HOCHSCHULE
RHEIN-WAAL
Rhine-Waal University
of Applied Sciences

Handbook of modules for the study course Sustainable Agriculture, B.Sc.

November 2015

The most important details

Duration:	7 semesters full-time, 9 semesters part-time
Location:	Kleve
Qualification:	Bachelor of Science, B.Sc.
Course Start:	Annually in the winter term
Language:	English
Practical Course:	Minimum of 8 weeks before the beginning of the 4th semester, longer practical experience in an agricultural or horticultural enterprise is recommended
Internship/ study abroad:	in the 6th semester
Bachelor thesis:	in the second half of the 7th semester

This study programme is a

Inhalt

Module No./ Modul-Nr.	Subjects / Module	CH/ SWS	Type					Ex/Prü	CP	CH / SWS						
			L/V	S	E/Ü	LC/Pr	Pro			WS / WT 1	SS / WT 2	WS / WT 3	SS / ST 4	WS / WT 5	SS / ST 6	WS / WT 7
SAg_1	Agroecology and sustainable development Agrarökologie und nachhaltige Entwicklung	4	3		1			T	5	4					SAg_30: Internship or Study abroad (30 CP) // Auslandsstudiensemester oder Praxissemester (30 CP)	SAg_31: Project with excursion // Projekt mit Exkursion (8 CP); SAg_32: Bachelor Thesis // Bachelorarbeit (12 CP); SAg_33: Colloquium // Kolloquium (8 CP)
SAg_2	Sustainable learning - learning sustainability Nachhaltiges Lernen - Nachhaltigkeit lernen	4	2		2			T	5	4						
SAg_3	Climate change and water management Klimawandel und Wassermanagement	4	4					P	5	4						
SAg_4	Economics and logistics Ökonomie und Logistik	4	4					P	5	4						
SAg_5	Analysis and interpretation of data Analyse und Interpretation von Daten	4	2		2			P	5	4						
SAg_6	Agricultural chemistry Agrikulturchemie	4	2			2		P	5	4						
SAg_7	Soil science and tillage Bodenwissenschaften und Bodenbearbeitung	6	3		1	2		P	5	2	4					
SAg_8	Bio- and food chemistry Bio- und Lebensmittelchemie	4	2			2		P	5		4					
SAg_9	Project Projekt	4		1			3	P	5		4					
SAg_10	Biology and biodiversity Biologie und Biodiversität	4	2			2		P	5		4					
SAg_11	Basics of animal sciences: Anatomy, physiology and animal nutrition Grundlagen der Nutztier-wissenschaften: Anatomie, Physiologie und Ernährung	4	2			2		P	5		4					
SAg_12	Analysis of international land use and cropping systems Analyse internationaler Landnutzungs- und Pflanzenbausysteme	4	2	2				P	5		4					
SAg_13	International markets, trade and agricultural policy Internationale Märkte, Handel und Agrarpolitik	4	3		1			P	5			4				
SAg_14	Energy and agricultural engineering Energie und Agrartechnologie	4	2		2			P	5			4				
SAg_15	Crop physiology and nutrition Pflanzenphysiologie und -ernährung	5	3			2		P	5			5				
SAg_16	Advanced interpersonal and intercultural communication Interpersonelle und interkulturelle Kommunikation	4		2	2			P	5			4				
SAg_17	Ethics and philosophy in life sciences Ethik & Philosophie in den Lebenswissenschaften	3		3				P	5			3				
SAg_18	Crop health Pflanzengesundheit	4	4					P	5			4				
SAg_19	Sociological and psychological aspects of sustainable development Soziologische und psychologische Aspekte nachhaltiger Entwicklung	4	2	2				P	5				4			
SAg_20	Animal health und breeding Tiergesundheit und Tierzucht	4	2			2		P	5				4			
SAg_21	Agrotechnology and new agriculture Agrartechnologie und neue Landwirtschaft	4	2		2			P	5				4			
SAg_22	Horticulture and agroforestry Gartenbau und Agroforst	4	2			2		P	5				4			
SAg_23	Elective modules 1 Wahlpflichtkatalog 1	6	6					P	9				6			
SAg_24	Animal Welfare Tiergerechtheit	4	2			2		P	5					4		
SAg_25	Food processing and human nutrition Lebensmittelverarbeitung und Ernährung	4	2			2		P	4					4		
SAg_26	Sustainability analysis of international supply chains Nachhaltigkeitsanalyse internationaler Wertschöpfungsketten	4					4	P	5					4		
SAg_27	Resource economics and risk assessment Ressourcenökonomie und Risikobewertung	4	2		2			P	5					4		
SAg_28	Sustainability management and food safety Nachhaltigkeitsmanagement und Lebensmittelsicherheit	4	2		2			P	5					4		
SAg_29	Elective modules 2 Wahlpflichtkatalog 2	6	6					P	9					6		
	total credit hours // Semesterwochenstunden	**122**	**68**	**10**	**17**	**20**	**7**			26	24	24	22	26		
										30	30	30	29	33	30	28
									Credit Points			**152**			**58**	
													210			

	total	1.Sem	2.Sem	3.Sem	4.Sem	5.Sem	6.Sem	7.Sem
CH	122	26	24	24	22	26		
CP	210	30	30	25	29	33	30	28

Abbreviations: // Abkürzungen
CH = credit hours per week // SWS = Semesterwochenstunden
WS = winter term // Wintersemester
SS = summer term // Sommersemester
Ex/Prü = type of examination // Prüfungsart
CP = credit points (= ECTS-points)
L/V = Lecture // Vorlesung
S = seminar // Seminar
E/Ü = exercise // Übung
LC/Pr = lab course // Praktikum
Pro = project // Projekt
T = certificate // Testat (unbenotet)
P = examination (graded) // benotete Prüfung

	Elective modules 1 Wahlpflichtkatalog 1	SWS	CP	Ex
SAg_23.1	Sustainable field crop and specialty crop production Nachhaltiger Anbau von Feldfrüchten und Spezialkulturen	2	3	P
SAg_23.2	Sustainable animal husbandry Nachhaltige Tierhaltung	2	3	P
SAg_23.3	Phytomedicine Phytomedizin	2	3	P
SAg_23.4	Traceability of agricultural products Rückverfolgbarkeit von Agrarprodukten	2	3	P
SAg_23.5	Pasture, grassland and fodder production Weidewirtschaft, Grünland und Futterproduktion	2	3	P
SAg_23.6	Soil ecology, soil biology and soil protection Bodenökologie, Bodenbiologie und Bodenschutz	2	3	P
SAg_23.7	Applied sustainability in agriculture Angewandte Nachhaltigkeit in der Landwirtschaft	2	3	P
SAg_23.8	Module from any other study course at the Rhine-Waal University of Applied Sciences Wahlmöglichkeit Angebot HRW	2	3	P
SAg_23.9	Module from any other study course at the Rhine-Waal University of Applied Sciences Wahlmöglichkeit Angebot HRW	2	3	P
	3 elective modules amount to	6	9	

	Elective modules 2 Wahlpflichtkatalog 2	SWS	CP	Ex
SAg_29.1	Herd management and health Herdenmanagement und -gesundheit	2	3	P
SAg_29.2	Advanced agricultural engineering and energy harvesting systems Hochleistungsagrartechnologie und Energieerntesysteme	2	3	P
SAg_29.3	Livestock and environment Nutztiere und Umwelt	2	3	P
SAg_29.4	Advanced environmental psychology and field methods of consulting - ändern in Umweltsystemanalyse Spezielle Umweltpsychologie und Feldmethoden der Beratung	2	3	P
SAg_29.5	Organic farming Ökologische Landwirtschaft	2	3	P
SAg_29.6	Methods in Agroecology Methoden der Agrarökologie	2	3	P
SAg_29.7	Module from any other study course at the Rhine-Waal University of Applied Sciences Wahlmöglichkeit Angebot HRW	2	3	P
SAg_29.8	Module from any other study course at the Rhine-Waal University of Applied Sciences Wahlmöglichkeit Angebot HRW	2	3	P
	3 elective modules amount to	6	9	

Animal
Tier
Plant/soil
Pflanze/Boden
Economy/analysis of sustainability
Ökonomie/Nachhaltigkeitsanalyse

SAg_01 Agroecology and Sustainable Development

Study semester:	**1** (full time) **1** (cooperative) **1** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	45 h	Preparation for contact time	30 h
Excursion/Exercise	15 h	Literature review	20 h
		Preparation for exams	40 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern; Dr. Conor Watson

Contents

Terms, definitions, principles and concepts of ecology and agroecology; global cycles of matter; population and community ecology; foodwebs, habitat and niche; disturbance and succession; diversity and stability of agroecosystems; interactions in cropping systems; sustainable agroecosystems; methods of sustainability assessment; terms, principles and limitations of Life Cycle (LCA) and sustainability assessment methods; application of exemplary method; define selected agricultural supply chains; interpretation and review of results

