strategies of environmental education and environmental communication</li> </ul> <p>A special goal of the module is to teach how people perceive environmental and sustainability problems on the one hand, and on the other hand, which interventions are conceivable to change environment-related behavior. The module is general from a theoretical point of view, but will be based on examples related to agriculture.</p>
<b>Course types</b>	Lecture 30h, seminar 30h

<b>Content</b>	Fundamental theories and concepts in environmental social science with a particular emphasis on sustainability transformations. These include: psychology of pro-environmental behaviour, environmental sociology, environmental justice. The course also outlines general epistemological concepts needed to understand the environment from a social science perspective. It further delves on modern human-environmental anthropologies such as Bruno Latour and Philippe Descola. It exemplifies these issues with empirical contributions on agriculture, food production and consumption with a particular focus on the global south.
<b>Title of courses</b>	Sustainability-oriented environmental social science
<b>Teaching and learning methods</b>	Lecture, Seminar, Paper-Workshops, Videocontent, Learning Games, Co-Teaching
<b>Usability in other programs</b>	Compulsory elective module according to § 9(8) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written test (90min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Braun
<b>Lecturer(s)</b>	Prof. Dr. Andreas Braun and Team
<b>Media used</b>	Literature plus online media (e.g. Youtube)
<b>Recommended literature</b>	Abrahamse, W. 2019: Encouraging Pro-Environmental Behaviour – What works, what doesn't, and why? London: Elsevier Academic Press. Clark, N., Szerszynski, B. 2020: Planetary Social Thought: The Anthropocene Challenge to the Social Science Cambridge: Polity. Heberlein, T.A. 2012: Navigating Environmental Attitudes. Oxford: Oxford University Press, USA Klöckner, C.A. 2015: The Psychology of Pro-Environmental Behaviour – Beyond Standard Information Strategies. Basingstoke, UK: Palgrave MacMillan. Moran, E. 2010: Environmental Social Science: Human - Environment interactions and Sustainability. London: Wiley Blackwell.

	Vaccaro, I., Smith, E.A., Aswanti, S. 2019: Environmental Social Sciences: Methods and Research Design. Cambridge: Cambridge University Press.
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### Climate change governance

<b>Module number / code</b>	K02
<b>Module name</b>	Climate change governance
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Upon Successful completion of this course, students are able to:</p> <ul style="list-style-type: none"> <li>• Understand of key scientific concepts related to climate change, including climate change adaptation and mitigation, resilience, tipping points and path dependency using examples (including in agriculture)</li> <li>• Understand the three pillars of climate policy governance and their implementation and operationalisation in international and national frameworks</li> <li>• Have a thorough understanding and examples of concrete mitigation and adaptation measures</li> <li>• Analysing and interpreting scientific literature dealing with climate change concepts.</li> </ul>
<b>Course types</b>	Vorlesung 15h, Seminar 45h
<b>Content</b>	<p>This course delves into the multidimensional aspects of climate change governance through the lens of scientific literature. Students will explore key concepts of climate change, the pillars of CC governance, mitigation, adaptation and means of implementation, drawing upon examples from agricultural sciences. Thereafter, climate change tipping points will be addressed, including adaptive pathways and their implications for policy and decision making.</p> <p>In the Seminar, students will present approaches to mitigate and adapt to climate change. Funding, including concise examples of payment schemes will also be addressed to obtain a full overview of historic developments, scientific approaches and hands-on examples of climate change governance on a local to global scale.</p> <p>Through critical analysis and discussion, students will gain insights into the complexities and challenges associated with climate change and examine how literature can offer concepts that help operationalize these cross-cutting issues.</p>
<b>Title of courses</b>	Climate change governance
<b>Teaching and learning methods</b>	Lectures in hybrid format presentation of scientific evidence, relevant case studies, documentaries and group discussions.
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination Regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester

<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 30min) Grade weighting P1: 50% Examination P2: Oral exam (15min) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw.u.Ök.Landwirtschaft
<b>Responsible person</b>	Dr. I. Sieber
<b>Lecturer(s)</b>	Dr. N. Nahar, Dr. I Sieber
<b>Media used</b>	various
<b>Recommended literature</b>	Knieling, J. and W. Leal Finho (ed.) 2013: Climate chang governance. Springer Verlag  Various scientific publications specified in the description of the respective course