Intended learning outcomes

On successful completion of this module, students should

- know the relevant definitions, principles and concepts of ecology and their application in agriculture[1]
- know how populations and communities of organisms in agroecosystems react to their environment[1]
- know the principles and range of applications of LCA and sustainability assessment methods in agriculture[1]
- comprehend the necessity of fact-based methods to assess supply chains[2]
- be able to relate their knowledge about ecology to its relevance in sustainable agriculture[2]
- partly apply methods of sustainability evaluation[3]
- present and document results and findings in a scientifically appropriate format[4]
- analyse how their findings are related to those of others[4]
- be able to evaluate the application of ecological principles and concepts in sustainable agricultural systems[5]
- be able to critically discuss possibilities and shortcomings of agroecology in the existing agricultural context[5]
- exemplary application[3], presentation[4] and critical interpretation of assessment results[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursions; exercises; feedback

Entrance requirements

None

Reading list

Gliessman: Agroecology
Odum, Brewer and Barrett: Fundamentals of Ecology
Callenbach: Ecology: A Pocket Guide
Various case studies and scientific publications, standards

Examination

Certificate

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence	X		

last amended August 2014

SAg_02 Sustainable Learning – Learning Sustainability

Study semester:	**1** (full time) **1** (cooperative) **1** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	30 h
Excursion/Exercise	30 h	Preparation for exams	60 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Dietrich Darr; Dipl.-Ing. Rüdiger Schmidt

Contents

Definitions, concepts and dimensions of sustainability and sustainable development; sustainability as a process; stakeholders and driving forces; introduction to methods of sustainability assessment; multi-, inter- and transdisciplinarity; basics of land use and supply chain systems; sustainable agroecosystems; people and team skills; time management; presentation skills; giving and receiving feedback; academic reading and academic writing

Intended learning outcomes

On successful completion of this module, students should

- know the relevant terms, definitions, concepts and dimensions of sustainability and sustainable development, with special emphasis on their relevance in agriculture[1]
- know how to succeed at university[1]
- be able to relate their knowledge about sustainability and sustainable development to agriculture and their own life[2]
- apply methods of self, time and project management individually and in groups[3]
- be able to critically discuss the perspectives and shortcomings of sustainability approaches in agriculture[5]
- be able to evaluate their personal learning progress and identify their own learning needs[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgment

Teaching and learning methods

Seminar; self-study; group work; excursion; exercise; feedback

Entrance requirements

None

Reading list

Smale and Fowlie: How to Succeed at University
Rogers, Jalal and Boyd: An Introduction to Sustainable Development
The Philosophical Transactions of The Royal Society, Biological Sciences: Theme Issues Sustainable Agriculture I & II
McIntyre et al. (eds.): International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD): Global Report
Pears and Shields: Cite them right

Examination

Certificate

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material; online tutorials; videos; video feedback

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence	X		

last amended August 2015

SAg_03 Climate Change and Water Management

Study semester:	**1** (full time) **1** (cooperative) **3** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	60 h	Preparation for contact time	30 h
		Literature review	30 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

N.N.

Instructors

Dr. Christian Fritz

Contents

Climate change: past climate change and the response of and effect on past societies; contrast, definition of weather and climate; energy budget of earth; natural greenhouse gases and their control and effect on climate; present climate zones; past climates in the history of earth and suspected factors involved with natural climate change; the climate system as part of the system earth; causes (forces) for and short-term and long-term controls on climate; the effect of feedback mechanisms on climate; anthropogenic climate change from population growth coupled with agricultural and industrial expansion; outlook for the future climate and basic concepts on climate control including change of agricultural present-day to future sustainable practise

Water management: fundamental knowledge about the properties of water and hydrological concepts; key technologies for water production, purification and treatment; sustainable water use and irrigation systems; integrated river management; water quality and risks

Intended learning outcomes

On successful completion of this module, students should

- know the relevant factors controlling climate and the interaction and interdependence of these factors[1]
- know the elements of the water cycle and water catchment management[1]
- outline and compute the key elements of irrigation and drainage systems[1]
- know and understand natural and anthropogenic influences on our climate system[2]
- comprehend the concept of modelling regional climate trends for agricultural purposes[2]
- value water as a scarce resource and improve understanding of the importance of conserving water resources[2]
- be able to relate changing environmental conditions to the effects on climate[3,4]

- master fundamental laws and equations in hydrology and their application in typical water management situations[3]
- identify the most important procedures of water treatment and purification and appreciate their importance with regard to possible toxicological impact on human population[4]
- analyse conditions of agricultural practise in the context of climate change, limited conventional energy resources and growing world population[4]
- develop sensitivity and need for climate control based on past societal experiences[5]
- be able to discuss options for sustainable agriculture in a world of limited natural resources[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursion; feedback

Entrance requirements

None

Reading list

Aguado and Burt: Understanding Weather and Climate
Ruddiman: Earth's Climate, Past and Future
Grotzinger and Jordan: Understanding Earth
Hornberger: Elements of Physical Hydrology
Brutsaert: Hydrology – an Introduction
Gray: Water Technology – an Introduction for Environmental Scientists and Engineers
Asano: Water Reuse: Issues, Technologies and Applications
Smith: Landscape Irrigation – Design and Management

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			

last amended August 2015

SAg_04 Economics and Logistics

Study semester:	**1** (full time) **1** (cooperative) **3** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	60 h	Preparation for contact time	30
		Literature review	30
		Preparation for exams	30
Sum	60 h	Sum	90

Total workload: **150 h**

Coordinator

Prof. Dr. Dagmar Mithöfer

Instructors

Dr. Jana Lohmann

Contents

Principles of microeconomics and macroeconomics; markets; supply and demand; welfare; consumer behaviour; economic growth; economic fluctuations; public policy; introduction to supply chains; introduction to supply chain management and logistics

Intended learning outcomes

On successful completion of this module, students should

- know principles of micro- and macroeconomics[1]
- know principles of supply chains, supply chain management and logistics[1]
- be able to relate their knowledge in economics to aspects in business management and public policy[2]
- apply standard economic and analytical tools to micro- and macroeconomic questions[3,4]
- document results and findings in a scientifically appropriate form[4,5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work and presentation

Entrance requirements

None

Reading list

Maniw and Taylor: Economics
Harrison and van Hoek: Logistics Management and Strategy: Competing through the Supply Chain

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			X

last amended August 2014

SAg_05 Analysis and Interpretation of Data

Study semester:	**1** (full time) **1** (cooperative) **1** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Exercise	30 h	Literature review	10 h
		Preparation for exams	40 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Sylvia Moenickes

Instructors

Ms. Sabine Manten

Contents

Introduction to maths: one variable calculus and application; linear algebra including vector spaces, matrix operations and eigenvalues and eigenvectors; calculus of several variables. Application and exercises with examples from decision making in agribusiness; sustainable agricultural production and engineering in agriculture

Introduction to applied statistics: probability theory; distributions; descriptive statistics; inferential statistics; correlation, regression; comparison of means; visualization of data with charts; application to and examples from agricultural market research

Intended learning outcomes

On successful completion of this module, students should

- understand the basics of maths and statistics[1]
- know the covered methods of data analysis[1]
- understand differences in methods of analysis and display of data[2]
- apply methods of data analysis and display to agricultural data[3, 4]
- critically assess examples of data display[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lectures; self-study; group work; exercise; feedback

Entrance requirements

None

Reading list

Milton: Head first data analysis
Ekstrom and Sorensen: Introduction to statistical data analysis for the life sciences
Soo Tang Tan: Applied mathematics for the managerial, life and social sciences
Bulmer: Principles of Statistics
Simon and Blume: Mathematics for Economists

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			X

last amended August 2014

SAg_06 Agricultural Chemistry

Study semester:	**1** (full time) **1** (cooperative) **1** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	45 h
Lab course	30 h	Lab journal writing	20 h
		Preparation for exams	25 h
Sum	60 h	Sum	95 h

Total workload: **150 h**

Coordinator

Prof. Dr. Peter Scholz

Instructors

Dr. Stefan Weber; Dr. Conor Watson

Contents

Terms, definitions, principles and concepts of general chemistry; models of the atom; chemical bonding; chemical equilibrium; acids and bases; oxidation / reduction; agricultural chemistry

Intended learning outcomes

On successful completion of this module, students should

- know the relevant definitions, principles and concepts of general and agricultural chemistry[1]
- be able to apply chemical theories and terminology to scientific questions[1,2]
- be able to conduct a simple experiment and to document the result[1-3]
- be able to interpret experimental results within known chemical theories[4,5]
- know important elements for agricultural sciences and their influence on farming[1,2]
- know farming relevant key processes in water and soil[1,2]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab work with lab journal

Entrance requirements

None

Reading list

Corwin: Introductory chemistry
Hill, McCreary and Kolb: Chemistry for changing times
Pulford and Flowers: Environmental chemistry at a glance

Examination

Graded exam

Teaching materials and media

Projector; white/black board; smart board; hand-outs; general lab equipment; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_07 Soil Science and Tillage

Study semester:	**1&2** (full time) **1&2** (cooperative) **1&2** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	45 h	Preparation for contact time	20 h
Exercise	15 h	Literature review	10 h
Lab course/Field course	30 h	Preparation for exams	30 h
Sum	90 h	Sum	60 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern; Dr. Conor Watson

Contents

Physical, chemical and biological properties of soils; terms and definitions of soil science; soil formation, classification and use; threats to and conservation of soil resources; relevance of soils for agricultural production; methods of soil analysis; methods of soil health appraisal; basics of soil tillage and influence on soil properties

Intended learning outcomes

On successful completion of this module, students should

- know the relevant concepts of soil physics, soil chemistry and soil biology[1]
- know how soils are formed, classified, function and can be protected[1]
- be able to relate their knowledge about soils to its relevance in sustainable agriculture[2]
- apply standard analytical lab procedures of soil science in experiments[3]
- apply methods to assess soil fertility and health[3]
- analyse and document results and findings in a scientifically appropriate form[4]
- analyse how their data fit to the data of others[4]
- be able to evaluate the influence of different tillage systems on soil properties and determine their sustainability[5]
- be able to critically discuss options of sustainable soil use and soil health in an agricultural context[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course with lab journal; field trip; excursion; feedback

Entrance requirements

None

Reading list

Brady and Weil: The Nature and Properties of Soils
Brady and Weil: Elements of the Nature and Properties of Soils
Grotzinger and Jordan: Understanding Earth
White: Principles and Practice of Soil Science

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2013

SAg_08 Bio- and Food Chemistry

Study semester:	**2** (full time) **2** (cooperative) **2** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	45 h
Lab course	30 h	Lab journal writing	20 h
		Preparation for exams	25 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Peter Scholz

Instructors

Dr. Stefan Weber; Dr. Nadine Merettig

Contents

Terms, definitions, principles and concepts of organic, bio and food chemistry; important functional groups; common reaction types; reaction mechanisms; important biomolecules: nucleotides, peptides and amino acids, carbohydrates, fatty acids; exemplary biochemical pathways; catalysis

A study of the chemistry and functionality of the major components comprising food systems, such as water, proteins, carbohydrates and lipids.

Intended learning outcomes

On successful completion of this module, students should

- know the relevant definitions, principles and concepts of organic, bio and food chemistry[1]
- be able to apply theories and terminology to scientific questions[1,2]
- be able to conduct simple experiments and to document the result[1-3]
- be able to interpret experimental results within known biochemical concepts[4,5]
- know the chemical composition and main properties of lipids, protein and carbohydrates[1]
- Demonstrate basic laboratory skills of relevance to food science[3]
- know the physiochemical properties and function of foods, as well as of vitamins, minerals and water[1,2]
- be able to describe the nature of foods, the causes of their deterioration, and the principles underlying food processing[1,2]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course with lab journal

Entrance requirements

Agricultural chemistry (Sag_06)

Reading list

Bruice: Essential organic chemistry
Bailey and Bailey: Organic chemistry
Horton, Moran, Scrimgeour, Perry and Rawn: Principles of biochemistry
Belitz: Food Chemistry
Damodaran: Fennema's Food Chemistry

Examination

Graded exam

Teaching materials and media

Projector; white/black board; smart board; hand-outs; general lab equipment; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_09 Project

Study semester:	**2** (full time) **2** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Seminar	15 h	Preparation for contact time	30 h
Project	45 h	Literature review	30 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern; Prof. Dr. Dagmar Mithöfer; Dr. Christian Fritz

Contents

The project is a group work on a topic chosen by the students in sustainable agriculture that will be analysed in respect of its sustainability; project management; scientific working and writing; aspects of sustainable agriculture; methods of sustainability assessment; setting up a business plan

Intended learning outcomes

On successful completion of this module, students should

- know the relevant aspects of sustainability in the respective topic of sustainable agriculture[1]
- be able to search scientific literature independently[2]
- be able to organise and manage a project and group work[2]
- apply relevant methods of sustainability evaluation[3]
- present and document results and findings in a scientific report/article[4]
- analyse how their findings are related to those of others[4]
- be able to evaluate methods of sustainability appraisal[5]
- be able to critically discuss their findings[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Group work; self-study; excursion; seminar; feedback; presentation

Entrance requirements

None

Reading list

Various case studies and scientific publications

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence	X		

last amended August 2014

SAg_10 Biology and Biodiversity

Study semester:	**2** (full time) **2** (cooperative) **2** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Lab course/Field course	30 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Kerstin Koch

Instructors

Prof. Dr. Kerstin Koch

Contents

Cells and their components; fundamentals of microbiology in relation to agriculture; basic botany and zoology; basic physiology (e.g. respiration, photosynthesis, flow of water and nutrients, sensing, movement); allocation; fundamental genetics as a basis for breeding; strategy types; biodiversity indices; Vavilov centres of diversity; diversity and ecosystem services; basics of biological experimentation and data documentation

Intended learning outcomes

On successful completion of this module, students should

- know the basics of cell, plant and animal biology[1]
- understand how plants and animals function and use resources and how this relates to strategies and diversity[2]
- understand how microorganisms influence important agricultural processes[2]
- apply their knowledge in the conduction and documentation of simple biological lab experiments[3]
- analyse agricultural management systems with respect to their influence and use of diversity[4]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course with lab journal; field trip

Entrance requirements

None

Reading list

Campbell and Reece: Biology
Reece, Urry, Cain, Wasserman, Minorsky, Jackson and Campbell: Biology
Stohlgren: Measuring Plant Diversity

Examination

Graded exam

Teaching materials and media

Beamer; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended June 2015

SAg_11 Basics of Animal Sciences: Anatomy, Physiology and Animal Nutrition

Study semester:	**2** (full time) **2** (cooperative) **2** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Lab course/Field course	30 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Christoph Böhmer

Instructors

Dr. Markus Haagen

Contents

Anatomy of farm animals (bones and skeletal system of fishes, poultry, ruminants, pigs, horses); basic animal physiology (cell and tissue, integumentary system, working of nerves, muscles, excretion, circulatory system, respiratory system, endocrine system, sensory systems, reproductive system); basic animal nutrition (digestive system, urinary system, animal growth and development, similarities and differences among groups of animals, important nutritional indices, fodder types and quality, additives)

Intended learning outcomes

On successful completion of this module, students should

- know the basics of animal anatomy, physiology and nutrition[1]
- understand basic interactions among anatomy, physiology and nutrition[2]
- apply their knowledge in the appraisal of farm animals and feeding systems[3,4]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course with lab journal; field trip

Entrance requirements

None

Reading list

Reece: Functional Anatomy and Physiology of Domestic Animals
McDonald et al.: Animal Nutrition

Examination

Graded exam

Teaching materials and media

Beamer; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended March 2015

Sag_12 Analysis of International Land Use and Cropping Systems

Study semester:	**2** (full time) **2** (cooperative) **4** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	30 h
Seminar	30 h	Literature review	20 h
		Preparation for exams	40 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern; Prof. Dr. Jens Gebauer; Dr. Conor Watson

Contents

Classification systems of global land use; basics, principles and concepts of cropping systems; arable farming and fodder production; introduction to grassland systems; relevant annual and perennial crops of temperate, subtropical and tropical regions; crop rotations and interactions in crops; aspects of sustainability in cropping systems; methods of sustainability assessment (e.g. carbon or water footprint, ecological rucksack, nutrient balances)

Intended learning outcomes

On successful completion of this module, students should

- know the relevant principles and concepts of global land use and cropping systems[1]
- know how annual and perennial crops are cultivated in arable farming systems, fodder production and grassland systems[1]
- be able to relate their knowledge to its relevance in creating sustainable cropping systems[2]
- apply methods of sustainability evaluation[3]
- present and document results and findings in a scientifically appropriate format[4]
- be able to evaluate cropping sequences in agricultural systems regarding their sustainability[5]
- be able to critically discuss possibilities and shortcomings of more sustainable cropping systems in relation to the investigated sustainability parameters[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; self-study; group work; excursion; exercise; feedback; presentation

Entrance requirements

None

Reading list

Rehm and Espig: The Cultivated Plants of the Tropics and Subtropics
McMahon, Kofranek and Rubatzky: Plant Science
Martin, Waldren and Stamp: Principles of Field Crop Production
Livingston: Field Crop Production
Sheaffer and Moncada: Introduction to Agronomy

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence		X	

last amended August 2014

SAg_13 International Markets, Trade and Agricultural Policy

Study semester:	**3** (full time) **4** (cooperative) **3** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	45 h	Preparation for contact time	40 h
Exercise	15 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Dietrich Darr

Instructors

Prof. Dr. Dietrich Darr

Contents

Introduction to agricultural policy and trade; global agricultural markets and trade; global agricultural trade and development; agricultural policy and public policy; land policy; EU Common Agricultural Policy; agricultural cooperatives; agricultural policy in other global regions