### Sustainable? Development?

<b>Module number / code</b>	K03
<b>Module name</b>	Sustainable? Development?
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	The terms "sustainability" and "development" are often perceived as synonymous. At the same time, "sustainable development" can also be understood as an oxymoron. The module aims to provide students with "Global South" competence and development competence, to make them capable of speaking in the area of development cooperation and the closely related area of sustainability transformation. At the same time, it aims to sensitise students to specific problems in the Global South. In addition, it aims to impart discursive skills in dealing with contrasting theories (such as liberal modernisation theory vs. postcolonial theory).
<b>Course types</b>	Vorlesung 30h, Seminar 30h
<b>Content</b>	The module thematises and problematises both terms. It teaches basic skills in the area of sustainability:



	<ul style="list-style-type: none"> <li>• Strong vs. weak sustainability</li> <li>• Efficiency, sufficiency, consistency</li> <li>• Triple bottom line vs. integrative concepts</li> <li>• Multispecies sustainability</li> <li>• International agreements, such as the Brundtland Report, MDGs, SDGs, UNFCCC etc.</li> </ul> <p>As well as basic theories of development:</p> <ul style="list-style-type: none"> <li>• Modernisation theories</li> <li>• Dependency theories</li> <li>• World system theories</li> <li>• Post-colonial and post-development perspectives</li> <li>• Global South concepts (Buen Vivir, Sumak Kawsay, Ubuntu)</li> </ul> <p>Building on this, it will be discussed to what extent sustainability is an agenda of the Global North, but development is an agenda of the Global South, where they can strengthen each other, but also contradict each other.</p>
<b>Title of courses</b>	Sustainable? Development?
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Comulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, annually
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written exam (90min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Prof. Dr. A. Braun
<b>Lecturer(s)</b>	Prof. Dr. A. Braun
<b>Media used</b>	verschiedene

<b>Recommended literature</b>	<p>Fundamental Readings:</p> <p>Carmody, P. 2019: Development Theory and Practice in a Changing World. Routledge. London.</p> <p>Pieterse, J.N. 2014: Development Theory: Deconstructions/ Reconstructions. SAGE Publications. Washington.</p> <p>Stern, M.J. 2018: Social Science Theory for Environmental Sustainability: A Practical Guide. Oxford University Press. Oxford.</p> <p>Dallas, G. and M. Lumbrano 2022: Governance, Stewardship and Sustainability: Theory, Practice and Evidence. Routledge. London.</p> <p>Literature for seminar discussions (examples):</p> <p>Redclift, M. 2005: Sustainable development (1987–2005): an oxymoron comes of age. Sustainable development, 13(4), 212-227.</p> <p>Spaiser, V. et al 2017: The sustainable development oxymoron: quantifying and modelling the incompatibility of sustainable development goals. International Journal of Sustainable Development &amp; World Ecology, 24(6), 457-470.</p> <p>Brown, K. 2012: Sustainable adaptation: an oxymoron?. In Sustainable Adaptation to Climate Change (pp. 21-31). Routledge.</p> <p>Ngai, P. B. Y. 2020: Local interpretation of the global discourse of sustainability and sustainable development in rural Cambodia. Environmental Communication, 14(8), 1079-1096.</p>
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## Environment and health

<b>Module number / code</b>	K04
<b>Module name</b>	Environment and health
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Upon successful completion of the module a student will be able to</p> <ul style="list-style-type: none"> <li>• Understand key concepts related to health and environmental effects, encompassing the physical, social, cultural, political, and economic environments.</li> <li>• Acquire knowledge about the implications of environmental factors on human health, such as air quality, water quality, climate change, and infectious diseases.</li> <li>• Gain an understanding of the interconnectedness between human activities and the environment within the context of public health.</li> <li>• Develop the ability to critically understand health risks associated with various environmental exposures.</li> <li>• Cultivate critical thinking and analytical skills regarding health and environmental issues and their effects.</li> <li>• Understand the scientific principles and evidence underlying the interrelationships between human health and the environment, with a focus on global health implications.</li> <li>• Learn to critically read and interpret public health literature, emphasizing health and environmental effects.</li> </ul>
<b>Course types</b>	Vorlesung 30h, Seminar 30h