Intended learning outcomes

On successful completion of this module, students should

- know the relevant concepts of international agriculture commodity markets, trade and agricultural policy[1]
- understand the role of governments and other stakeholders in the agricultural policy arena[1]
- be able to relate basic concepts of political sciences to current developments in the agriculture sector[2]
- apply agricultural trade and policy concepts to discuss and solve agribusiness case studies[3]
- be able to analyse and critically discuss the impact of agricultural trade and policy in a global context[4]
- marketing and sales options in agribusiness contexts[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar, self-study; group work and presentation; excursion

Entrance requirements

None

Reading list

Peterson: A Billion Dollars a Day: The Economics and Politics of Agricultural Subsidies
Hill B: Understanding the Common Agricultural Policy
Hill M: The public policy process

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart/ pin-board; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended October 2013

SAg_14 Energy and Agricultural Engineering

Study semester:	**3** (full time) **4** (cooperative) **5** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	50 h
Exercise	30 h	Literature review	20 h
		Preparation for exams	20 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Matthias Kleinke

Instructors

Prof. Dr. Matthias Kleinke

Contents

Fundamentals of physics, incl. mechanics and electricity; mathematical problem solving, incl. the use of units; fundamentals of agricultural machines and buildings; properties of machinery used in the crop production chain; fundamentals of energy conversion technologies; thermal and electrical energy systems; the use and production of energy in agriculture; fundamentals of economic and environmental assessment of agrotechnology

Intended learning outcomes

On successful completion of this module, students should

- know the fundamentals of physics[1]
- know basic mathematical problem solving and the relevant unit systems[1]
- understand basic functioning and use of technology in agriculture and energy systems[2]
- understand the technology for crop production chains[2]
- apply technological solutions to agricultural problems[3]
- analyse pros and cons of agrotechnology[4]
- be able to critically discuss the benefits and negative effects of agrotechnology[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursion

Entrance requirements

None

Reading list

Tipler and Mosca: Physics for Scientists and Engineers Extended Version
Field and Solie: Introduction to Agricultural Engineering Technology: A Problem Solving Approach
Kaltschmitt, Streicher and Wiese (eds.): Renewable Energy: Technology, Economics and Environment

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended April 2013

SAg_15 Crop Physiology and Nutrition

Study semester:	**3** (full time) **4** (cooperative) **3** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	45 h	Preparation for contact time	30 h
Lab course/Field course	30 h	Literature review	20 h
		Preparation for exams	25 h
Sum	75 h	Sum	75 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern; N.N.

Contents

Biotic and abiotic stress (examples: salt, water); advanced photosynthesis and water use; competition; allelopathy; advanced methods of crop physiology and nutrition; function of plant nutrients; uptake, transport and mobilisation of nutrients; practical nutrient management and fertilisation

Intended learning outcomes

On successful completion of this module, students should

- know the essential nutrients of plants and their basic functions[1]
- understand effects of environmental stressors on plants[2]
- undstand[2] the photosynthetic pathways and discuss[3] their impact on plant water use
- apply methods of crop physiology and nutrition to agricultural questions[3]
- analyse basic connections between state of nutrition and physiological consequences[4]
- analyse ecophysiological and nutritional reasons for crop rotations

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course with lab journal; field trip

Entrance requirements

Biology and biodiversity (SAg_10)

Reading list

Lambers, Stuart Chapin and Pons: Plant Ecophysiology
Larcher: Physiological Plant Ecology
Marschner: Mineral Nutrition of Higher Plants
Barker and Pilbeam: Handbook of Plant Nutrition.
Bilitewski, Härtle, Marek, Weissbach and Boeddicker: Waste Management
Fageria: The Use of Nutrients in Crop Plants

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended September 2015

SAg_16 Interpersonal and Intercultural Communication – in curriculum Advanced Interpersonal and Intercultural Communication

Study semester:	**3** (full time) **4** (cooperative) **5** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Seminar	30 h	Preparation for contact time	40 h
Exercise	30 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Dietrich Darr

Instructors

Prof. Dr. Dietrich Darr

Contents

Introduction; culture and interpersonal communication; perception of self and others; listening; verbal messages; non-verbal messages; emotional messages and conflict; conversational messages; interpersonal power and influence; intercultural communication competence

Intended learning outcomes

On successful completion of this module, students should

- know the relevant concepts of advanced interpersonal and intercultural communication[1]
- be familiar with concepts used to describe cultural differences between countries[2]
- be able to effectively and appropriately begin, sustain and conclude conversations in various business contexts[3]
- be able to constructively handle emotional conversations[3,4,5]
- be able to apply and neutralize influencing tactics and strategies in business contexts[3,4,55]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; exercise; role play; self-study; group work and presentation

Entrance requirements

None

Reading list

Gudykunst and Mody: Handbook of International and Intercultural Communication
Deardorff: The SAGE Handbook of Intercultural Competence
Parhizgar: Multicultural Behavior and Global Business Environments
DeVito: The interpersonal communication book

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart/ pin-board; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence			X
Methodological competence		X	
Social competence	X		

last amended September 2015

SAg_17 Ethics and Philosophy in Life Sciences

Study semester:	**3** (full time) **4** (cooperative) **3** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Seminar	45 h	Preparation for contact time	30 h
		Literature review	30 h
		Preparation for exams	45 h
Sum	45 h	Sum	105 h

Total workload: **150 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Dr. Milena Valeva

Contents

Logic, argumentation and science; the nature of reality; knowledge and truth; religion and political philosophy; theories of ethics and morality; ethical and moral reasoning; technology assessment; ethics in food security, food safety and biomass production; ethics in life sciences

Intended learning outcomes

On successful completion of this module, students should

- know the basic concepts and theories of philosophy and ethics[1]
- know how to plan and conduct a seminar on a relevant topic of life sciences ethics[1]
- know the principles and range of technology assessment methods[1]
- comprehend the necessity of systematic and fact-based approaches to assess technologies[2]
- be able to identify moral reasoning[2]
- apply ethical concepts as an instrument for moral reasoning[3]
- analyse texts and presentations for moral reasoning of topics relevant in life sciences[4]
- be able to critically discuss relevant topics of life sciences ethics in the context of a sustainable development of agriculture[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Seminar; self-study; group work; feedback; presentation

Entrance requirements

None

Reading list

Comstock: Life Science Ethics
Solomon: The Big Questions: A Short Introduction to Philosophy
Rachels: The Elements of Moral Philosophy
VDI 3780: Technology Assessment

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence		X	
Methodological competence	X		
Social competence	X		

last amended September 2015

SAg_18 Crop Health

Study semester:	**3** (full time) **4** (cooperative) **5** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lectures	60 h	Preparation for contact time	30 h
		Literature review	30 h
		Preparation for exams	30 h
Sum	60 h	Sum	75 h

Total workload: **150 h**

Coordinator

Prof. Dr. habil. Jens Gebauer

Instructors

Dr. Barbara Darr

Contents

Crop species diversity; concepts of pests and diseases in plants; types of plant pests and diseases; losses caused by pests and plant diseases; development of pests and diseases and the effect of the environment; abiotic factors; weeds; fungi; bacteria; nematodes; viruses; slugs and snails; insects; wildlife; breeding agricultural and horticultural crops; principles and concepts in breeding; marker assisted breeding approaches; genebank management; genetic improvement of under-utilized crops; levels of agrobiodiversity; plant diversity in cropping systems; assessment of diversity

Intended learning outcomes

On successful completion of this module, students should

- know crop species[1]
- know the relevant concepts of plant protection[1]
- know the relevant concepts in plant breeding[1]
- set up breeding programmes for crop plants[3]
- understand the impact of diversity for ecosystem functioning[2]
- be able to relate their knowledge about plant protection and agrobiodiversity and its relevance in sustainable agriculture[2]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; field trip; presentation

Entrance requirements

None

Reading list

Schumann and D'Arcy: Essential Plant Pathology
Agrios: Plant Pathology
Pedigo and Rice: Entomology and Pest Management
Brown: An Introduction to Plant Breeding
Hancock: Plant Evolution
Engels et al.: Managing Plant Genetic Diversity

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			

last amended September 2015

SAg_19 Rural Development – in curriculum Sociological and Psychological Aspect of Sustainable Development

Study semester:	**4** (full time) **3** (cooperative) **4** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Seminar	30 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Dietrich Darr

Instructors

Prof. Dr. Dietrich Darr

Contents

Introduction to rural development; human-ecological systems; economic development theories; measures of development; strategies for rural development; financing of rural development; rural tourism; values, attitudes; behaviour; social-ecological dilemmas; approaches to encourage pro-environmental behaviour

Intended learning outcomes

On successful completion of this module, students should

- understand major economic and sociological concepts relevant to rural development and natural resource management[1]
- understand determinants of human pro-environmental behavior[1]
- comprehend contemporary challenges of sustainable development in rural areas[2]
- analyse human-ecological dilemmas and be able to develop appropriate strategies to solve them[3,4]
- be able to critically discuss sustainable rural development issues in the context of agriculture and natural resource management[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; self-study; group work and presentation; excursion; experiments

Entrance requirements

None

Reading list

Koger, Winter: The psychology of environmental problems: psychology for sustainability
Singh: Rural development: principles, policies and management
Scholz: Environmental literacy in science and society: from knowledge to decisions
Clayton, Myers: Conservation psychology - understanding and promoting human care for nature
Norton, Alwang and Masters: Economics of agricultural development

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart/ pin-board; visualisation aids for presentation; demonstration materials

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended August 2015

SAg_20 Animal Health and Breeding

Study semester:	**4** (full time) **3** (cooperative) **4** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Lab course/Field course	30 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

N.N.