<b>Content</b>	The "Environment and Health: Impact of Human Environmental Interactions on Health Issues" course is designed to understand the connections between health and the environment, introducing students with key concepts across various dimensions of global health. Students will examine the complex relationships within physical, social, cultural, political, and economic environments in the context of health. Topics include the impact of environmental factors on human health, such as air and water quality, climate change, and infectious diseases. Using a multidisciplinary approach, students will gain insights into the interconnectedness of human activities and the environment, emphasizing contextual understanding in global health. The course focuses on developing critical thinking and analytical skills for assessing health risks associated with diverse environmental exposures. Students will learn to critically read and interpret public health literature, with a specific focus on understanding the effects on health and the environment.
<b>Title of courses</b>	Environment and health
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, annually
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 20min) Grade weighting P1: 50% Examination P2: Written report (appr. 1700 words) Grade weighting P2: 50%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. N. Nahar
<b>Lecturer(s)</b>	Dr. N. Nahar
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Frumkin, Howard (Ed.) 2016: Environmental health. From global to local. Third edition. San Francisco CA: Jossey-Bass A Wiley Brand.

	Various scientific publications specified in the description of the respective course
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### Education for sustainable development and agriculture

<b>Module number / code</b>	K05
<b>Module name</b>	Education for sustainable development and agriculture
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>This module examines the fundamental role of education in achieving a sustainable future. It explores the theoretical foundations and practical applications of ESD principles, equipping students with the knowledge and skills necessary to make informed decisions and know-how of effective knowledge transfer and contribute to positive change. Course Objectives:</p> <ul style="list-style-type: none"> <li>• Develop a comprehensive understanding of ESD: Explore the origins, key concepts, and principles of ESD as outlined by UNESCO and other international frameworks within the sustainable development framework.</li> <li>• Critically evaluate various teaching and learning methodologies: analyse how different pedagogical approaches, such as project-based learning, experimental and active learning, gamification, and co-creation, can effectively foster sustainability literacy, critical thinking, and problem-solving skills.</li> <li>• Develop and implement practical tools and strategies: You will gain practical skills in curriculum design, lesson planning, and assessment methods tailored explicitly for promoting ESD.</li> <li>• Promote collaboration and knowledge exchange: By fostering active participation, dialogue, and collaboration throughout the course, we will cultivate a supportive learning environment that encourages diverse perspectives and co-creation of knowledge on sustainable solutions.</li> </ul> <p>Course Learning Outcomes:</p> <ul style="list-style-type: none"> <li>• Explore the interrelationships between environmental, social, and economic sustainability and learn about the Sustainable Development Goals (SDGs).</li> <li>• Design and implement learning activities that promote critical thinking, joint problem-solving, negotiation, communication and collaborative decision-making in the context of sustainability.</li> <li>• Effectively communicate and knowledge transfer methods to diverse audiences based on classified characteristics.</li> <li>• Contribute to building a more informed and engaged community capable of driving positive change towards a sustainable future.</li> </ul>
<b>Course types</b>	Seminar 30h, Projektarbeit 30h
<b>Content</b>	<ul style="list-style-type: none"> <li>• Learning to live with complexity and uncertainty</li> <li>• Concept of ESD, fundamentals and case studies</li> <li>• Transformative learning, social learning, and learning for change</li> <li>• Capacity building in knowledge management, behavioral change, and social innovation</li> <li>• Digitalization, digital transformation and ESD</li> </ul>

	<ul style="list-style-type: none"> <li>• Leadership for Sustainability: integrated problem-solving and communication skills</li> <li>• Gamification for ESD by stimulating creativity and innovation</li> <li>• Equity, values, ethics, and inclusion in education</li> <li>• Dynamics of Entrepreneurship</li> <li>• Systems thinking and future thinking for sustainability</li> <li>• Living Lab approach: applied research model to effect changes in the interest of sustainable development</li> </ul>
<b>Title of courses</b>	Education for sustainable development and agriculture
<b>Teaching and learning methods</b>	Seminar, Projekt
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180 hours, of which 60 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Project report (appr. 2500 words) Grade weighting P1: 70% Examination P2: Oral presentation (appr. 15min) Grade weighting P2: 30%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. M. Motlagh
<b>Lecturer(s)</b>	Dr. M. Motlagh
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Education for Sustainable Development Goals: learning objectives 2017: <a href="https://unesdoc.unesco.org/ark:/48223/pf0000247444">https://unesdoc.unesco.org/ark:/48223/pf0000247444</a> What is Education for Sustainable Development? 2019: <a href="https://en.unesco.org/themes/education-sustainable-development/what-is-esd">https://en.unesco.org/themes/education-sustainable-development/what-is-esd</a>

## One health: human, animal and environmental interactions

<b>Module number / code</b>	K06
<b>Module name</b>	One health: human, animal and environmental interactions
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Upon successful completion of the module a student will be able to</p> <ul style="list-style-type: none"> <li>• Understand key concepts related to the interconnectedness of human, animal, and environmental health, including social, cultural, economic, political, and sustainability factors.</li> <li>• Acquire knowledge about the mechanisms of disease emergence and the role of human-animal-environment interactions in the spread of infectious diseases.</li> <li>• Gain an understanding of the principles and practices of pandemic preparedness, emphasizing the One Health approach.</li> <li>• Develop the ability to critically assess the impact of agricultural practices on land use, ecosystems, food security, and health outcomes.</li> <li>• Develop critical thinking and analytical skills regarding the decolonization of global health, focusing on historical perspectives and equity.</li> <li>• Understand the scientific principles and evidence underlying the impacts of climate change on health, including shifting disease patterns and agricultural sustainability.</li> <li>• Learn to critically read and interpret One Health literature, emphasizing interdisciplinary approaches to health and environmental issues.</li> </ul>
<b>Course types</b>	Vorlesung 30h, Seminar 30h
<b>Content</b>	<p>This course, "One Health: Human, Animal, and Environmental Interactions," explores the interconnectedness of human, animal, and environmental health through a multidisciplinary lens. Students will examine how social, cultural, economic, political, and climate change factors influence health outcomes. The course will explore into the mechanisms of disease emergence, emphasizing the role of human-animal-environment interactions in the spread of infectious diseases. Furthermore, it will address strategies for pandemic preparedness, highlighting the importance of a One Health approach in preventing and managing global health crises. Agricultural practices, considering their effects on land use, ecosystems, food security, and their implications for health outcomes will be incorporated. Additionally, the course will explore the concept of decolonizing global health, focusing on the historical perspectives of global health and equity. Through this exploration, students will gain a holistic understanding of the complex factors that contribute to health in our interconnected world of humans, animals, and environments.</p>
<b>Title of courses</b>	One health: human, animal and environmental interactions
<b>Teaching and learning methods</b>	Vorlesung, Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §(18) Examination regulations Master AGES
<b>Duration</b>	1 Semester, annually

<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Oral presentation (appr. 20min) Grade weighting P1: 0% Examination P2: Written report (appr. 2000 words) Grade weighting P2: 0%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Landwirtschaft, Int. Agrarentw. u. Ök. Landwirtschaft
<b>Responsible person</b>	Dr. N. Nahar
<b>Lecturer(s)</b>	Dr. N. Nahar
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Prata, J., A. Ribeiro, and T. Rocha-Santos (ed.) 2022: One Health, Integrated Approach to 21st Century Challenges to Health. 1st edition. Academic Press.  Various scientific publications specified in the description of the respective course

### Philosophy of sciences

<b>Module number / code</b>	K21M
<b>Module name</b>	Philosophy of sciences
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>In view of the plural constitution of scientific cultures and the different understandings of scientificity associated with them, a reflection on the ideals of science, the conceptions of methods and the conceptions of subject matter of the individual sciences is indispensable. This is especially true against the background of a required interdisciplinary cooperation of different sciences in the face of current crisis phenomena.</p> <p>In this module, students will be familiarized with the basic questions of the philosophy of sciences in an exemplary way. Through this, they acquire the ability to critically assess methodological and scientific ideals in the face of a variety of different individual sciences. They will acquire the competence to apply scientific theoretical considerations to concrete</p>