Instructors

Dr. Markus Haagen

Contents

Examination of animals (individual and herd; diagnosis, treatment, prevention); animal immune system; diseases caused by viruses, bacteria, fungi, protozoa and parasites; epizootic and other livestock diseases (e.g. metabolic diseases; diseases of the respiratory system, of the cardiovascular system, of the urinary system, of the reproductive system, of the nervous system); nutritional deficiencies, toxicities and animal health; disease prevention and health promotion in organic, conventional and sustainable agriculture; hygiene in animal housing; legal regulations; differences in health among breeds; history of and basics of animal breeding; quantitative genetics; pure and cross breeding; fundamentals of genomic breeding (e.g. methods for analysing eukaryotic genomes, gene identification, mapping, sequence analysis); diversity and animal breeding; performance testing; modern breeding strategies and breeding strategies for sustainable agriculture

Intended learning outcomes

On successful completion of this module, students should

- know the basics of animal health and breeding[1]
- know the important livestock diseases[1]
- understand the mechanisms and regulations of immune systems of different livestock species[2]
- understand the genetic basis of breeding programmes[2]
- compare animal husbandry systems with respect to influences on animal health and wellbeing[3]
- are able to diagnose mayor livestock diseases and give advice concerning animal health problems in case studies[3, 4]
- compare different breeding programmes[4] and evaluate their success[5]
- asses animal health and disease prevention programmes for a sustainable development of agriculture[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course with lab journal; case studies

Entrance requirements

Basics of animal sciences (SAg_11)

Reading list

Williams: The Complete Textbook of Animal Health & Welfare
Hafez and Hafez: Reproduction in Farm Animals
Bearden, Fuquay and Willard: Applied Animal Reproduction
Pineda and Dooley: McDonald's Veterinary Endocrinology and Reproduction
Payne and Wilson: An Introduction to Animal Husbandry in the Tropics
Van Soest: Nutritional Ecology of the Ruminant

Examination

Graded exam

Teaching materials and media

Beamer; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_21 Agrotechnology and New Agriculture

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	50 h
Exercise	30 h	Literature review	20 h
		Preparation for exams	20 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Matthias Kleinke

Instructors

Prof. Dr. Matthias Kleinke; Prof. Dr. Joachim Fensterle; Dr. Christian Fritz

Contents

Fundamentals of and new developments in agrotechnology (e.g. concerning irrigation technology, technology in animal husbandry, energy use and production); fundamentals and methods of technology assessment (TA); urban and vertical farming; precision farming; graphical display of data; basic GIS and GIS software; bio- and genetic engineering; genetically modified food; nanotechnology in food and agriculture

Intended learning outcomes

On successful completion of this module, students should

- know the basic functioning and use of agrotechnological equipment[1]
- know the basic concepts and mechanisms of bio- and genetic engineering[1]
- know[1] and understand[2] basic concepts, apply[3] and analyse[4] exemplary case study, critically discuss necessity and limits of technology assessment [5]
- understand the application of nanotechnology, bio- and genetic engineering in agriculture and the food industry[2]
- understand concepts of urban, vertical and precision farming[2]
- apply agrotechnological solutions to agronomic problems[3]
- analyse pros and cons of new developments in agriculture[4]
- analyse pros and cons of the use of nanotechnology, bio- and genetic engineering in agriculture[4]
- be able to critically discuss the benefits and negative effects of agrotechnology[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursion

Entrance requirements

None

Reading list

Field and Solie: Introduction to Agricultural Engineering Technology: A Problem Solving Approach
Benkeblia (ed.): Sustainable Agriculture and New Biotechnologies
Mascia, Scheffran and Widholm (eds.): Plant Biotechnology for Sustainable Production of Energy and Co-products
Smit, Nasr and Ratta: Urban Agriculture – Food, Jobs and Sustainable Cities
Despommier: The Vertical Farm
Wütscher and Decker (eds.): Interdisciplinarity in Technology Assessment: Implementation and its Chances and Limits

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended March 2015

SAg_22 Horticulture and Agroforestry

Study semester:	**4** (full time) **3** (cooperative) **4** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	30 h
Lab course/Field course	30 h	Literature review	30 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. habil. Jens Gebauer

Instructors

Prof. Dr. habil. Jens Gebauer

Contents

Basics of horticulture plant physiology; nomenclature and systematics of horticultural plants; genera and the most important species of fruits; vegetables; ornamentals and tree nursery products; horticulture production systems and their comparison to agricultural production systems; post-harvest crop physiology; quality assessment of horticultural products; seed production; storage of orthodox and recalcitrant seeds; propagation techniques; temperate and tropical agroforestry systems; non-timer forest products; tree crop interactions; wood production and wood quality; homegardens as small scale agroforestry systems

Intended learning outcomes

On successful completion of this module, students should

- know the relevant horticultural products and their production systems[1]
- know different agroforestry production systems of different climatic zones[1]
- be able to evaluate the influence of environmental factors on horticultural cropping systems[4]
- be able to critically discuss options of agroforestry systems[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work and presentation; lab course with lab journal; field trip

Entrance requirements

None

Reading list

Jackson, Looney, Morley-Bunker and Thiele: Temperate and Subtropical Fruit Production
Mason: Nursery Management
Davies: Organic Vegetable Production: A Complete Guide
Dole and Wilkins: Floriculture: Principles and Species
Hartmann et al.: Plant Propagation: Principles and Practices
Kellimore: Handbook of Agroforestry
Eyzaguirre and Linares: Home Gardens and Agrobiodiversity
Akinnifesi: Indigenous Fruit Trees in the Tropics

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			

last amended August 2014

Sag_23.1 Sustainable Field Crop and Specialty Crop Production

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Jens Gebauer

Instructors

Dr. Barbara Darr

Contents

Focus on special field and horticultural crops such as asparagus, cabbage, Jerusalem artichoke, chicory, champignons, grapes, strawberries, rhubarb, blueberries, Christmas trees, heathers and their propagation; seed production; varieties; growing requirements; management harvest and product quality in respect to sustainable production

Intended learning outcomes

On successful completion of this module, students should

- know the special field and horticultural crops and their management[1]
- be able to relate their knowledge to other crops[1]
- be able to evaluate the cropping systems and determine their sustainability[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work and presentation; field trip

Entrance requirements

None

Reading list

Thompson: Asparagus Production
Toogood: Plant Propagation
George: Vegetable Seed Production

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			

last amended March 2015

SAg_23.2 Sustainable Animal Husbandry

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	25 h
		Literature review	15 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

N.N.

Instructors

Dr. Markus Haagen

Contents

Animal husbandry systems in different contexts and countries; interactions between animal husbandry and other parts of the production system; analysis of economic, ecological and social sustainability of animal production systems

Intended learning outcomes

On successful completion of this module, students should

- have an overview of different animal husbandry systems[1]
- understand interactions between animal husbandry and other agricultural chains[2]
- apply acquired understanding to animal husbandry systems in different settings[3]
- critically assess the use of sustainability indicators in animal production systems[4]
- design sustainable animal husbandry systems for different contexts[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; self-study; group work; case studies

Entrance requirements

Basics of animal sciences (SAg_11)

Reading list

Provided by lecturer

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_23.3 Phytomedicine

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lab course/Field course	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	h

Total workload: **90 h**

Coordinator

Prof. Dr. Jens Gebauer

Instructors

Prof. Dr. Jens Gebauer

Contents

Characterisation and identification of pests, diseases and weeds in the field and in the laboratory; description and evaluation of symptoms; infection of healthy plants and documentation of disease development under laboratory conditions; dissection of insects; collection and documentation of plant material showing symptoms cause by pests and diseases; scientific drawing

Intended learning outcomes

On successful completion of this module, students should

- be able to characterise and identify pests and diseases[3]
- be able to evaluate and document symptoms cause by pests and diseases[4]
- apply standard lab procedures for the investigation and documentation of pests and diseases[3]
- prepare and present an scientific herbarium[3,5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lab course; self-study; group work; field trip with herbarium

Entrance requirements

None

Reading list

Trigiano et al.: Plant Pathology: Concepts and Laboratory Exercises
Pedigo and Rice: Entomology and Pest Management
Geigy: Unkrauttafeln
Hodges: The Guild Handbook of Scientific Illustration

Examination

Graded exam: oral exam; herbarium

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_23.4 Traceability of Agricultural Products

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	25 h
		Literature review	20 h
		Preparation for exams	15 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

N.N.