	cases of application in the practice of sciences. In particular, they will acquire the ability to reflect on the plurality of scientific cultures in the tension between sciences and humanities.
<b>Course types</b>	Seminar 30h
<b>Content</b>	Exemplary seminar courses introduce the basic issues and positions of the philosophy of science. The relevant classical approaches (logical empiricism, critical rationalism, revolutionary transformism, research program approach, anarchistic methodology, science in context, science studies, etc.) as well as the essential dynamics (linguistic turn, practical turn, iconic turn, spatial turn, etc.) are taken into account. In methodological terms, this also means the possible thematization of different areas of methodology (observations, experiments, model building, theories, etc.). The module is explicitly adapted to the plurality of individual sciences and in this respect takes into account the issues of the two-culture problem (humanities and natural sciences, science wars).
<b>Title of courses</b>	Philosophy of sciences
<b>Teaching and learning methods</b>	Lecture, seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES; Method module
<b>Duration</b>	1 Semester
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, of which 30 contact hours
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written report (appr. 8.000 words)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Geisteswissenschaften
<b>Responsible person</b>	Prof. Dr. Dr. K. Köchy
<b>Lecturer(s)</b>	Prof. Dr. Dr. Kristian Köchy and colleagues
<b>Media used</b>	diverse
<b>Recommended literature</b>	Barberousse A., Bonnay D., Cozic M. (Ed.) 2018: The Philosophy of Science: A Companion (Oxford Studies in Philosophy of Science), Oxford University Press Newton-Smith W. H. (Ed.) 2000: A Companion to the Philosophy of Science, Oxford: Blackwell Curd M., Stathis P. (Ed.) 2013: The Routledge Companion to Philosophy of Science, New York, London: Routledge



## Philosophy of environment and society

<b>Module number / code</b>	K22
<b>Module name</b>	Philosophy of environment and society
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>The potential threats to our traditional ways of dealing with nature have a global dimension and are undeniably explosive. They create an urgent need for action, which, however, includes basic philosophical reflections. In all relevant fields of action it becomes clear that the protection of the environment and the quality of human life have to be thought together. Classical oppositions such as that of nature and society must be overcome. If philosophy is challenged here, then it is under the condition that the global problems of human-nature interaction imply, on the one hand, an intimate interconnection of questions of natural and social philosophy, and, on the other hand, the interaction of approaches in environmental philosophy and environmental ethics.</p> <p>The present module responds to these challenges. It has the task of demonstrating the necessity of a critical philosophical examination of the environment and society in order to solve the aforementioned problem areas. It aims to introduce students to the relevant topics and to demonstrate the connection between the aforementioned aspects in an exemplary way.</p> <p>Furthermore, the students acquire competences</p> <ul style="list-style-type: none"> <li>• of free and independent oral reproduction</li> <li>• of analysis, argumentation, critical reflection and discussion of philosophical issues</li> </ul>
<b>Course types</b>	Seminar 30h
<b>Content</b>	In exemplary seminars, topics of natural philosophy (e.g. the concept of nature, philosophy of the organic), environmental and bioethics (e.g. anthropocentrism, pathocentrism, biocentrism, holocentrism) and critical social theory (e.g. political economy, technological development, imperial ways of life) are reflected and discussed in their interconnectedness and interdependence on the basis of relevant texts and materials. In doing so, it is particularly important to work out the references to current crisis phenomena in the field of environment and nature (e.g. climate crisis, species extinction) as well as social developments (e.g. global exploitation relations, political polarization, gender and diversity) and to question their possible transformations.
<b>Title of courses</b>	je nach Semester verschiedene
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, annually
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch

<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 30h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written report (appr. 8.000 words)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Geisteswissenschaften
<b>Responsible person</b>	apl. Prof. Dr. D. Stederoth
<b>Lecturer(s)</b>	apl. Prof. Dr. D. Stederoth
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Jamieson D. (Ed.) 2003: A Companion to Environmental Philosophy, Oxford: Wiley-Blackwell. Hale B., Light A., Lawhon L. (Eds.) 2022: The Routledge Companion to Environmental Ethics, New York: Routledge Carolan M. 2020: Society and the Environment. Pragmatic Solutions to Ecological Issues, New York: Routledge