Instructors

N.N.

Contents

Traceability concept; tracing geographical and production system of agricultural products; tracing methods (special emphasis on stable isotopes); current use of the methods; traceability and consumer protection

Intended learning outcomes

On successful completion of this module, students should

- know principles of traceability and stable isotope analysis[1]
- know tracing methods[1]
- understand the functioning, use and limitations of tracing methods[2]
- apply the methods to practical problems[3]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course; field trip; excursion

Entrance requirements

None

Reading list

Lees: Food Authenticity and Traceability

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended March 2015

SAg_23.5 Pasture, Grassland and Fodder Production

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	25 h
		Literature review	15 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Dr. Christian Fritz

Contents

Principles of grassland and fodder production; important grassland species; management of pastures and meadows; measuring productivity in grassland; practical project in grassland and fodder production

Intended learning outcomes

On successful completion of this module, students should

- know grassland and fodder production systems, yield estimates and quality indicators[1]
- recognize important grassland species[2]
- compare grassland developed under different management situations[3,4]
- develop management recommendations[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; lab course; field trip; excursion

Entrance requirements

None

Reading list

Hopkins: Grass, its Production and Utilization
Elgersma et al.: Fresh Herbage for Dairy Cattle

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended March 2015

SAg_23.6 Soil Ecology, Soil Biology and Soil Protection

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern; Dr. Conor Watson

Contents

Influence of environmental and human factors on soil biology and associated matter fluxes; determination of basic physical and chemical soil characteristics; estimation of soil fauna, microbial biomass and soil microbial activity; determination of carbon and nutrient fluxes; determination of resource use efficiency and potential nutrient release; means of soil protection; experimental design and statistical analysis

Intended learning outcomes

On successful completion of this module, students should

- know microbial indicators of soil ecology[1]
- know how soil biology is influenced by abiotic and biotic factors[1]
- be able to relate their knowledge about soil ecology to its relevance in sustainable agriculture[2]
- apply special analytical lab procedures of soil ecology in lab experiments[3]
- analyse and document results and findings in a scientifically appropriate form[4]
- analyse how their data fit to the data of others[4]
- be able to evaluate the influence of different soil treatments on soil biological properties and determine their contribution to sustainable soil use[5]
- be able to critically discuss options of sustainable soil use and soil health in an agricultural context[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lab course; field trip; lecture; self-study; presentation

Entrance requirements

None

Reading list

Killham: Soil Ecology
Various scientific publications for methods and comparison of results

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2013

SAg_23.7 Applied Sustainability in Agriculture

Study semester:	**4** (full time) **3** (cooperative) **6** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Field course/Excursion	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Jens Gebauer; Prof. Dr. Florian Wichern

Contents

Investigation of various practical examples of sustainable agriculture; factors influencing sustainable agriculture; aspects of non-sustainable development in agriculture; challenges of sustainable land use and agriculture

Intended learning outcomes

On successful completion of this module, students should

- know the determining factors for agricultural systems and factors influencing their sustainability[1]
- recognize challenges of sustainable development in agriculture[2]
- compare agricultural systems with respect to their sustainability using a sustainability assessment[3,4]
- develop management recommendations for farms to increase their sustainability[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; field trip; excursions; self-study; presentation

Entrance requirements

None

Reading list

Various case studies and scientific publications

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence		X	

last amended August 2014

SAg_23.8 Module from any Study Course at Rhine-Waal University of Applied Sciences

Study semester: **4** **Credit Points (ECTS):** **3**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Peter F. W. Simon

Instructors

All lecturers of the university

Contents

Depending on the chosen module to be elected from all study courses of Rhine-Waal University

Intended learning outcomes

On successful completion of this module, students should

- acquire knowledge from other areas of the university and deepen or enlarge their horizon[1]
- understand the importance of getting information beyond their specialisation[2]
- be able to implement alternative ways and approaches to problem solving[3]
- compare contents and learning outcomes of other study courses with their own achievements[4]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Depending on chosen module

Entrance requirements

Depending on chosen module

Reading list

Depending on chosen module

Examination

Graded exam

Teaching materials and media

Depending on chosen module

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended April 2013

SAg_23.9 Module from any Study Course at Rhine-Waal University of Applied Sciences

Study semester: **4** **Credit Points (ECTS):** **3**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Peter F. W. Simon

Instructors

All lecturers of the university

Contents

Depending on the chosen module to be elected from all study courses of Rhine-Waal University

Intended learning outcomes

On successful completion of this module, students should

- acquire knowledge from other areas of the university and deepen or enlarge their horizon[1]
- understand the importance of getting information beyond their specialisation[2]
- be able to implement alternative ways and approaches to problem solving[3]
- compare contents and learning outcomes of other study courses with their own achievements[4]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Depending on chosen module

Entrance requirements

Depending on chosen module

Reading list

Depending on chosen module

Examination

Graded exam

Teaching materials and media

Depending on chosen module

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended April 2013

SAg_24 Animal Welfare

Study semester:	**5** (full time) **6** (cooperative) **5** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Lab course/Field course	30 h	Literature review	30 h
		Preparation for exams	20 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

N.N.

Instructors

Prof. Dr. Steffi Wiedemann; Dr. Markus Haagen

Contents

Overview of legal regulations concerning animal welfare and animal rights; basics and methods of animal ethology; observation and evaluation of animal behaviour; criteria for evaluating livestock-friendliness; animal welfare in housing, handling and slaughtering

Intended learning outcomes

On successful completion of this module, students should

- know the covered legal regulations[1]
- know the main behavioural traits of the important farm animals[1]
- understand[2] and apply[3] methods of animal ethology and behaviour observation
- analyse the livestock-friendliness of livestock systems[4]
- be able to critically discuss the possibilities and shortcomings of animal welfare in sustainable agriculture[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursion; lab course; field trip

Entrance requirements

Basics of animal sciences (SAg_11); Animal health and breeding (SAg_20)

Reading list

Webster and Webster: Animal welfare
Jensen: The ethology of domestic animals: An introductory text
Grandin and Johnson: Animals in translation
Williams: The complete textbook of animal health and animal welfare
Vaarst, Roderick and Lund: Animal health and welfare in organic agriculture
Recent journal articles and publications distributed in the course

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended September 2015

SAg_25 Food Processing and Human Nutrition

Study semester:	**5** (full time) **6** (cooperative) **5** (part time)	**Credit Points (ECTS):**	**4**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	20 h
Lab course/Field course	30 h	Literature review	20 h
		Preparation for exams	20 h
Sum	60 h	Sum	60 h

Total workload: **120 h**

Coordinator

Prof. Dr. Florian Kugler

Instructors

Prof. Dr. Florian Kugler

Contents

Nature of foods; basics of human nutrition; technological influences on food availability; processing of selected products (e.g. milk, meat, cereals, vegetables, fruits, wine); nutrition values as influenced by technology; eating habits; nutritional advices; food politics; influences on food choices

Intended learning outcomes

On successful completion of this module, students should

- know and understand the nature of food and human nutrition[1,2]
- be able to evaluate the importance of food to human health[1,2]
- know the basics of different processing methods and their weak and strong points concerning food quality and human nutrition[1,2]
- apply the knowledge in developing solutions for case studies and questions in food technology[3]
- be able to analyse effects of selected processed foods on human nutrition[4]
- be able to critically discuss possibilities and shortcomings of a sustainable development in human nutrition under different economic and cultural conditions[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursion; case studies; lab course; field trip

Entrance requirements

None

Reading list

Moffat and Prowse: Human Diet and Nutrition in a Biocultural Perspective: Past meets Present
Campbell-Platt: Food Science and Technology

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			X

last amended April 2015

SAg_26 Sustainability Analysis of International Supply Chains

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Project	60 h	Preparation for contact time	30 h
		Literature review	30 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr. Dagmar Mithöfer

Instructors

Prof. Dr. Dagmar Mithöfer

Contents

Group work aiming at analysing the supply chain of a given agricultural good in respect of its sustainability; advanced project management; scientific working and writing; advanced aspects of sustainable agriculture and sustainable supply chains; methods of sustainability assessment (e.g. Response Inducing Sustainability Evaluation, life-cycle assessment, ecological rucksack, EMAS, cradle-to-cradle concept)

Intended learning outcomes

On successful completion of this module, students should

- know the relevant fields of action of sustainability in the investigated supply chain[1]
- be able to organise and manage a project and a team[2]
- apply the relevant methods of sustainability assessment[3]
- present and document results and findings in a scientific report/article[4]
- analyse how their findings relate to those of others[4]
- be able to evaluate methods of sustainability appraisal[5]
- be able to critically discuss their findings[5]
- be able to develop management recommendations[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Group work; self-study; feedback; presentation