### Global political economy and development

<b>Module number / code</b>	K52
<b>Module name</b>	Global political economy and development
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Knowledge of the relevant theories, debates and issues in Global Political Economy.  Analytical skills: Categorization of theories, detection of theoretical inconsistencies, operationalization of theoretical propositions, empirical analysis of selected policy areas.
<b>Course types</b>	Seminar 30h
<b>Content</b>	Labour in the Global Economy; Politics of Money, Debt and Finance; Issues of Post-Colonial Political Economy; Gender and Race in Globalisation; Global Governance and Development Cooperation; Global Political Ecology and Environmental Politics; European Integration and Migration Policy; Urbanization and Agrarian Studies; Postcolonial, Decolonial and Postdevelopment Theory; State, Civil Society and Social Struggles
<b>Title of courses</b>	alternates, depending on disciplinary affiliation
<b>Teaching and learning methods</b>	Seminar

<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, each semester
<b>Frequency of module offer</b>	Summer und winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 30h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Group presentation (appr. 20min) or Written report (appr. 7.000 words)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Gesellschaftswissenschaften
<b>Responsible person</b>	Prof. Dr. A. Ziai
<b>Lecturer(s)</b>	Prof. Dr. A. Ziai and others
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Depending on the seminar

### Methods of sociology and humanities

<b>Module number / code</b>	K53M
<b>Module name</b>	Methods of sociology and humanities
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>Students are familiar with advanced data collection and data analysis methods as well as the necessary measures to ensure the quality of the collected data and can apply them competently and independently.</p> <p>Students are able to collect data on the basis of complex, also multi-method designs and to use them for content evaluation and analysis.</p> <p>They learn differentiated methods specifically tailored to the analysis of sustainability concepts and topics and deepen these using practical examples. Students acquire the ability to apply methodological procedures to a concrete problem in the field of sustainability research and to interpret the results. Students are competent in evaluating existing and also</p>

	<p>complex data as well as analysis results in relation to social science concepts and topics on sustainability.</p> <p>Students deepen their knowledge and learn to apply and critique e.g. one or more of the following methods and their combination:</p> <ul style="list-style-type: none"> <li>• Participatory Research</li> <li>• Survey Research</li> <li>• Attitude research (quanti + quali)</li> <li>• Multi-Sited Ethnography</li> <li>• network analysis</li> <li>• Subjectification research</li> <li>• biographical research</li> <li>• Discourse and dispositif analysis</li> <li>• Narrative Analysis</li> <li>• Archive and library research</li> <li>• hermeneutics</li> <li>• Mixed Methods</li> </ul>
<b>Course types</b>	Seminar 30h
<b>Content</b>	alternates, depending on disciplinary affiliation
<b>Title of courses</b>	alternates, depending on disciplinary affiliation
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES; Method module
<b>Duration</b>	1 Semester, annually
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 30h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	optional Written report (appr. 7,000 words) or Oral exam (30min) or Written exam (appr. 90min) or Project presentation (appr. 30min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Gesellschaftswissenschaften
<b>Responsible person</b>	Prof. Dr. E. Tuider

<b>Lecturer(s)</b>	Prof. Dr. E. Tuijder (FB5), Prof. Dr. B. Langfeldt (FB5), PD Dr. M. Roscher (FB5), Prof. Dr. H. Büschel (FB5), Prof. Dr. K. Köchy (FB 02), apl Prof. Dr. D. Stederoth (FB 02), Adjunct lecturer
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	alternates, depending on disciplinary affiliation

### Spatial dimensions of sustainability transitions

<b>Module number / code</b>	K61
<b>Module name</b>	Spatial dimensions of sustainability transitions
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students learn to examine the spatial dimensions of the current socio-ecological crisis as well as the implications of the urgently needed socio-ecological transformations for cities, landscapes and regions. On this basis, they will be introduced to different aspects of sustainability labs and experiments in urban, regional and landscape planning.
<b>Course types</b>	Seminar 60h
<b>Content</b>	<p>The seminar consists of three parts. In the first part, the notions of planetary boundaries, Anthropocene, sustainability transitions, transformations, living labs, etc. are introduced through lectures and group discussions.</p> <p>The second part is dedicated to student presentations based on 1-2 international journal articles each. These will cover topics such as</p> <ul style="list-style-type: none"> <li>• Scaling and rescaling of niche experiments,</li> <li>• Participation and social selectivity,</li> <li>• Power in transformation processes, and</li> <li>• Success factors and enabling conditions.</li> </ul> <p>Finally, in the third part, students are to prepare small case studies. The aim is to combine the findings from the international journal articles with cases (national or international) chosen individually by the participants.</p>
<b>Title of courses</b>	Spatial dimensions of sustainability transitions
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, jährlich
<b>Frequency of module offer</b>	annually in summer semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-