Entrance requirements

None

Reading list

Various case studies and scientific publications; European and international standards

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence	X		

last amended August 2014

SAg_27 Resource Economics and Risk Assessment

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	45
Exercise	30 h	Literature review	20
		Preparation for exams	25
Sum	60 h	Sum	90

Total workload: **150**

Coordinator

Prof. Dr. Dagmar Mithöfer

Instructors

Prof. Dr. Dagmar Mithöfer

Contents

Ethics, environment and economics; property rights, externalities and environmental problems; dynamic efficiency; economics of renewable resources; economics of non-renewable resources; energy economics; sustainable development; irreversibility, decisions under risk and uncertainty; measuring risk; concepts in environmental risk assessment and risk management; cost benefit analysis under risk

Intended learning outcomes

On successful completion of this module, students should

- know the relevant concepts and principles of natural resource and environmental economics[1]
- be familiar with concepts of risk and uncertainty[1]
- be able to relate their knowledge of risk to management decisions in the agrifood sector and natural resource use[2]
- apply analytical tools to examine externalities and natural resource use [3]
- document results and findings in a scientifically appropriate form[4]
- analyse the relevant processes in a business[4]
- be able to design concepts for various business areas[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work and presentation; exercises, case studies

Entrance requirements

None

Reading list

Tietenberg and Lewis: Environmental & Natural Resources Economics
Perman, Ma, Common, Maddison and McGilvray: Natural Resource and Environmental Economics
Ricci: Environmental and Health Risk Assessment and Management: Principles and Practices
Hardaker, Huirne and Anderson: Coping with Risk in Agriculture

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	x		
Methodological competence	x		
Social competence			X

last amended April 2013

SAg_28 Sustainability Management and Food Safety

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**5**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	40 h
Exercise	30 h	Literature review	20 h
		Preparation for exams	30 h
Sum	60 h	Sum	90 h

Total workload: **150 h**

Coordinator

Prof. Dr.-Ing. Rudolf Schumachers

Instructors

Dr. Bernd Kimpfel

Contents

Historical development of integrated and sustainability management; national and international standards for integrated and sustainability management systems (e.g. EMAS, ISO 14000ff; EFQM, ISO 9000ff, Six Sigma; OHSAS 18001; ISO 26000); methods of system control and evaluation (e.g. PDCA); stakeholder concept; process of developing and continuously updating user-oriented sustainability management systems in agricultural contexts (e.g. GLOBALGAP, EC 834/2007, NOP); management systems and food safety (e.g. Codex Alimentarius, ISO 22000, HACCP); legal requirements in food safety; controlling food safety and regulatory agencies; auditing, labelling and control systems (e.g. organic food; ISO 19011); food safety risks, risk analysis and management (e.g. ISO 31000); occupational safety and health, hygiene

Intended learning outcomes

On successful completion of this module, students should

- know the components of integrated and sustainability management systems, standards and the legal framework[1]
- know the components and controls of food safety[1]
- understand relation between food safety, logistics and sustainability management[2]
- apply covered instruments in case studies for system control, evaluation and improvement[3]
- develop concepts and strategies for the implementation of sustainability management systems in agricultural companies[3]
- analyse food safety and product quality using the relevant standards and procedures[3, 4]
- analyse[4] and improve[5] sustainability management systems for sustainable agriculture
- evaluate and critically discuss concepts of food safety, product quality and sustainability management in the agricultural and agribusiness context[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work

Entrance requirements

None

Reading list

Various scientific publications, relevant standards, directives and legal frameworks

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2014

SAg_29.1 Herd Management and Health

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	25 h
		Literature review	15 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

N.N.

Instructors

Prof. Dr. Steffi Wiedemann; Dr. Markus Haagen

Contents

Procedures and logistics in small and large herds; documentation and evaluation of performance; performance indicators; controlling of feeding, housing, fertility and health; interactions between herd management and health/performance indicators

Intended learning outcomes

On successful completion of this module, students should

- understand procedures and logistics required to manage small and large herds[2]
- apply[3] performance indicators and instruments of herd controlling as a basis for decision making in case studies on herd management[4]
- evaluate interactions of herd management and health of individuals based on acquired knowledge[5]
- transfer insights to related situations and critically discuss methods and outcome for a sustainable development in agriculture[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; self-study; group work; case studies

Entrance requirements

Animal health and breeding (SAg_20)

Reading list

Brand et al.: Herd health and production management in dairy practice
Williams: The complete textbook of animal health and animal welfare
Further literature to be distributed in the course

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended September 2015

SAg_29.2 Advanced Agricultural Engineering and Energy Harvesting Systems

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	30 h
		Literature review	15 h
		Preparation for exams	15 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Matthias Kleinke

Instructors

Prof. Dr. Steffi Wiedemann

Contents

International high tech approaches in horti-/agriculture and food systems; high tech in crop production (e.g. precision farming; irrigation technology; robotics); high tech in animal husbandry (e.g. robotics); efficient and innovative greenhouse technology; biomass production for energetic and chemical use; advanced bio- and genetic engineering; nanotechnology in food and agriculture; information processing and decision making; information technology in enterprise and supply chain management

Intended learning outcomes

On successful completion of this module, students should

- know state of the art technology in agriculture and food supply chains[1]
- understand the differences in food and non-food biomass production[2]
- apply agrotechnological solutions to societal and agronomic problems[3]
- analyse interactions of crop and livestock system components in industrial and alternative agricultural systems[4]
- be able to critically discuss the benefits and negative effects of high tech and biomass for energy, especially on enterprise level[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; self-study; group work; excursion

Entrance requirements

None

Reading list

Kaltschmitt, Streicher and Wiese (eds.): Renewable Energy: Technology, Economics and Environment
Afgan and Carvalho (eds.): New and Renewable Technologies for Sustainable Development
Deublein and Steinhauser: Biogas from Waste and Renewable Resources

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_29.3 Livestock and Environment

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	25 h
		Literature review	15 h
		Preparation for exams	20h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

N.N.

Instructors

Prof. Dr. Steffi Wiedemann

Contents

Influences of livestock husbandry on the environment (e.g. production of greenhouse gases, sequestration of greenhouse gases in grassland, nutrient imbalances, landscape aspects); effects of environment on animal husbandry (e.g. housing, behaviour, breeds)

Intended learning outcomes

On successful completion of this module, students should

- understand the animal and husbandry system as part of the environment[2]
- critically compare publications about livestock and environment[4]
- evaluate interactions of livestock and environment based on acquired knowledge[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; self-study; group work

Entrance requirements

Basics of animal sciences: Anatomy, physiology and animal nutrition (SAg_11)

Reading list

Current journal articles provided in the course

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_29.4 Advanced environmental psychology and field methods of consulting

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

N.N.

Instructors

N.N.

Contents

Advanced understanding of psychological concepts relevant to sustainable development and natural resources management; practical application of research methods for sustainable rural development; practising and developing the role and scope of agriculture extension and conflict management; advanced frameworks, tools and skills for business consulting

Intended learning outcomes

On successful completion of this module, students should

- understand advanced psychological models relevant to sustainable development and natural resource management[1]
- comprehend contemporary challenges of sustainable development in rural areas[2]
- be able to design and conduct an empirical social research project in the field of sustainable development[3]
- be able to apply methods and concepts relevant to agriculture extension and business consulting[3]
- document results and findings of their research project in a scientifically appropriate form[4]
- analyse how their data fit to the data of others[4]
- be able to critically discuss sustainable development issues in the context of conflicts in natural resource management[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Seminar; business case study; field trip; excursion

Entrance requirements

International agricultural extension and business consulting (SAg_16); Sociological and psychological aspects of sustainable development (SAg_19)

Reading list

Koger and DuNann Winter: The Psychology of Environmental Problems: Psychology for Sustainability
Schmuck and Schultz: Psychology of Sustainable Development.
Leeuwis and van den Ban: Communication for Rural Innovation: Rethinking Agricultural Extension
Ison and Russell: Agricultural Extension and Rural Development: Breaking out of Knowledge Transfer Traditions
Friga and Rasiel: The McKinsey Mind: Understanding and Implementing the Problemsolving Tools and Management Techniques of the World's Top Strategic Consulting Firm

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence		X	

last amended April 2013

SAg_29.5 Organic Farming

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Florian Wichern

Contents

History, principles and concepts of organic farming in various countries; statistics and development of organic farming; sustainability of organic farming systems

Intended learning outcomes

On successful completion of this module, students should

- know the principles of organic farming in Europe, the United States and other relevant countries[1]
- understand the conceptual and practical differences between conventional and organic farming[2]
- critically discuss publications comparing conventional and organic farming[4]
- evaluate the sustainability of organic farming systems[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Lecture; seminar; self-study; field trip; excursion

Entrance requirements

Agroecology and sustainable development (SAg_01); Soil science and tillage (SAg_07); Crop physiology and nutrition (SAg_15); Horticulture and agroforestry (SAg_22)

Reading list

Schmidt and Kloeble: Reference figures for organic farming inspections
Lampkin: Organic farming
Lampkin, Measures and Padel: Organic farm management handbook
Parrott and Marsden: The real green revolution
Koepf: The biodynamic farm

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended August 2014

SAg_29.6 Methods in Agroecology

Study semester:	**5** (full time) **6** (cooperative) **7** (part time)	**Credit Points (ECTS):**	**3**

Workload

Contact time		Self-study	
Lecture	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr.-Ing. Sylvia Moenickes

Contents

Students choose a specific research question from a list of given subjects and conduct experiments in the lab or field: Agroecological methods are applied to answer the research question.

Intended learning outcomes

On successful completion of this module, students should

- know the relevant agroecological theories and concepts[1]
- be able to approach the chosen problem with different methodological approaches[2]
- apply the relevant agroecological methods in the lab or field[3]
- present and document their scientific results appropriately[4]
- analyse how their findings relate to those of others[4]
- be able to critically discuss their findings and methodology[5]
- be able to develop recommendations in relation to the chosen problem[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Seminar; lab course; self-study; field trip; excursion

Entrance requirements

Agroecology and sustainable development (SAg_01); Soil science and tillage (SAg_07); Analysis of international land use and cropping systems (SAg_12); Animal health & breeding (SAg_20); Horticulture and agroforestry (SAg_22)

Reading list

Altieri: Agroecology: The science of sustainable agriculture
Gliessman: Agroecology: The ecology of sustainable food systems
Gliessman: Field and laboratory investigations in agroecology
Various case studies and scientific publications

Examination

Graded exam

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			

last amended August 2015

SAg_29.7 Module from any Study Course at Rhine-Waal University of Applied Sciences

Study semester: **4** **Credit Points (ECTS):** **3**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Peter F. W. Simon

Instructors

All lecturers of the university

Contents

Depending on the chosen module to be elected from all study courses of Rhine-Waal University

Intended learning outcomes

On successful completion of this module, students should

- acquire knowledge from other areas of the university and deepen or enlarge their horizon[1]
- understand the importance of getting information beyond their specialisation[2]
- be able to implement alternative ways and approaches to problem solving[3]
- compare contents and learning outcomes of other study courses with their own achievements[4]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Depending on chosen module

Entrance requirements

Depending on chosen module

Reading list

Depending on chosen module

Examination

Graded exam

Teaching materials and media

Depending on chosen module

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended April 2013

SAg_29.8 Module from any Study Course at Rhine-Waal University of Applied Sciences

Study semester: **4** **Credit Points (ECTS):** **3**

Workload

Contact time		Self-study	
Lectures	30 h	Preparation for contact time	20 h
		Literature review	20 h
		Preparation for exams	20 h
Sum	30 h	Sum	60 h

Total workload: **90 h**

Coordinator

Prof. Dr. Peter F. W. Simon

Instructors

All lecturers of the university

Contents

Depending on the chosen module to be elected from all study courses of Rhine-Waal University

Intended learning outcomes

On successful completion of this module, students should

- acquire knowledge from other areas of the university and deepen or enlarge their horizon[1]
- understand the importance of getting information beyond their specialisation[2]
- be able to implement alternative ways and approaches to problem solving[3]
- compare contents and learning outcomes of other study courses with their own achievements[4]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Depending on chosen module

Entrance requirements

Depending on chosen module

Reading list

Depending on chosen module

Examination

Graded exam

Teaching materials and media

Depending on chosen module

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence			X

last amended April 2013

SAg_30 Internship or Study Abroad

Study semester:	**6** (full time) **5** (cooperative) **1-7** (part time)	**Credit Points (ECTS):**	**30**

Workload

Contact time	Self-study
Sum	Sum 900 h

Total workload: **900 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Depends on selected activity

Contents

Internship: Intention of the work placement is for the students to work in one or more functional divisions/branches of a company in order to implement knowledge and methods from their studies. The students are requested to consider the coherencies of economic, ecological, ethical and security aspects. The work placement can also be pursued abroad.

Study abroad: Instead of the work placement the students have the option to study a semester at a university abroad in order to deepen their theoretical and practical knowledge. The students attend selected classes and pass the relevant exams.

Intended learning outcomes

Internship: The learning outcomes result from the selected activity and the business environment of companies, organisations and institutions. It is necessary that these partners and the university agree on contents and outcomes in order to allow for an appropriate coordination of the study.

Study abroad: Instead of the work placement the students have the option to study a semester at a university abroad in order to deepen their theoretical and practical knowledge. The students attend selected classes and pass the relevant exams. On completion of their study abroad, students should be able to discuss relevant issues in a cross cultural and academic surrounding. Upon agreement of study abroad student and supervisor fix the intended outcomes. Upon return from study abroad the supervisor will check the written report based on the following criteria: expectations vs. the achievements actually made, validity of experiences for the studies, active learning, structuring of experiences achieved, effective competence to solve problems in an unfamiliar surrounding.

Teaching and learning methods

Depends on selected activity

Entrance requirements

Minimum of 90 ECTS

Reading list

Depends on selected activity

Examination

Internship: written report

Study abroad: successful completion of 15 ECTS, written report, presentation

Teaching materials and media

Depends on selected activity

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence		X	
Methodological competence		X	
Social competence	X		

last amended September 2015

SAg_31 Project with Excursion

Study semester:	**7** (full time) **7** (cooperative) **8** (part time)	**Credit Points (ECTS):**	**8**

Workload

Contact time		Self-study	
Seminar/Project	20 h	Preparation for excursion	60 h
Field course/Excursion	100 h	Literature review	60 h
Sum	120 h	Sum	120 h

Total workload: **240 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

Prof. Dr. Jens Gebauer; Prof. Dr. Florian Wichern

Contents

Investigation of various practical examples of sustainable agriculture; factors influencing sustainable agriculture; aspects of non-sustainable development in agriculture; challenges of sustainable land use and agriculture

Intended learning outcomes

On successful completion of this module, students should

- know the determining factors for agricultural systems and factors influencing their sustainability[1]
- recognize challenges of sustainable development in agriculture[2]
- compare agricultural systems with respect to their sustainability using a systematic sustainability assessment[3-4]
- be able to present their results in a scientific appropriate format[4]
- develop management recommendations for farms to increase their sustainability[5]
- critically discuss assets and shortcomings of approaches for sustainable development in agriculture[5]

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Field trip; excursion; self-study; presentation

Entrance requirements

None

Reading list

Various case studies and scientific publications

Examination

Certificate

Teaching materials and media

Projector; white/black board; hand-outs; lab equipment; flipchart; visualisation aids for presentation; demonstration material; A/V media

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence		X	
Social competence		X	

last amended August 2014

SAg_32 Bachelor Thesis

Study semester:	**7** (full time) **7** (cooperative) **8** (part time)	**Credit Points (ECTS):**	**12**

Workload

Contact time	Self-study
Sum	Sum 360 h

Total workload: **360 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

All lecturers of the faculty

Contents

The contents of the bachelor thesis are specific and have to be coordinated with the chosen/elected instructor/lecturer. The assigned task will be adequately described and documented as well as the chosen approach, methodology and results.

Intended learning outcomes

On successful completion of this module, students should

- demonstrate that they are able to complete a praxis-oriented task from their field of study without help and within an allotted period of time
- implement technical knowledge in a scientifically appropriate way
- structure the necessary processes and tasks necessary for solving the conceptual formulation, control their progress and adjust if necessary
- be able to document their starting point, the chosen approach and their findings in such a way that they fulfill the requirements of a scientific publication

[1]Knowledge; [2]Comprehension; [3]Application; [4]Analysis; [5]Synthesis and judgement

Teaching and learning methods

Entrance requirements

Minimum of 175 ECTS

Reading list

Depending on chosen subject/task

Examination

Written thesis of approx. 40–100 pages only

Teaching materials and media

specific

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			X

last amended August 2013

SAg_33 Colloquium

Study semester:	**7** (full time) **7** (cooperative) **9** (part time)	**Credit Points (ECTS):**	**8**

Workload

Contact time	Self-study
Sum	Sum 240 h

Total workload: **240 h**

Coordinator

Prof. Dr. Florian Wichern

Instructors

All lecturers of the faculty

Contents

The content of the colloquium is based on the bachelor thesis.

Intended learning outcomes

The students present the results of their bachelor thesis during the colloquium. They put their research and findings in a context with the practical approach and present their findings in a scientific and structured way. The students justify their chosen approach autonomously by taking into consideration how far their results were influenced by assumptions/presuppositions and simplifications. They are able to analyze questions regarding their thesis and their findings and to answer these within the frame of the technical and non-technical context.

Teaching and learning methods

Entrance requirements

Minimum of 202 ECTS

Reading list

Examination

oral exam only

Teaching materials and media

specific

Areas of competence

Area of competence	Core area	Partly relevant	Of minor relevance
Professional competence	X		
Methodological competence	X		
Social competence			X

last amended August 2013