<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Examination P1: Written report (appr. 1000 words) Grade weighting P1: 60% Examination P2: Oral presentation (appr. 20min) Grade weighting P2: 40%
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Architektur, Stadt- und Landschaftsplanung
<b>Responsible person</b>	Prof. Dr. M. Leibenath
<b>Lecturer(s)</b>	Prof. Dr. M. Leibenath
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Augenstein, K., Bachmann, B., Egermann, M., Hermelingmeier, V., Hilger, A., Jaeger-Erben, M., Kessler, A., Lam, D. P. M. et al. (2020), From niche to mainstream: the dilemmas of scaling up sustainable alternatives. <i>GAIA - Ecological Perspectives for Science and Society</i> , 29, 3, 143-147 ( <a href="https://dx.doi.org/10.14512/gaia.29.3.3">https://dx.doi.org/10.14512/gaia.29.3.3</a> ). Sonnberger, M. & Lindner, D. (2021), Participation in real-world laboratories in a new light?! Closing the gap between co-creative and deliberative participation. <i>Raumforschung und Raumordnung   Spatial Research and Planning</i> , 79, 4, 424-437 ( <a href="https://dx.doi.org/10.14512/rur.27">https://dx.doi.org/10.14512/rur.27</a> ). Wittmayer, J. M., Avelino, F., van Steenberghe, F. & Loorbach, D. (2017), Actor roles in transition: Insights from sociological perspectives. <i>Environmental Innovation and Societal Transitions</i> , 24, 45-56 ( <a href="https://dx.doi.org/10.1016/j.eist.2016.10.003">https://dx.doi.org/10.1016/j.eist.2016.10.003</a> ).

## Supply chain management

<b>Module number / code</b>	K71
<b>Module name</b>	Supply chain management
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	Students will be able to distinguish between terms and theoretical lines of development of supply chain management as well as identify, evaluate and apply different approaches to the analysis and design of value chains. At the end, the students will have the necessary knowledge to be able to evaluate and apply strategies and instruments of supply chain management in a differentiated manner in research and practice.
<b>Course types</b>	Vorlesung 60h
<b>Content</b>	Introduction to SCM Terminology, Supply Chain and Operations Strategy, Supplier Management and Development, Supply Chain Risk Management, Supply Chain Performance, Digital Technologies in Supply Chains, Sustainable Supply Chain Management

<b>Title of courses</b>	Supply chain management
<b>Teaching and learning methods</b>	Vorlesung
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, jährlich
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Written exam (120min)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Wirtschaftswissenschaften
<b>Responsible person</b>	Prof. Dr. S. Seuring-Stella
<b>Lecturer(s)</b>	Prof. Dr. S. Seuring-Stella
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Mentzer J.T.; DeWitt W.; Keebler J.S.; Min S.; Nix N.W.; Smith C.D. and Zacharia Z. 2001: Defining supply chain management, Journal of Business Logistics, Vol. 22, No. 2, pp. 1-25. Halldórsson A., Hsuan J., Kotzab H. 2015: Complementary theories to supply chain management revisited – from borrowing theories to theorizing, Supply Chain Management: An International Journal, Vol. 20, Issue: 6, pp.574-586. Seuring S. and Müller M. 2008: From a literature review to a conceptual framework for sustainable supply chain management, Journal of Cleaner Production, No. 16, pp. 1699-1710

### Sustainable behaviour and governance

<b>Module number / code</b>	K72
<b>Module name</b>	Sustainable behaviour and governance
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired</b>	The basic orientation of the courses offered here is to enable students to apply economic theories and concepts in order to compare and analyse

<b>competencies and qualification goals</b>	the behaviour of economic actors in different contexts as well as the possibility and effect of economic policy measures. Students acquire the necessary knowledge to be able to evaluate and assess behavioural patterns of economic actors, economic policy measures and methodological approaches in behavioural economics in a differentiated manner. The degree of specialization in this area is determined by how many courses from this area students choose. The focus is on applying the methodological and conceptual knowledge gained to behaviours and regulation related to sustainability.
<b>Course types</b>	Seminar 30h
<b>Content</b>	Behavioural economics, game theory, economic policy, finance
<b>Title of courses</b>	Thematically changing courses, for example - Intermediate behavioural economics, - Foundations of experimental economics, - Intermediate public economics, - Impact evaluation in environmental economics using field experiments - Economics of entrepreneurship - Environmental economics
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES Methodical courses can be Compulsory elective module according to §9(6) Examination regulations Master AGES
<b>Duration</b>	1 Semester, jedes Semester
<b>Frequency of module offer</b>	Summer und winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	Fundamentals of Microeconomics
<b>Required prerequisites for participation</b>	-
<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	depending on the course Written exam, Oral presentation or Written report
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Wirtschaftswissenschaften
<b>Responsible person</b>	Prof. Dr. A. Dannenberg
<b>Lecturer(s)</b>	Prof. Dr. A. Dannenberg, Prof. Dr. Frank, Prof. Dr. Bünstorf, Prof. Dr. I. Bischoff, Prof. Dr. Wetzel, Prof. Dr. Kesternich, Prof. Dr. Bonin
<b>Media used</b>	verschiedene



<b>Recommended literature</b>	depending on the course
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### Decision support tools in sustainability management

<b>Module number / code</b>	K73
<b>Module name</b>	Decision support tools in sustainability management
<b>Type of module</b>	Elective module
<b>Learning outcomes, acquired competencies and qualification goals</b>	<p>In this seminar, students get acquainted with various tools that may support decision-making for multi-faceted sustainability performance. After a theoretical introduction on selected instruments including data envelopment analysis (DEA), decision-tree methodology, analytical hierarchy process (AHP) and system dynamics modelling, the students will gain in-depth practical experience by working with one selected tool. In the sense of a project seminar, the students successively develop a systems model for addressing a specific problem in the field of sustainability management, and then report and reflect on model-building procedure and findings.</p> <p>Goals and objectives:</p> <ul style="list-style-type: none"> <li>• Get acquainted to decision support tools that are applicable for problems in the realm of sustainability management</li> <li>• Get in-depth insights and gain first experience in building a systems model</li> <li>• Reflect on the assets and limitations of various decision support tools</li> <li>• Gain experience in working in a team, in how to make decisions in a group and how to manage time and resources</li> </ul>
<b>Course types</b>	Seminar 60h
<b>Content</b>	Tools that support decision-making when targeting sustainability performance of organisations and supply chains
<b>Title of courses</b>	Decision support tools in sustainability management
<b>Teaching and learning methods</b>	Seminar
<b>Usability in other programs</b>	Compulsory elective module according to §9(8) Examination regulations Master AGES
<b>Duration</b>	1 Semester, jährlich
<b>Frequency of module offer</b>	annually in winter semester
<b>Teaching language</b>	Englisch
<b>Recommended (knowledge) prerequisites</b>	-
<b>Required prerequisites for participation</b>	-

<b>Student workload</b>	180h, within 60h contact time
<b>Required course work</b>	
<b>Prerequisites for examination(s)</b>	
<b>Module examination(s)</b>	Oral presentation (appr. 30min) with outline (appr. 3.000 words)
<b>Credit points (ECTS)</b>	6 cp
<b>Teaching unit</b>	Wirtschaftswissenschaften
<b>Responsible person</b>	Prof. Dr. S. Gold
<b>Lecturer(s)</b>	Prof. Dr. S. Gold and staff
<b>Media used</b>	verschiedene
<b>Recommended literature</b>	Dyson, R., Allen, R., Camanho, A., Podinovski, V., Sarrico, C., Shale, E. 2001: Pitfalls and protocols in DEA. European Journal of Operational Research, 132(2), 245-259. Stermann, J.D. 2000: System Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill.