HOCHSCHULE RHEIN-WAAL
Rhine-Waal University of Applied Sciences

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

draft for reaccreditation 2019

# 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 agribusiness company or an agricultural or horticultural enterprise is recommended |
| **Internship/ study abroad:** | in the 6th semester |
| **Bachelor thesis:** | in the second half of the 7th semester (full time) in the 9th semester (part time) |
| **Calculation of workload**: | 1 CP equals 30 hours per semester |
| **Examinations**: | all examination types as detailed in §14, 17–20 General Examination Regulations for Bachelor Degree Programmes |
| **Literature**: | Literature mentioned in the module descriptions are first recommendations and do not replace the syllabus of the module. |

This study programme is an

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| Module No./ Modul-Nr. | Subjects / Module | Module Requirements Modulvoraus-setzungen | CH/ SWS | Type | | | | | Ex/Prü | | CP* | CH / SWS | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L/V | S | E/Ü | LC/Pr | Pro | graded/ benotet | attestation/Testat | | WT / WS 1 | ST / SS 2 | WT / WS 3 | ST / SS 4 | WT / WS 5 | SS / ST 6 | WS / WT 7 | |
| SAg_01 | Basics of Biology and Agroecology I<br>Grundlagen der Biologie und Agroökologie I | | 4 | 3 | | | 1 | | P | | 5 | 4 | | | | | | | |
| SAg_02 | Sustainable Learning - Learning Sustainability<br>Nachhaltiges Lernen - Nachhaltigkeit lernen | | 4 | 1 | 2 | 1 | | | P | T | 5 | 4 | | | | | | | * |
| SAg_03 | Agricultural Engineering I and Energy Use in Agriculture<br>Agrartechnik I und Energienutzung in der Landwirtschaft | | 4 | 2 | | 2 | | | P | | 5 | 4 | | | | | | | |
| SAg_04 | Principles of Economics<br>Grundlagen der Ökonomie | | 4 | 1 | 1 | 2 | | | P | | 5 | 4 | | | | | | | |
| SAg_05 | Analysis and Interpretation of Data I<br>Analyse und Interpretation von Daten I | | 4 | 2 | | 2 | | | P | | 5 | 4 | | | | | | | |
| SAg_06 | Agricultural Chemistry<br>Agrikulturchemie | | 4 | 2 | | | 2 | | P | T | 5 | 4 | | | | | | | * |
| SAg_07 | Soil Science and Tillage<br>Bodenkunde und Bodenbearbeitung | | 6 | 3 | | 1 | 2 | | P | T | 5 | 2 | 4 | | | | | | * |
| SAg_08 | Organic and Biochemistry, Biotechnology<br>Organische und Biochemie, Biotechnologie | | 4 | 2 | | | 2 | | P | T | 5 | | 4 | | | | | | * |
| SAg_09 | Biology and Biodiversity<br>Biologie und Biodiversität | | 4 | 2 | | | 2 | | P | T | 5 | | 4 | | | | | | * |
| SAg_10 | Agricultural Engineering II and Agrotechnology<br>Agrartechnik II und Agrartechnologie | SAg_03 | 4 | 2 | | 2 | | | P | | 5 | | 4 | | | | | | |
| SAg_11 | Agricultural Economics and Farm Management<br>Agrarökonomie und Farmmanagement | | 4 | 1 | 1 | 2 | | | P | | 5 | | 4 | | | | | | |
| SAg_12 | Basics of Animal Sciences<br>Grundlagen der Nutztierwissenschaften | | 4 | 3 | | | 1 | | P | T | 5 | | 4 | | | | | | * |
| SAg_13 | International Markets, Trade and Agricultural Policy<br>Internationale Märkte, Handel und Agrarpolitik | | 4 | 1 | 3 | | | | P | T | 5 | | | 4 | | | | | * |
| SAg_14 | Climate Change and Water Management<br>Klimawandel und Wassermanagement | | 4 | 4 | | | | | P | | 5 | | | 4 | | | | | |
| SAg_15 | Crop Physiology and Nutrition<br>Pflanzenphysiologie und -ernährung | SAg_01<br>SAg_06 | 5 | 3 | | | 2 | | P | T | 5 | | | 5 | | | | | * |
| SAg_16 | Crop Health I<br>Pflanzengesundheit I | | 4 | 4 | | | | | P | | 5 | | | 4 | | | | | |
| SAg_17 | Analysis and Interpretation of Data II<br>Analyse und Interpretation von Daten II | | 4 | 2 | | 2 | | | P | | 5 | | | 4 | | | | | |
| SAg_18 | Animal Husbandry and Health<br>Haltung, Zucht und Gesundheit von Tieren | SAg_12 | 4 | 2 | | | 2 | | P | T | 5 | | | 4 | | | | | * |
| SAg_19 | Agroecology II and Agronomy<br>Agrarökologie II und Agronomie | SAg_09<br>SAg_15 | 4 | 2 | 1 | 1 | | | P | | 5 | | | | 4 | | | | |
| SAg_20 | Rural Development and Sustainable Behaviour<br>Ländliche Entwicklung und nachhaltiges Verhalten | | 4 | 1 | 2 | 1 | | | P | T | 5 | | | | 4 | | | | * |
| SAg_21 | Horticulture and Agroforestry<br>Gartenbau und Agroforst | | 5 | 3 | | | 2 | | P | T | 5 | | | | 5 | | | | * |
| SAg_22 | Project<br>Projekt | | 4 | | | | | 4 | | T | 5 | | | | 4 | | | | |
| SAg_23 | Elective modules 1<br>Wahlpflichtkatalog 1 | | 8 | 4 | 4 | | | | P | | 10 | | | | 8 | | | | |
| SAg_24 | Ethics in Life Sciences<br>Ethik in den Lebenswissenschaften | | 3 | 1 | 2 | | | | P | | 5 | | | | | 3 | | | |
| SAg_25 | Sustainability and Agri-food Chains<br>Nachhaltigkeit und Agri-food Wertschöpfungsketten | | 4 | 1 | | 1 | | 2 | P | | 5 | | | | | 4 | | | |
| SAg_26 | Natural Resources and Environmental Economics<br>Ressourcen- und Umweltökonomie | SAg_04 | 4 | 1 | 1 | 2 | | | P | | 5 | | | | | 4 | | | |
| SAg_27 | Animal Welfare<br>Tiergerechtheit | SAg_12<br>SAg_18 | 4 | 2 | | 2 | | | P | | 5 | | | | | 4 | | | |
| SAg_28 | Elective modules 2<br>Wahlpflichtkatalog 2 | | 8 | 4 | 4 | | | | P | | 10 | | | | | 8 | | | |
| SAg_29 | Internship or Study Abroad<br>Praxissemester oder Auslandsstudiensemester | min. 90 ECTS** | | | | | | | | T | 30 | | | | | | X | | |
| SAg_30 | Academic Methods and Principles<br>Wissenschaftliches Arbeiten | | 4 | | 2 | 2 | | | | T | 5 | | | | | | | 4 | |
| SAg_31 | Elective Modules 3<br>Wahlpflichtkatalog 3 | | 8 | | 4 | | | 4 | | T | 10 | | | | | | | 8 | |
| SAg_32 | Bachelor Thesis<br>Bachelorarbeit | min. 180 ECTS | | | | | | | P | | 12 | | | | | | | X | |
| SAg_33 | Colloquium<br>Kolloquium | 207 ECTS | | | | | | | P | | 3 | | | | | | | X | |
| | **total credit hours // Semesterwochenstunden** | | **135** | **59** | **27** | **23** | **16** | **10** | | | | **26** | **24** | **25** | **25** | **23** | | **12** | |
| | | | | | | | | | | | | **30** | **30** | **30** | **30** | **30** | **30** | **30** | |
| | | | | | | | | | | | **Credit Points** | | | **150** | | | **60** | | |
| | | | | | | | | | | | | | | | **210** | | | | |

| | | total | 1.Sem | 2.Sem | 3.Sem | 4.Sem | 5.Sem | 6.Sem | 7.Sem |
|---|---|---|---|---|---|---|---|---|---|
| CH | | 135 | 26 | 24 | 25 | 25 | 23 | 0 | 12 |
| CP | | 210 | 30 | 30 | 30 | 30 | 30 | 30 | 30 |

**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

*ECTS will only be credited after completing all parts of the module.
ECTS werden erst nach vollständigem Ableisten aller Modulteile gutgeschrieben.
** In addition to the General Examination Regulations for Bachelor 's Degree Programmes regarding the admission to the internship or study abroad the student has to show the successful completion of all modules/module examinations of the first study year of the study programme.
Ergänzend zu den Voraussetzungen der Rahmenprüfungsordnung zur Zulassung zum Praxis- oder Auslandsstudiensemester hat der/die Studierende das erfolgreiche Ableisten sämtlicher Module/Modulprüfungen des 1. Studienjahres des Studiengangs nachzuweisen.

| | **Elective modules 1**<br>**Wahlpflichtkatalog 1** | | **SWS** | **Ex** | **CP** | |
|---|---|---|---|---|---|---|
| SAg_23.1 | Focus Field Animal Sciences and Aquaponics 1<br>Schwerpunkt Tierwissenschaften und Aquaponik 1 | | 4 | P | 5 | |
| SAg_23.2 | Focus Field Plant and Soil Sciences 1<br>Schwerpunkt Pflanzen- und Bodenwissenschaften 1 | | 4 | P | 5 | |
| SAg_23.3 | Focus Field Analysis of Sustainability and Food Sciences 1<br>Schwerpunkt Nachhaltigkeitsanalyse und | | 4 | P | 5 | |
| SAg_23.4 | Focus Field Economics and Social Sciences 1<br>Schwerpunkt Wirtschafts- und Sozialwissenschaften 1 | | 4 | P | 5 | |
| SAg_23.5 | Module from any Bachelor Study Course of the Faculty of Life Sciences at Rhine-Waal University of Applied Sciences<br>Wahlmöglichkeit Angebot Fakultät Life Sciences Bachelorstudiengänge | | 4 | P | 5 | *** |
| | **2 elective modules amount to** | | **8** | | **10** | |

| | **Elective modules 2**<br>**Wahlpflichtkatalog 2** | | **SWS** | **Ex** | **CP** | |
|---|---|---|---|---|---|---|
| SAg_28.1 | Focus Field Animal Sciences and Aquaponics 2<br>Schwerpunkt Tierwissenschaften und Aquaponik 2 | | 4 | P | 5 | |
| SAg_28.2 | Focus Field Plant and Soil Sciences 2<br>Schwerpunkt Pflanzen- und Bodenwissenschaften 2 | | 4 | P | 5 | |
| SAg_28.3 | Focus Field Analysis of Sustainability and Food Sciences 2<br>Schwerpunkt Nachhaltigkeitsanalyse und Lebensmittelwissenschaften 2 | | 4 | P | 5 | |
| SAg_28.4 | Focus Field Economics and Social Sciences 2<br>Schwerpunkt Wirtschafts- und Sozialwissenschaften 2 | | 4 | P | 5 | |
| SAg_28.5 | Module from any Bachelor Study Course of the Faculty of Life Sciences at Rhine-Waal University of Applied Sciences<br>Wahlmöglichkeit Angebot Fakultät Life Sciences Bachelorstudiengänge | | 4 | P | 5 | *** |
| | **2 elective modules amount to** | | **8** | | **10** | |

| | **Elective modules 3**<br>**Wahlpflichtkatalog 3** | | **SWS** | **Ex** | **CP** | |
|---|---|---|---|---|---|---|
| SAg_31.1 | Project reg. Academic Principles and Methods in preparation of Bachelor Thesis<br>Projekt zum Wissenschaftlichen Arbeit in der Vorbereitung der Bachelorarbeit | | 8 | T | 10 | |
| SAg_31.2 | Language Course<br>Sprachkurs | | 4 | T | 5 | *** |
| SAg_31.3 | Module from catalogue 1 and 2 of study programme<br>Wahlmöglichkeit aus Wahlpflichtkatalog 1 und 2 des Studiengangs | | 4 | P | 5 | |
| SAg_31.4 | Module from any Bachelor Study Course at Rhine-Waal University of Applied Sciences<br>Wahlmöglichkeit Angebot HRW Bachelorstudiengänge | | 4 | P | 5 | *** |
| | **1-2 elective modules amount to** | | 8 | | 10 | |

The faculty reserves the right to determine a minimum number of participants for offering an elective subject. Admission to mandatory modules is subject to available capacities. The possibility to obtain the required number of credit points remains unaffected. / Die Fakultät behält sich das Recht vor, eine Mindestteilnehmerzahl für das Zustandekommen eines Wahlpflichtkurses festzulegen. Die Zulassung zu Pflichtmodulen erfolgt vorbehaltlich freier Kapazitäten. Die Möglichkeit des Erreichens der vorgeschriebenen

In case of new developments in the different fields of Sustainable Agriculture the faculty reserves the right to expand the range of elective modules by further study courses over the time. / Die Fakultät behält sich vor, das Wahlpflichtangebot im Laufe der Zeit bei neuen Entwicklungen in verschiedenen Feldern der nachhaltigen Landwirtschaft durch weitere Fächer zu erweitern.

*** The actual selection from any study programme of the Rhine-Waal University has to be approved by the Examination Committee of the Faculty of Life Sciences. / Die konkrete Auswahl aus dem Studienangebot bedarf der Zustimmung des Prüfungsausschussvorsitzenden. /

| Module No./ Modul-Nr. | Subjects / Module | Module Requirements Modulvoraus-setzungen | CH/ SWS | Type | | | | | Ex/Prü | | CP* | Part Time Study // Berufsbegleitendes Studium CH / SWS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | L/V | S | E/Ü | LC/Pr | Pro | graded/ benotet | attestation/Testat | | WT / WS 1 | ST / SS 2 | WT / WS 3 | ST / SS 4 | WT / WS 5 | SS / ST 6 | WS / WT 7 | WS / WT 8 | WS / WT 9 | |
| SAg_01 | Basics of Biology and Agroecology I<br>Grundlagen der Biologie und Agroökologie I | | 4 | 3 | | | 1 | | P | | 5 | 4 | | | | | | | | | |
| SAg_02 | Sustainable Learning - Learning Sustainability<br>Nachhaltiges Lernen - Nachhaltigkeit lernen | | 4 | 1 | 2 | 1 | | | P | T | 5 | 4 | | | | | | | | | * |
| SAg_03 | Agricultural Engineering I and Energy Use in Agriculture<br>Agrartechnik I und Energienutzung in der Landwirtschaft | | 4 | 2 | | 2 | | | P | | 5 | | | 4 | | | | | | | |
| SAg_04 | Principles of Economics<br>Grundlagen der Ökonomie | | 4 | 1 | 1 | 2 | | | P | | 5 | | | 4 | | | | | | | |
| SAg_05 | Analysis and Interpretation of Data I<br>Analyse und Interpretation von Daten I | | 4 | 2 | | 2 | | | P | | 5 | 4 | | | | | | | | | |
| SAg_06 | Agricultural Chemistry<br>Agrikulturchemie | | 4 | 2 | | | 2 | | P | T | 5 | 4 | | | | | | | | | * |
| SAg_07 | Soil Science and Tillage<br>Bodenkunde und Bodenbearbeitung | | 6 | 3 | | 1 | 2 | | P | T | 5 | 2 | 4 | | | | | | | | * |
| SAg_08 | Organic and Biochemistry, Biotechnology<br>Organische und Biochemie, Biotechnologie | | 4 | 2 | | | 2 | | P | T | 5 | | 4 | | | | | | | | * |
| SAg_09 | Biology and Biodiversity<br>Biologie und Biodiversität | | 4 | 2 | | | 2 | | P | T | 5 | | 4 | | | | | | | | * |
| SAg_10 | Agricultural Engineering II and Agrotechnology<br>Agrartechnik II und Agrartechnologie | SAg_03 | 4 | 2 | | 2 | | | P | | 5 | | | | 4 | | | | | | |
| SAg_11 | Agricultural Economics and Farm Management<br>Agrarökonomie und Farmmanagement | | 4 | 1 | 1 | 2 | | | P | | 5 | | | | 4 | | | | | | |
| SAg_12 | Basics of Animal Sciences<br>Grundlagen der Nutztierwissenschaften | | 4 | 3 | | | 1 | | P | T | 5 | | 4 | | | | | | | | * |
| SAg_13 | International Markets, Trade and Agricultural Policy<br>Internationale Märkte, Handel und Agrarpolitik | | 4 | 1 | 3 | | | | P | T | 5 | | | | | 4 | | | | | * |
| SAg_14 | Climate Change and Water Management<br>Klimawandel und Wassermanagement | | 4 | 4 | | | | | P | | 5 | | | | | 4 | | | | | |
| SAg_15 | Crop Physiology and Nutrition<br>Pflanzenphysiologie und -ernährung | SAg_01<br>SAg_06 | 5 | 3 | | | 2 | | P | T | 5 | | | 5 | | | | | | | * |
| SAg_16 | Crop Health I<br>Pflanzengesundheit I | | 4 | 4 | | | | | P | | 5 | | | | | 4 | | | | | |
| SAg_17 | Analysis and Interpretation of Data II<br>Analyse und Interpretation von Daten II | | 4 | 2 | | 2 | | | P | | 5 | | | 4 | | | | | | | |
| SAg_18 | Animal Husbandry and Health<br>Haltung, Zucht und Gesundheit von Tieren | SAg_12 | 4 | 2 | | | 2 | | P | T | 5 | | | | | | | 4 | | | * |
| SAg_19 | Agroecology II and Agronomy<br>Agrarökologie II und Agronomie | SAg_09<br>SAg_15 | 4 | 2 | 1 | 1 | | | P | | 5 | | | | | | 4 | | | | |
| SAg_20 | Rural Development and Sustainable Behaviour<br>Ländliche Entwicklung und nachhaltiges Verhalten | | 4 | 1 | 2 | 1 | | | P | T | 5 | | | | 4 | | | | | | * |
| SAg_21 | Horticulture and Agroforestry<br>Gartenbau und Agroforst | | 5 | 3 | | | 2 | | P | T | 5 | | | | | | 5 | | | | * |
| SAg_22 | Project<br>Projekt | | 4 | | | | | 4 | | T | 5 | | | | 4 | | | | | | |
| SAg_23 | Elective modules 1<br>Wahlpflichtkatalog 1 | | 8 | 4 | 4 | | | | P | | 10 | | | | | | 8 | | | | |
| SAg_24 | Ethics in Life Sciences<br>Ethik in den Lebenswissenschaften | | 3 | 1 | 2 | | | | P | | 5 | | | | | | | 3 | | | |
| SAg_25 | Sustainability and Agri-food Chains<br>Nachhaltigkeit und Agri-food Wertschöpfungsketten | | 4 | 1 | | 1 | | 2 | P | | 5 | | | | | | | | | 4 | |
| SAg_26 | Natural Resources and Environmental Economics<br>Ressourcen- und Umweltökonomie | SAg_04 | 4 | 1 | 1 | 2 | | | P | | 5 | | | | | | | 4 | | | |
| SAg_27 | Animal Welfare<br>Tiergerechtheit | SAg_12<br>SAg_18 | 4 | 2 | | 2 | | | P | | 5 | | | | | | | 4 | | | |
| SAg_28 | Elective modules 2<br>Wahlpflichtkatalog 2 | | 8 | 4 | 4 | | | | P | | 10 | | | | | 4 | | 4 | | | |
| SAg_29 | Internship or Study Abroad<br>Praxissemester oder Auslandsstudiensemester | min. 90 ECTS** | | | | | | | | T | 30 | | | | X | | | | | | |
| SAg_30 | Academic Methods and Principles<br>Wissenschaftliches Arbeiten | | 4 | | 2 | 2 | | | | T | 5 | | | | | | | | | | 4 |
| SAg_31 | Elective Modules 3<br>Wahlpflichtkatalog 3 | | 8 | | 4 | | | 4 | | T | 10 | | | | | | | | | | 8 |
| SAg_32 | Bachelor Thesis<br>Bachelorarbeit | min. 180 ECTS | | | | | | | P | | 12 | | | | | | | | X | | |
| SAg_33 | Colloquium<br>Kolloquium | 207 ECTS | | | | | | | P | | 3 | | | | | | | | | | X |
| | **total credit hours // Semesterwochenstunden** | | **135** | **59** | **27** | **23** | **16** | **10** | | | **210** | **18** | **16** | **17** | **16** | **16** | **17** | **19** | **0** | **16** | |
| | | | | | | | | | | | **Credit Points** | **20** | **20** | **20** | **20** | **20** | **20** | **25** | **42** | **23** | |
| | | | | | | | | | | | | **145** | | | | | | | **65** | | |
| | | | | | | | | | | | | **210** | | | | | | | | | |

| total | | 1.Sem | 2.Sem | 3.Sem | 4.Sem | 5.Sem | 6.Sem | 7.Sem | 8. Sem | 9. Sem |
|---|---|---|---|---|---|---|---|---|---|---|
| CH | 135 | 18 | 16 | 17 | 16 | 16 | 17 | 19 | 0 | 16 |
| CP | 210 | 20 | 20 | 20 | 20 | 20 | 20 | 25 | 42 | 23 |

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

*ECTS will only be credited after completing all parts of the module.
ECTS werden erst nach vollständigem Ableisten aller Modulteile gutgeschrieben.
** In addition to the General Examination Regulations for Bachelor 's Degree Programmes regarding the admission to the internship or study abroad the student has to show the successful completion of all modules/module examinations of the first study year of the study programme.
Ergänzend zu den Voraussetzungen der Rahmenprüfungsordnung zur Zulassung zum Praxis- oder Auslandsstudiensemester hat der/die Studierende das erfolgreiche Ableisten sämtlicher Module/Modulprüfungen des 1. Studienjahres des Studiengangs nachzuweisen.

The elective modules hold true as in the fulltime version.

# SAg_01 Basics of Biology and Agroecology I

| | | | |
|---|---|---|---|
| **Study Semester:** | **1** (full time)<br>**1** (part time)<br>**1** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lectures | 45 h | Preparation for contact time | 30 h |
| Lab course/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; NN; Dipl.-Ing. agr. Julia Gorris

## Contents

Basics, terms and concepts of cell biology (plant and animal cells and their components); fundamental genetics for breeding (molecular basis, inheritance, mutations, polyploidy); basics of zoology; 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; basics of biological and agroecological experimentation and data documentation; introduction to scientific working

## Intended learning outcomes

On successful completion of this module, students should

- know the relevant definitions, principles and concepts of cell biology, genetics and zoology[1]
- 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]
- be able to relate their knowledge in biology and ecology to its relevance in sustainable agriculture[2]
- partly apply methods of biology and agroecology[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]

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

## Teaching and learning methods

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

## Entrance requirements

*Mandatory*: None

*Recommended*:

## Reading list

McGraw Hill: Biology
Alberts: Essential Cell Biology
Campbell and Reece: Biology
Reece, Urry, Cain, Wasserman, Minorsky, Jackson and Campbell: Biology
Gliessman: Agroecology
Odum, Brewer and Barrett: Fundamentals of Ecology
Callenbach: Ecology: A Pocket Guide
Various case studies and scientific publications

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

written exam; presentation

## Teaching materials and media

Projector; white/black board; hand-outs; flipchart; 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: November 2018

# SAg_02 Sustainable Learning – Learning Sustainability

| | | | |
|---|---|---|---|
| **Study Semester:** | **1** (full time)<br>**1** (part time)<br>**1** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 30 h |
| Seminar | 30 h | Preparation for exams | 60 h |
| Excursion/Exercise | 15 h | | |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Florian Wichern

## Instructors

Prof. Dr. Dietrich Darr; Prof. Dr. Florian Wichern; M.Sc. Rüdiger Schmidt

## Contents

**Self Management and Learning**: people and team skills; time management; presentation skills; giving and receiving feedback; academic reading and academic writing

**Sustainability**: Definitions, concepts and dimensions of sustainability and sustainable development; stakeholders and driving forces; introduction to methods of sustainability assessment (e.g. footprints, LCA); introduction to sustainability management, auditing, labelling and control systems (e.g. EMAS, ISO, Codex Alimentarius); multi-, inter- and transdisciplinarity; basics of land use and supply chain systems; sustainable agroecosystems

## 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

*Mandatory*: None

*Recommended*:

## Reading list

Smale and Fowlie: How to Succeed at University
Pears and Shields: Cite them right
Gliessman: Agroecology
Morse: Sustainability: A Biological Perspective
McIntyre et al. (eds.): International Assessment of Agricultural Knowledge, Science and Technology for Development (IAASTD): Global Report

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes: certificate for "Self Management and Learning"

for "Sustainability": written exam; assignments

## 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: February 2019

# SAg_03 Agricultural Engineering I and Energy Use in Agriculture

| | | | |
|---|---|---|---|
| **Study Semester:** | **1** (full time)<br>**3** (part time)<br>**1** (cooperative) | **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, fundamentals of agricultural machines and buildings; properties of machinery used in the production chain, e.g. engines, tractors, tillage equipment, plant protection and fertilization, cereals, sugarbeet, potato, cattle and pic breeding, fundamentals of energy conversion technologies; renewable energy in agriculture, thermal and electrical energy systems; the use and production of energy in agriculture;

## Intended learning outcomes

On successful completion of this module, students should

- know the fundamentals of physics[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

*Mandatory*: None

*Recommended*: 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_04 Principles of Economics

| | | | |
|---|---|---|---|
| **study semester:** | **1** (full time)<br>**1** (part time)<br>**1** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 30 h |
| Seminar | 15 h | Literature review | 30 h |
| Exercise | 30 h | Preparation for exams | 30 h |
| Sum | 60 h | Sum | 90 h |

**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; firm behaviour; competition; public sector; economic growth; economic fluctuations; public policy

## Intended learning outcomes

On successful completion of this module, students should

- know principles of micro- and macroeconomics[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; exercises; group work and presentation

## Entrance requirements

*Mandatory*: None

*Recommended*: None

## Reading list

Mankiw, Taylor: Economics

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: February 2019

# SAg_05 Analysis and Interpretation of Data I

| | | | |
|---|---|---|---|
| **Study Semester:** | **1** (full time)<br>**1** (part time)<br>**1** (cooperative) | **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. PD Dr.-Ing. Sylvia Moenickes

## Instructors

N.N.

## Contents

**Mathematics 1**: Calculus 1: review of prominent functions, differentiation and integration and their application; introduction to differential equations

**Statistics 1**: descriptive statistics and data visualization; basics of probability theory; basic distributions (binomial, hypergeometric, Poisson, normal, exponential)

## Intended learning outcomes

On successful completion of this module, students should

- know basic mathematical concepts and procedures, and their application[1,2,3]
- develop an exact way of thinking, working and wording as well as a feeling for numbers and the well-considered use of the calculator[2,3]
- be able to find and verify independent solutions[3,4,5]
- be able to interpret mathematical formulas[4,5]

[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

*Mandatory*: None

*Recommended*:

## 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_06 Agricultural Chemistry

| | | | |
|---|---|---|---|
| **Study Semester:** | **1** (full time)<br>**1** (part time)<br>**1** (cooperative) | **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. Conor Watson; Dr. Stefan Weber

## Contents

**Lecture:**
Terms, definitions, principles and concepts of general chemistry; models of the atom; chemical bonding; chemical equilibrium; acids and bases; oxidation / reduction; processes affecting soil nutrients, loss of nutrients from agricultural soils

**Lab course:**
Practical experiments illustrating theories taught in lectures; fundamental lab skills including measuring and transferring solutions, titration, report writing, constructing standard graphs and using them to calculate nutrient concentrations

## 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 in 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

*Mandatory*: None

*Recommended*:

## Reading list

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

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## 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: November 2018

# SAg_07 Soil Science and Tillage

| | | | |
|---|---|---|---|
| **Study Semester:** | **1&2** (full time)<br>**1&2** (part time)<br>**1&2** (cooperative) | **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

**Lecture:**
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

**Lab course:**

## 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

*Mandatory*: None

*Recommended*: Agricultural chemistry (SAg_06)

## Reading list

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

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## 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 | | X | |

last amended: November 2018

# SAg_08 Organic and Biochemistry, Biotechnology

| | | | |
|---|---|---|---|
| **Study Semester:** | **2** (full time)<br>**2** (part time)<br>**2** (cooperative) | **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

**Lecture:**
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; genetic code, transcription, regulation and translation; exemplary biochemical pathways; catalysis; bio- and genetic engineering; genetically modified food

**Lab course:**
Purification of products by distillation; basic synthesis procedures: nucleophilic substitution reactions; qualitative analysis of biomolecules: nucleic acids, protein and carbohydrates; chromatographic methods; isolation of plasmidic DNA and electrophoresis; basic biotechnological procedures and microbial methods: culture techniques

## 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]
- know the basic concepts and mechanisms of bio- and genetic engineering[1]
- understand the application of bio- and genetic engineering in agriculture and the food industry[2]
- be able to apply theories and terminology to scientific questions[1,2]
- analyse pros and cons of the use of bio- and genetic engineering in agriculture[4]
- 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]
- know the importance of microorganisms in biotechnology[1]
- understand and apply basic biotechnological processes, with respect to the metabolism of the selected microorganism[2,3,4,5]

[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

## Entrance requirements

*Mandatory*: None

*Recommended*: 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
Benkeblia (ed.): Sustainable Agriculture and New Biotechnologies
Mascia, Scheffran and Widholm (eds.): Plant Biotechnology for Sustainable Production of Energy and Co-products

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for the lab course

## 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 | | X | |

last amended: November 2018

# SAg_09 Biology and Biodiversity

| | | | |
|---|---|---|---|
| **Study Semester:** | **2** (full time)<br>**2** (part time)<br>**2** (cooperative) | **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

**Biology**: fundamentals of microbiology in relation to agriculture; human and animal parasites; plant tissues, basics in plant physiology (photosynthesis, plant hormones); functional plant anatomy; flow of water and nutrients; sensing and movement, fruit and seed dispersal strategies;

**Biodiversity**: fundamentals of plant identification; invasive species; indicator plants; biodiversity and the CBD; Hot Spots of biodiversity; strategy types in nature conservation; biodiversity indices; Vavilov centres of diversity

**Lab course:**
plant anatomy, microscopy and specimen preparation, practice of biological experimentation and scientific data documentation

## Intended learning outcomes

On successful completion of this module, students should

- know the basics of 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 differ from eukaryotes and influence important agricultural processes[2]
- apply their knowledge in the conduction and documentation of simple biological lab experiments[3]
- are able to identify plant species and analyse agricultural 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

## Entrance requirements

*Mandatory*: *None*

*Recommended*: None

## Reading list

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

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## Teaching materials and media

Beamer; white/black board; handout; 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: November 2018

# SAg_10 Agricultural Engineering II and Agrotechnology

| | | | |
|---|---|---|---|
| **Study Semester:** | **2** (full time)<br>**4** (part time)<br>**2** (cooperative) | **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 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; agrotechnology in plant protection: good agricultural practice, pesticides: users protection, environmental protection, field sprayer: handling, drift, technique

## Intended learning outcomes

On successful completion of this module, students should

- know the basic functioning and use of agrotechnological equipment[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 concepts of urban, vertical and precision farming[2]
- be able to apply agrotechnological solutions to agronomic problems[3]
- be able to analyse pros and cons of new developments 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

*Mandatory*: Agricultural Engineering I and Use of Energy in Agriculture (SAg_03)

*Recommended*: None

## Reading list

Field and Solie: Introduction to Agricultural Engineering Technology: A Problem Solving Approach
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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_11 Agricultural Economics and Farm Management

| | | | |
|---|---|---|---|
| **Study Semester:** | **2** (full time)<br>**2** (part time)<br>**2** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 30 h |
| Seminar | 15 h | Literature review | 30 h |
| Exercise | 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

The farm, farming and food system; business economics with special reference to businesses in the agrifood sector; business objectives; the behaviour of firms; farm management; production economics; production factors, costs of production; budgeting; enterprise choice; linear programming; entrepreneurship

## Intended learning outcomes

On successful completion of this module, students should

- know the relevant concepts and principles of agricultural economics[1]
- be familiar with all functional areas of a agrifood and farm business[1]
- be able to relate their knowledge of general objectives to management decisions in agricultural production[2]
- apply standard analytical tools to examine production economics decisions and enterprise choice[3]
- document results and findings in a scientific 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; exercise; self-study; group work; business case studies

## Entrance requirements

*Mandatory*: None

*Recommended*: None

## Reading list

Cramer, Jensen, Southgate: Agricultural Economics and Agribusiness
Olson: Economics of Farm Management in a Global Setting
Norwood and Lusk: Agricultural Marketing and Price Analysis

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: February 2019

# SAg_12 Basics of Animal Sciences

| | | | |
|---|---|---|---|
| **Study Semester:** | **2** (full time)<br>**2** (part time)<br>**2** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

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

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Steffi Wiedemann

## Instructors

Prof. Dr. Steffi Wiedemann

## Contents

**Lecture:**
Introduction to animal husbandry and sciences; domestication; basic animal anatomy and applied physiology (skeletal system, working of nerves and muscles, digestive system, circulatory system, respiratory system, endocrine system, sensory systems, reproductive system, lactation); basics of animal growth and development, similarities and differences among groups of animals, introduction to the composition and quality assessment of feedstuff and animal-derived products; exercises during the lecture; field trip

**Lab course:**
Enhancement of knowledge by demonstration of relevant organ systems, organs, milk and feed stuff; basic quality assessments of milk and feed stuff

## Intended learning outcomes

On successful completion of this module, students should

- know the basics of animal husbandry, anatomy and physiology[1]
- understand basic interactions among anatomy and physiology and animal husbandry[2]
- apply the knowledge for basic feed ration balancing[3]
- apply their knowledge in the appraisal of farm animals [3,4]

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

## Teaching and learning methods

Lecture; self-study; group work; e-learning units; lab course with lab journal; exercise; field trip

## Entrance requirements

*Mandatory*: None

*Recommended*:

## Reading list

Gillespie: Modern Livestock and Poultry Production
Reece: Functional Anatomy and Physiology of Domestic Animals
Moyes, Schulte: Principles of Animal Physiology
Frandson: Anatomy and Physiology of Farm Animals

Further literature will be named and given in the course.

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## Teaching materials and media

Beamer; white/black board; hand-outs; e-learning platform; 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: November 2018

# SAg_13 International Markets, Trade and Agricultural Policy

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**3** (part time)<br>**5** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 40 h |
| Seminar | 45 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

**Lecture:**
Introduction to agricultural policy and trade; the functioning of agricultural markets; global agricultural markets and trade; agricultural trade and development; agricultural commodity trading; agricultural policy as public policy; EU Common Agricultural Policy; land policy; the role of agricultural cooperatives; agricultural policy in other global regions

**Seminar:**
For the seminars, students will complete weekly reading assignments. These reading materials consist of scientific articles and book chapters, which deepen and complement the topics covered during the lectures. Students will present their reading materials and discuss selected questions during the seminars.

## 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[2]
- be able to apply basic concepts of political sciences to current developments in the agriculture sector[3]
- be able to analyse and critically discuss the impact of agricultural and trade policy in a global context[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; poster walk; excursion

## Entrance requirements

*Mandatory*: None

*Recommended*: Principles of Economics (SAg_04)

## Reading list

Peterson: A Billion Dollars a Day: The Economics and Politics of Agricultural Subsidies
Cubbage: Natural Resource Policy
B. Hill: Understanding the Common Agricultural Policy
M. Hill: The Public Policy Process

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for seminar

## Teaching materials and media

Projector; white/black board; hand-outs; flipchart/ pin-board

## Areas of competence

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

last amended: February 2019

# SAg_14 Climate Change and Water Management

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**5** (part time)<br>**5** (cooperative) | **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

Amr Hefny

## 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; tools and methods for climate impact assessment (e.g. carbon footprint, carbon offset)

**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; tools and methods for water use assessment (e.g. water footprint)

## 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

*Mandatory*: None

*Recommended*:

## 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_15 Crop Physiology and Nutrition

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**3** (part time)<br>**5** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 45 h | Preparation for contact time | 30 h |
| Lab 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; Prof. Dr. habil Jens Gebauer, Dr. Katja Kehlenbeck; Dr. Conor Watson; Dipl.-Ing. agr. Julia Gorris

## Contents

**Lecture:**
Plant physiological responses to abiotic factors (light/radiation, temperature, water, salt); function of plant hormones; details of photosynthesis and water use in higher plants; competition and allelopathy; toxicity and plant physiological responses; functions of essential plant nutrients; uptake, transport and mobilisation of nutrients; practical nutrient management and fertilisation; methods of sustainability assessment (material flow analysis, nutrient flow analysis)

**Lab course:**
Plant physiological responses to abiotic factors (e.g. nutrients, salt); function of plant hormones; functions of essential plant nutrients; uptake, transport and mobilisation of nutrients; practical nutrient management and fertilisation; advanced methods of crop physiology and nutrition; applied statistics; scientific work

## Intended learning outcomes

On successful completion of this module, students should

- know the essential nutrients of plants and their basic functions[1]
- know the basic plant physiological mechanisms[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

*Mandatory*: Basics of Biology and Agroecology I (SAg_01); Agricultural Chemistry (SAg_06)

*Recommended*: Biology and Biodiversity (SAg_09), Soil Science and Tillage (SAg_07)

## Reading list

Lambers, Stuart Chapin and Pons: Plant Ecophysiology
Larcher: Physiological Plant Ecology
Lincoln and Zeiger: Plant Physiology
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
Scientific articles

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## 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: November 2018

# SAg_16 Crop Health I

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**5** (part time)<br>**5** (cooperative) | **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

Prof. Dr. habil. Jens Gebauer

## Instructors

Dr. Katja Kehlenbeck

## Contents

History of plant pathology; losses caused by weeds, pests and plant diseases; development of pests and diseases and the effect of the environment; types of diseases incl. fungi, bacteria and viruses with examples; types of pests incl. nematodes, insects, mites, slugs/snails and wildlife with examples; problems caused by weeds and parasitic plants with examples; integrated pest management incl. physical, cultural, biotechnological and biological methods of plant protection; chemical plant protection methods and action principles; regulations and laws regarding sustainable use of pesticides; principles and concepts in plant breeding and its contribution to crop health; importance of agro-biodiversity and its conservation; plant diversity in cropping systems and its contribution to crop health

## Intended learning outcomes

On successful completion of this module, students should

- know important crop species[1]
- know important weed, plant pathogen and pest species[1]
- know[1] and understand[2] the relevant concepts of plant protection
- know[1] and understand[2] the relevant concepts in plant breeding
- know[1] and understand[2] the relevant concepts in the conservation of plant genetic resources
- understand the impact of biodiversity on ecosystem functioning[2]
- be able to relate their knowledge about plant protection and agrobiodiversity to its relevance in sustainable agriculture[2]
- be able to apply their knowledge to use pesticides in a sustainable and responsible manner[3]
- be able to analyse if application of pesticides is necessary[4]
- be able to critically discuss the benefits and negative effects of pesticide application[5]

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

## Teaching and learning methods

Lecture; self-study; group work and presentations; field trip; exercises on species identification

## Entrance requirements

*Mandatory*: None

*Recommended*:

## 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
Engels et al.: Managing Plant Genetic Diversity

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_17 Analysis and Interpretation of Data II

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**3** (part time)<br>**5** (cooperative) | **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

N.N.

## Instructors

N.N.

## Contents

**Mathematics 2**: Linear algebra: vector spaces and matrix operations, eigenvalue analysis: Calculus introduction to multivariate functions

**Statistics 2**: Inferential statistics; correlation, regression analysis; hypothesis testing; analysis of variance, post hoc test; parameter estimation, time series

## Intended learning outcomes

On successful completion of this module, students should

- know basic mathematical concepts and procedures for multivariate problems, and their application[1,2,3]
- understand differences in methods of analysis and display of data[2]
- apply methods of data analysis and display to agricultural data based on R[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

*Mandatory*: None

*Recommended*:

## 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
Stewart, Redlin und Watson: Algebra and Trigonometry
Stewart: Calculus. Metric International Version

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_18 Animal Husbandry and Health

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**7** (part time)<br>**5** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 30 h | Preparation for contact time | 40 h |
| Lab 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. Steffi Wiedemann

## Instructors

Prof. Dr. Steffi Wiedemann

## Contents

**Lecture:**
Basics of animal husbandry including management, housing and nutrition of different farm animal species and systems (organic, conventional, intermediate); introduction to animal health (individual and herd health; diagnosis, treatment, prevention of important diseases in farm animal production such as metabolic, infectious (e.g. zoonotic) or nutritional diseases; introduction to the immune system; introduction to animal hygiene; legal regulations; basics of animal breeding (quantitative genetics; pure and cross breeding; fundamentals of genomic breeding, importance of diversity, breeding strategies for sustainable agriculture)

**Lab course:**
Enhancement of knowledge by practical applications, exercises and excursions

## Intended learning outcomes

On successful completion of this module, students should

- know the basics of animal husbandry, 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, 4]
- know and understand major livestock diseases and are able to apply their knowledge[3]
- compare different breeding programmes[4] and evaluate their success[5]
- assess animal health and disease prevention programs 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; exercises; field trip

## Entrance requirements

*Mandatory*: Introduction to animal sciences (SAg_12)

*Recommended*:

## Reading list

Gillespie: Modern Livestock and Poultry Production
Williams: The Complete Textbook of Animal Health & Welfare
Hafez and Hafez: Reproduction in Farm Animals
Bearden, Fuquay and Willard: Applied Animal Reproduction

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## 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 | | X | |

last amended: November 2018

# SAg_19 Agroecology II and Agronomy

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**4** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 30 h | Preparation for contact time | 30 h |
| Seminar | 15 h | Literature review | 20 h |
| Exercise/Excursion | 15 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. Katja Kehlenbeck; Dr. Conor Watson; Dipl.-Ing. agr. Julia Gorris; N.N.

## 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; agroecological practices and scientific evidence; sustainability management, auditing, labelling and control systems in plant production (organic food standards, HACCP, Global Gap); application of methods for sustainability assessment (e.g. carbon or water footprint, ecological rucksack, nutrient balances); application of agronomic methods in plant production

## 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

*Mandatory*: Biology and biodiversity (SAg_09); Crop physiology and nutrition (SAg_15)

*Recommended*: Soil science and tillage (SAg_07)

## Reading list

Rehm and Espig: The Cultivated Plants of the Tropics and Subtropics
Gliessman: Agroecology
Odum: Fundamentals of Ecology
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

Various scientific articles

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_20 Rural Development and Sustainable Behaviour

| | | | |
|---|---|---|---|
| **Study Semester:** | **2** (full time)<br>**4** (part time)<br>**2** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

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

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Dietrich Darr

## Instructors

N.N.

## Contents

**Lecture:**
Introduction to rural development; human-ecological systems; economic development theories; measures of development; strategies for rural development; financing of rural development; rural tourism; sustainable development goals; rural public policies

**Seminar:**
For the seminars, students will complete weekly reading assignments, group tasks or online tutorials. These materials deepen and complement the topics covered during the lectures. Students will present their materials and discuss selected questions during the seminars.

**Exercise:**
Students will practice selected concepts during the exercise.

## 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]
- comprehend contemporary challenges of sustainable development in rural areas[2]
- analyse public policies dilemmas in developed and developing countries[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

*Mandatory*: None

*Recommended*: None

## Reading list

Singh: Rural development: principles, policies and management
Scholz: Environmental literacy in science and society: from knowledge to decisions
Norton, Alwang and Masters: Economics of agricultural development
Yunus: A world of three zeros

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for seminar

## 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: February 2019

# SAg_21 Horticulture and Agroforestry

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**4** (part time)<br>**4** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

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

**Total workload:** **150 h**

## Coordinator

Prof. Dr. habil. Jens Gebauer

## Instructors

Dr. Katja Kehlenbeck

## Contents

**Lecture:**
Nomenclature and systematics of horticultural plants; origin and domestication of horticultural plants; assessment of agro-biodiversity and its importance in sustainable production systems; diversity of important horticultural plant species (fruits, vegetables, herbs and spices, ornamentals, trees); horticultural production systems in temperate and tropical regions, their importance and aspects of their sustainability; harvest and post-harvest handling; seed production and storage of orthodox and recalcitrant seeds; sexual and vegetative propagation techniques; temperate and tropical agroforestry systems and their aspects of sustainability; tree-crop interactions; homegardens as small scale agroforestry systems; non-timber forest products including wild fruit trees

**Lab course:**
Training in identification of crops (hortiversity), sexual and vegetative propagation of annual and perennial crops, seeding, weeding, thinning, pruning, harvesting and post-harvest handling, farm visits

## Intended learning outcomes

On successful completion of this module, students should

- know the relevant horticultural products and their production systems[1]
- know basics in propagation of horticultural crops[1]
- know[1] and understand[2] the concepts of agro-biodiversity and centres of crop diversity
- know[1] and understand[2] the concepts of agroforestry production systems of different climatic zones
- be able to apply different aspects of sustainability in horticultural production[3]
- be able to evaluate the influence of environmental factors on horticultural cropping systems[4]
- be able to critically discuss the opportunities and challenges in horticulture[5]
- 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; demonstration materials; experiments in the greenhouse/gardens; field trip

## Entrance requirements

*Mandatory*: None

*Recommended*: Crop Health I (SAg_16)

## 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## 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 | | | X |

last amended: November 2018

# SAg_22 Project

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**6** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| project | 10 h | Preparation for contact time | 90 h |
| discussions | 10 h | Literature review | 10 h |
| group work | 20 h | Preparation for exams | 10 h |
| Sum | 40 h | Sum | 110 h |

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Matthias Kleinke

## Instructors

all lecturers of the faculty

## Contents

Organization of projects a part of a knowledge-based education; structuring of tasks; collection and analysis of relevant academic literature; acquisition of social competence and ability to work in a team; acquisition and deepening of subject-specific knowledge and methods; writing of academic texts; adequate presentation of results by way of posters, reports or presentation

## Intended learning outcomes

On successful completion of this module, students should

- know and apply methods of academic writing to a project relevant to the study course[3]
- have acquired and broadened their discipline-specific knowledge[1,3,4]
- be able to define the relevant project phases on the basis of the project's subject and to define an appropriate project organisation[1]
- be able to collect the relevant data and to discuss the information in their group[2]
- be able to detect multidisciplinary contexts and to apply if necessary knowledge and methods in an interdisciplinary, but always problem- and/or goal-oriented way
- be able to work independently as well as in a team and have experienced requirements and options of leadership without disciplinary authority[2]
- be able to analyze the scientific/academic and societal relevance of the results for the achievement of the project's goal[4]
- be able to summarize the results of the project in a written report and prepare the presentation to the study course group[4]

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

## Teaching and learning methods

group work; project; discussion; contact time; presentation

## Entrance requirements

*Mandatory*: None

*Recommended*: basic subjects relevant for the chosen project

## Reading list

Wilson: An introduction to Scientific Research
Carey: A Beginner's Guide to Scientific Method
Valiela: Doing Science: Design, Analysis, and Communication of Scientific Research
Kahn: The Student's Guide to Successful Project Teams
APittampalli: Read This before Our Next Meeting
Horine: Project Management Absolute Beginner's Guide
Portny: Project Management for Dummies
Alley: The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid
Hofmann: Scientific Writing and Communication: Papers, Proposals, and Presentations
Alley: The Craft of Scientific Writing

Depending on disciplinary orientation of the project the supervisor will provide relevant academic literature.

## Examination

Certificate according to §§ 14 and 20 General Examination Regulations for Bachelor’s and Master’s Degree Programmes

## Teaching materials and media

Projector; white/black board; flipchart; visualization tools (facilitator's toolcase); AV-media; overhead projector; demonstration material; library

## Areas of competence

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

last amended: January 2019

# SAg_23.1 Focus Field Animal Sciences and Aquaponics I

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**4** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

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

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Steffi Wiedemann

## Instructors

Prof. Dr. Steffi Wiedemann and other lecturers

## Contents

**Lectures:**
Animal husbandry systems for different species in different contexts and different countries (topics include advanced animal nutrition, animal breeding, animal health, animal housing and animal hygiene); health management of typical farm and aquatic animals; interactions between livestock farming systems and health of animals; environmental impacts of livestock farming systems; impact of environment on livestock farming

**Exercise/Field course**
Enhancement of knowledge by exercises and field trips

## Intended learning outcomes

On successful completion of this module, students should

- describe different husbandry systems for the most relevant farm and aquatic animal species[1]
- understand interactions between livestock farming systems and the environment [2]
- apply standard procedures to manage health in farm animals[3]
- critically discuss advantages and disadvantages of different livestock husbandry systems[4]
- develop management recommendations for livestock farms to improve their sustainability[5]

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

## Teaching and learning methods

Lecture; exercise; self-study; e-learning units; literature review; group work and presentation; field course

## Entrance requirements

*Mandatory*:

*Recommended*: Basics of Animal Sciences (SAg_12) or Agronomy I and Animal Husbandry (AB_03)

## Reading list

Williams: The Complete Textbook of Animal Health & Welfare
Hafez and Hafez: Reproduction in Farm Animals
Bearden, Fuquay and Willard: Applied Animal Reproduction
Sejian et al.: Climate Change Impact on Livestock: Adaptation and Mitigation
FAO: Tackling climate change through livestock
Current journal articles provided in the course

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Projector; white/black board; e-learning platform; 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: November 2018

# SAg_23.2 Focus Field Plant and Soil Sciences I

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**4** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Seminar | 20 h | Preparation for contact time | 30 h |
| Lab course | 20 h | Literature review | 30 h |
| Exercise and excursion | 20 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. Jens Gebauer, Dr. Katja Kehlenbeck, Dr. Conor Watson, N.N.

## Contents

The elective modules in this focus field deal with subjects in plant and soil sciences and provide the students an opportunity to strengthen their knowledge base and to specialize in this domain. The core area of plant sciences deals mainly with cultivated plants, its botanical and cultivation details and their use by human beings. In soil sciences the focus is primarily on agricultural soils at different spatial scales, however, comparing it with soils of forests and natural habitats where applicable. The elective courses offered, will either broaden students' perspective of crops and cropping systems, or strengthen their knowledge in specific areas. In addition to lectures and seminars, students will elaborate on their practical, methodical and analytical skills in field trips/excursions, exercises and lab courses.

## Intended learning outcomes

On successful completion of this module, students should

- have broadened their knowledge base on plant species in particular crops and soils and their management[1,2]
- be able to apply the knowledge gained on plants and soils to other cropping systems and soils[3]
- be able to analyse crop production systems and soils as basis for sustainable agriculture[4]
- be able to disseminate their knowledge to both scientific and non-scientific audience[5]

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

## Teaching and learning methods

Lectures; seminar; self-study; literature review; group work and presentation; field trip/excursion; exercise; lab course

## Entrance requirements

*Mandatory*: None

*Recommended*: Basics of Biology and Agroecology I (SAg_01); Soil Science and Tillage (SAg_07); Biology and Biodiversity (SAg_09); Crop Physiology and Nutrition (SAg_15); Crop Health I (SAg_16)

## Reading list

Will be announced in the individual elective courses

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Projector; white/black board; hand-outs; greenhouse/garden 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 | | X | |

last amended: November 2018

# SAg_23.3 Focus Field Analysis of Sustainability and Food Sciences

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**4** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Seminar | 60 h | Preparation for contact time | 35 h |
| | | Literature review | 35 h |
| | | Preparation for exams | 20 h |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150 h**

## Coordinator

N.N.

## Instructors

Prof. PD Dr.-Ing. Sylvia Moenickes, Prof. Dr. Florian Kugler, N.N

## Contents

The elective modules in this focus field deal with subjects in the way of analysing sustainability in agricultural systems and in the field of food sciences and provide the students an opportunity to strengthen their knowledge base and to specialize in this domain. In addition to lectures and seminars, students will elaborate on their practical, methodical and analytical skills in field trips/excursions, exercises and lab courses.

The core area of the analysis of sustainability deals mainly with the investigation of various practical examples e.g. of urban farming and sustainable agricultural technologies; factors influencing urban farming and sustainable agriculture; aspects of non-sustainable development in agriculture; challenges of sustainable urban farming, land use and agriculture. In nature conservation as part of an sustainable land use the focus is primarily on important animal and plant species for nature conservation; endangered species and biodiversity; classification of relevant natural habitats and their position in landscapes; nature conservation approaches; investigation of interactions between agriculture and natural ecosystems; conflicts, regulations and laws; drivers of and stakeholders in nature conservation; examples of nature conservation. To the area of modelling ecological systems one focus is developing models for growth, harvesting, population interaction, environmental effects; computer based modelling, sustainability as steadiness and stability of critical points. In food sciences the following topics are relevant: nature of food, basics of human nutrition, technological influences on food availability; processing of selected products, nutrition value as influences by technology, eating habits, nutritional advices, food policy, influences on food choices.

## Intended learning outcomes

On successful completion of the different modules in this focus field, students should e.g.

- know the determining factors for agricultural systems and in particular urban farming systems and factors influencing their sustainability[1]
- recognize challenges of urban farming and sustainable development in agriculture[2]

- compare conventional, traditional and urban agricultural systems with respect to their sustainability using a sustainability assessment[3,4]
- analyse pros and cons of new developments in agriculture[4]
- develop recommendations for sustainable urban farming systems and concepts[5]
- know the major habitats, landscapes and conservation approaches[1]
- be able to describe the major regulatory approaches to nature conservation in Europe[1]
- recognize conflicts, limitations and challenges for nature conservation in agricultural landscapes[2]
- be able to recommend means to improve sustainability in agricultural systems in relation to nature conservation[5]
- know the relevant properties of ecological systems defining their long-term behaviour[1]
- understand the balance equation describing ecological systems[1,2,3]
- be able to set up balance equations for ecological processes and solve them with computer algebra systems[1,2,3]
- 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[1,2]
- 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

*Mandatory*: None

*Recommended*: Basics of Biology and Agroecology I (SAg_01); Soil Science and Tillage (SAg_07); Biology and Biodiversity (SAg_09)

## Reading list

Various case studies and scientific publications; soil classification manuals; agroecology manuals; manuals for vegetation appraisal

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes; certificate for lab course

## 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: December 2018

# SAg_23.4 Focus field Economics and Social Sciences I

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**4** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Seminar | 60 h | Preparation for contact time | 35 h |
| | | Literature review | 35 h |
| | | Preparation for exams | 20 h |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150 h**

## Coordinator

N.N.

## Instructors

N.N.

## Contents

## Intended learning outcomes

On successful completion of this module, students should

- xxx[1,2]

[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

*Mandatory*: None

*Recommended*:

## Reading list

xx

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_23.5 Module from any Bachelor Study Course at the Faculty of Life Sciences at Rhine-Waal University of Applied Sciences

| | | | |
|---|---|---|---|
| **Study Semester:** | **4** (full time)<br>**6** (part time)<br>**4** (cooperative) | **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

Prof. Dr. Peter F. W. Simon

## Instructors

All lecturers of the faculty

## Contents

Depending on the chosen module to be elected from any bachelor study course of the faculty of Life Sciences

## Intended learning outcomes

On successful completion of this module, students should

- acquire knowledge from other areas of the faculty 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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 | | | |

last amended: November 2018

# SAg_24 Ethics in Life Sciences

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**9** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 30 h |
| Seminar | 30 h | Literature review | 30 h |
| | | Preparation for exams | 45 h |
| Sum | 45 h | Sum | 105 h |

**Total workload:** **150 h**

## Coordinator

N.N.

## 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

*Mandatory*: None

*Recommended*:

## 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_25 Sustainability and Agri-food Chains

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**7** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 45 h |
| Exercise | 15 h | Literature review | 20 h |
| Project | 30 h | Preparation for exams | 25 h |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Dagmar Mithöfer

## Instructors

Prof. Dr. Dagmar Mithöfer

## Contents

Sustainability assessment in the agrifood-sector; advanced aspects of sustainable agriculture and sustainable agrifood chains; current issues in international agrifood chains; instruments of sustainability assessment; instruments of sustainable agrifood chain management

## Intended learning outcomes

On successful completion of this module, students should

- know the relevant fields of action of sustainability in the investigated agri-food 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]
- be able to evaluate methods of farming and agri-food chain sustainability assessment[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

Self-study; group work, excursion; case studies; seminar presentation

## Entrance requirements

*Mandatory*: None

*Recommended*: None

## Reading list

Various case studies and scientific publications will be provided by lecturer.

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_26 Natural Resource and Environmental Economics

| | | | |
|---|---|---|---|
| **Study Semester:** | **3** (full time)<br>**3** (part time)<br>**5** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 15 h | Preparation for contact time | 45 h |
| Seminar | 15 h | Literature review | 20 h |
| Exercise | 30 h | Preparation for exams | 25 h |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150**

## Coordinator

Prof. Dr. Dagmar Mithöfer

## Instructors

Prof. Dr. Dagmar Mithöfer

## Contents

Environment and economics; markets and welfare; market failure; property rights; externalities; pollution; natural resource use; dynamic efficiency; economics of renewable resources; economics of non-renewable resources; environmental valuation; cost benefit analysis; sustainable development; policy instruments; public choice; decisions under risk; risk measures; concepts in environmental risk assessment and risk management

## 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 the concept of risk[1]
- be able to relate their knowledge of risk to management decisions in the agri-food sector and natural resource use[2]
- apply cost benefit analysis to projects in the agribusiness and environmental sector[3]
- document results and findings in an appropriate form[4]
- analyse the relevant processes in a business[4]
- be able to design recommendations for private and public decision makers[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

*Mandatory*: Principles of Economics (SAg_04)

*Recommended*: None

## Reading list

Tietenberg and Lewis: Environmental & Natural Resources Economics
Perman, Ma, Common, Maddison and McGilvray: Natural Resource and Environmental Economics
Pearce, Atkinson and Mourato: Cost Benefit Analysis and the Environment: Recent Developments
Hardaker, Huirne and Anderson: Coping with Risk in Agriculture

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: February 2019

# SAg_27 Animal Welfare

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**7** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 30 h | Preparation for contact time | 25 h |
| Exercise | 30 h | Literature review | 30 h |
| | | Preparation for exams | 35 h |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Steffi Wiedemann

## Instructors

Prof. Dr. Steffi Wiedemann

## Contents

**Lecture:**
Definition of animal welfare; overview of legal regulations concerning animal welfare and animal rights; criteria for evaluating livestock-friendliness; stress and pain; animal welfare in housing, handling, transport and slaughtering; zootechnical procedures; animal welfare in laboratory animals; welfare labels; basics and methods of animal ethology; observation and evaluation of animal behaviour;

**Exercise:**
Enhancement of knowledge by application of methods to assess animal welfare, excursions and case studies

## 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; exercise; field trip; case study

## Entrance requirements

*Mandatory*: Introduction to Animal Sciences (SAg_12)

*Recommended*: Animal Husbandry and Health (SAg_18)

## Reading list

Webster: Management and 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Projector; white/black board; hand-outs; computers, 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: November 2018

# SAg_28.1 Focus Field Animal Sciences and Aquaponics II

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**5** or **7** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

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

**Total workload:** **150 h**

## Coordinator

Prof. Dr. Steffi Wiedemann

## Instructors

Prof. Dr. Steffi Wiedemann and other lecturers

## Contents

**Lectures:**
Animal husbandry systems for different species in different contexts and different countries (topics include advanced animal nutrition, animal breeding, animal health, animal housing and animal hygiene); health management of typical farm and aquatic animals; interactions between livestock farming systems and health of animals; environmental impacts of livestock farming systems; impact of environment on livestock farming

**Exercise/Field course**
Enhancement of knowledge by exercises and field trips

## Intended learning outcomes

On successful completion of this module, students should

- describe different husbandry systems for the most relevant farm and aquatic animal species[1]
- understand interactions between livestock farming systems and the environment [2]
- apply standard procedures to manage health in farm animals[3]
- critically discuss advantages and disadvantages of different livestock husbandry systems[4]
- develop management recommendations for livestock farms to improve their sustainability[5]

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

## Teaching and learning methods

Lecture; exercise; self-study; e-learning units; literature review; group work and presentation; field course

## Entrance requirements

*Mandatory*:

*Recommended*: Basics of Animal Sciences (SAg_12) or Agronomy I and Animal Husbandry (AB_03)

## Reading list

Williams: The Complete Textbook of Animal Health & Welfare
Hafez and Hafez: Reproduction in Farm Animals
Bearden, Fuquay and Willard: Applied Animal Reproduction
Sejian et al.: Climate Change Impact on Livestock: Adaptation and Mitigation
FAO: Tackling climate change through livestock
Current journal articles provided in the course

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Projector; white/black board; e-learning platform; 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: November 2018

# SAg_28.2 Focus Field Plant and Soil Sciences II

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**7** or **9** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Seminar | 20 h | Preparation for contact time | 30 h |
| Lab course | 20 h | Literature review | 30 h |
| Exercise and excursion | 20 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. Jens Gebauer, Dr. Katja Kehlenbeck, Dr. Conor Watson, N.N.

## Contents

The elective modules in this focus field deal with subjects in plant and soil sciences and provide the students an opportunity to strengthen their knowledge base and to specialize in this domain. The core area of plant sciences deals mainly with cultivated plants, its botanical and cultivation details and their use by human beings. In soil sciences the focus is primarily on agricultural soils at different spatial scales, however, comparing it with soils of forests and natural habitats where applicable. The elective courses offered, will either broaden students' perspective of crops and cropping systems, or strengthen their knowledge in specific areas. In addition to lectures and seminars, students will elaborate on their practical, methodical and analytical skills in field trips/excursions, exercises and lab courses.

## Intended learning outcomes

On successful completion of this module, students should

- have broadened their knowledge base on plant species in particular crops and soils and their management[1,2]
- be able to apply the knowledge gained on plants and soils to other cropping systems and soils[3]
- be able to analyse crop production systems and soils as basis for sustainable agriculture[4]
- be able to disseminate their knowledge to both scientific and non-scientific audience[5]

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

## Teaching and learning methods

Lectures; seminar; self-study; literature review; group work and presentation; field trip/excursion; exercise; lab course

## Entrance requirements

*Mandatory*: None

*Recommended*: Basics of Biology and Agroecology I (SAg_01); Soil Science and Tillage (SAg_07); Biology and Biodiversity (SAg_09); Crop Physiology and Nutrition (SAg_15); Crop Health I (SAg_16)

## Reading list

Will be announced in the individual elective courses

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Projector; white/black board; hand-outs; greenhouse/garden 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 | | X | |

last amended: November 2018

# SAg_28.3 Focus Field Analysis of Sustainability and Food Sciences II

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**5 or 7** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Lecture | 30 h | Preparation for contact time | 35 h |
| Seminar | 30 h | Literature review | 35 h |
| | | Preparation for exams | 20 h |
| Sum | 60 h | Sum | 90 h |

**Total workload:** **150 h**

## Coordinator

N.N.

## Instructors

Prof. Dr. Florian Kugler; Prof. PD Dr.-Ing. Sylvia Moenickes; Prof. Dr. Florian Wichern; Dipl.-Ing. Rüdiger Schmidt

## Contents

**Lecture:** Nature of foods; basics of human nutrition; processing of selected products (e.g. milk, meat, cereals, vegetables, and fruits); nutrition values as influenced by technology; eating habits; nutritional advices; influences on food choice

**Lab course:** Production of diary products, sausages, and foodstuffs of plant origin in technical scale; analysis of quality parameters, such as total acid of fruit juices and anthocyanin contents of syrup samples; investigation of enzyme activities to verify successful pasteurization; extraction of natural substances; determination of the dependency of the appearance of natural colours on the pH value; determination of starch and antioxidants in potatoe products; simulation of metabolic processes in laboratory scale

**Ecological Modelling**: Models for growth, harvesting, population interaction, environmental effects; computer based modelling; sustainability as steadiness and stability of critical points (attractor, repellor)

**Organic Farming**: 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 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]
- know relevant properties of ecological systems defining their long-term behaviour[1]
- understand balance equations describing ecological systems[1,2,3]
- be able to set up balance equations for ecological processes[3]
- be able to solve these equations with the help of computer algebra systems[3]
- be able to support decisions in ecological management[4,5]
- 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; self-study; group work; excursion; case studies; lab course; field trip

## Entrance requirements

*Mandatory*: None

*Recommended*: **Food Processing**: Agricultural Chemistry (SAg_06); Organic and Biochemistry, Biotechnology (SAg_08); Rural Development and Sustainable Behaviour (SAg_10); **Ecological Modelling**: Analysis and Interpretation of Data I (SAg_05) and II (SAg_17); **Organic Farming**: Basics of Biology and Agroecology I (SAg_01); Soil Science and Tillage (SAg_07); Crop Physiology and Nutrition (SAg_15); Horticulture and Agroforestry (SAg_21)

## Reading list

Moffat and Prowse: Human Diet and Nutrition in a Biocultural Perspective: Past meets Present
Campbell-Platt: Food Science and Technology
Schmidt and Kloeble: Reference figures for organic farming inspections
Lampkin: Organic farming
Lampkin, Measures and Padel: Organic farm management handbook

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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: November 2018

# SAg_28.4 Focus Field Economics and Social Sciences II

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**5 or 7** (part time)<br>**7** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Seminar | 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. habil. Jens Gebauer

## Instructors

Prof. Dr. habil. Jens Gebauer; Dr. Katja Kehlenbeck

## Contents

**Education for Sustainable Horticulture**: This course will enable students to communicate horticulture-related scientific knowledge to the public, including children, youth, adults and elderly. In an interdisciplinary manner, students will learn different methods of environmental education and communication, including oral and poster presentations, development of flyers and brochures, guided tours through the tropical greenhouse and study and showpiece gardens and special events for the different target audiences. Students will work in small groups on selected horticultural topics or single plant species, e.g. cocoa and chocolate, coffee and its products, apple varietal diversity, forgotten vegetable species, tropical fruits, wild fruits, nuts of tropical and temperate regions. For each topic, students will develop different, innovative and activating communication methods and apply them to the public, e.g. during a guided greenhouse tour, a presentation or an open day at the greenhouse, including a quick impact assessment of their work. Student in this course must have basic horticultural knowledge and should like working with visitors of the greenhouse and sharing their knowledge.

## Intended learning outcomes

On successful completion of this module, students should

- know[1] communication methods for horticultural education and be able to apply[3] them
- be able to develop and organize horticultural events for different target audience groups[3]
- be able to disseminate their horticultural knowledge to non-scientific audience and assess the impact of their efforts[4,5]

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

## Teaching and learning methods

Seminar; self-study; literature review; group work, presentation of communication materials; performing dissemination exercises

## Entrance requirements

*Mandatory*: None

*Recommended*: Crop Health I (SAg_16); Horticulture and Agroforestry (SAg_21)

## Reading list

Liebermann: Education and the Environment: Creating Standards-Based Programs in Schools and Districts
Konig: Making your Garden Come Alive!

Plus specific literature depending on the project subject

## Examination

Graded exam according to §§ 14, 17–19 General Examination Regulations for Bachelor's Degree Programmes

## Teaching materials and media

Projector; white/black board; hand-outs; greenhouse/garden 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 | | X | |

last amended: November 2018

# SAg_28.5 Module from any Bachelor Study Course at the Faculty of Life Sciences at Rhine-Waal University of Applied Sciences

| | | | |
|---|---|---|---|
| **Study Semester:** | **5** (full time)<br>**7** (part time)<br>**7** (cooperative) | **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

Prof. Dr. Peter F. W. Simon

## Instructors

All lecturers of the faculty

## Contents

Depending on the chosen module to be elected from any bachelor study course of faculty of Life Sciences

## Intended learning outcomes

On successful completion of this module, students should

- acquire knowledge from other areas of the faculty 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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 | | | |

last amended: November 2018

# SAg_29 Internship or Study Abroad

| | | | |
|---|---|---|---|
| **Study Semester:** | **56** (full time)<br>**1–7** (part time)<br>**6** (cooperative) | **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

*Mandatory*: Minimum of 90 ECTS and all modules of the first 2 semesters

*Recommended*:

## Reading list

Depends on selected activity

## Examination

**Internship:** written report

**Study abroad:** successful completion of 15 ECTS, written report, presentation to supervisor of study abroad

## 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: November 2018

# SAg_30 Academic Principles and Methods

| | | | |
|---|---|---|---|
| **Study Semester:** | **7** (full time)<br>**9** (part time)<br>**8** (cooperative) | **Credit Points (ECTS):** | **5** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Seminar | 20 h | Preparation for contact time | 40 h |
| Exercise | 30 h | Literature review | 60 h |
| Sum | 50 h | Sum | 100 h |

**Total workload:** **150 h**

## Coordinator

N.N.

## Instructors

N.N.

## Contents

Techniques of academic work; basics of academic work; structure of an academic paper; use of a library and scientific literature; literature research: presentation of results and topics; handling specialist literature: excerption; handling and proving arguments; presentation of results; presentation techniques; academic writing

## Intended learning outcomes

On successful completion of this module, students should

- know the principles of academic work and are able to apply and document these in practice[1,3]
- know the general structure of academic work and are able to arrange and format it[1,3]
- be able to document scientific issues[3]
- become acquainted with methodical aspects; internalize science-ethical issues like copyright, correct citation, plagiarism, etc.[1,2]
- be able to judge references and sources with respect to their relevance and significance[4,5]

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

## Teaching and learning methods

Lecture; self-study; group work; exercises

## Entrance requirements

*Mandatory*: None

*Recommended*: None

## Reading list

Literature will be provided by the lecturer

## Examination

Certificate according to §§ 14 and 20 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Projector; white/black board; hand-outs; flipchart; visualisation aids for presentation; AV-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: February 2019

# SAg_31.1 Project reg. Academic Principles and Methods in Preparation of Bachelor Thesis

| | | | |
|---|---|---|---|
| **Study Semester:** | **7** (full time)<br>**9** (part time)<br>**9** (cooperative) | **Credit Points (ECTS):** | **10** |

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Project practice-oriented | 30 h | Preparation for contact time | 20 h |
| | | Literature review | 50 h |
| | | practical, scientific work | 180 h |
| | | writing project report | 20 h |
| Sum | 30 h | Sum | 270 h |

**Total workload:** **300 h**

## Coordinator

Prof. Dr. Joachim Fensterle

## Instructors

all lecturers of the faculty

## Contents

The student should be prepared for his or her bachelor thesis through applied research. As a rule, the intended supervisor of the thesis will enable the student to gain theoretical and practical experience in his/her own research environment by working independently on a scientific topic that is preferably close to the planned thesis. All aspects of scientific work are taken up here, i.e. in addition to practical work (e.g. in the laboratory), in particular literature studies on the content and methodological preparation of the topic, experiment planning, scientifically appropriate documentation and writing of a final report, as well as presentation of the (interim) results in status seminars and oral final presentation if necessary.

The planned workload of 300 hours is to be completed as a rule during a continuous period of 6 weeks after completion of the internship, whereby the contact time and self-study portions can vary depending on the type of research activity. The figures given in the above table are therefore to be understood as a guideline.

The project for the preparation of the Bachelor's thesis can also be carried out in the company of the internship.

## Intended learning outcomes

On successful completion of this module, students should

- be able to work independently with scientific literature[3]
- be able to apply methods of theoretical and scientific work[1,3]
- be able to correctly document scientific work[3]
- have deepened their specialist knowledge on specific topics[1,3,4]
- have expanded their ability to work in a team[3]

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

## Teaching and learning methods

practical scientific work

## Entrance requirements

*Mandatory*: None

*Recommended*: Internship (SAg_29); Academic Methods and Principles (SAg_30); relevant basic courses of the semesters 1–5 according to the choice of topic

## Reading list

Depending on the chosen subject area, scientific literature is made available by the supervisor or procured by the student.

## Examination

Certificate according to §§ 14 and 20 General Examination Regulations for Bachelor's and Master's Degree Programmes

## Teaching materials and media

Relevant subject-related literature; if applicable, relevant laboratory equipment

## Areas of competence

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

last amended: November 2018

# xx_yy Language Course for Students (Without Previous Knowledge)

**Study Semester:** **1** (winter term/summer term) **Credit Points (ECTS):** **5**

## Workload

| Contact time | | Self-study | |
|---|---|---|---|
| Language course | 52 h | Preparation for contact time | 28 h |
| | | Self study | 50 h |
| | | Preparation for exams | 20 h |
| Sum | 52 h | Sum | 98 h |

**Total workload:** **150 h**

## Coordinator

International Center: Office of Languages and Intercultural Communication

## Instructors

Ratka Sosovska; Frau Elfriede van Dijk (LfbA DaF)

## Contents

Module contents are based on the “can-do statements” of the Common European Framework of Reference for Languages (CEFR) for the levels A1–B2. All four skills areas – Listening, Speaking, Reading, Writing – are practiced.

## Intended learning outcomes

The main objective of this module is to develop students’ verbal communication skills as well as to impart to them effective general learning and communication strategies. Upon successful completion of this module, students should be able to navigate common everyday situations using simple linguistic means of communication.

On successful completion of this module, students should

- Xxx[hochgestellte Zahl]

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

## Teaching and learning methods

classroom instruction; language practice in Language Lab; self-study

## Entrance requirements

Level A1.1: The main objective of this module is to develop students’ verbal communication skills in German as well as to impart to them effective general learning and communication strategies. Upon successful completion of this module, students should be able to navigate common everyday situations using simple linguistic means of communication.

Level A1.2: The main objective of this module is the continued development of students' verbal communication skills by expanding their passive and active vocabularies and solidifying their grasp on underlying grammatical structures. Upon successful completion of this module, students should be able to navigate common everyday situations using simple linguistic means of communication.

Level A2.1: The main objective of this module is the continued development of students' communicative skills by expanding and solidifying their passive and active vocabularies, as well as their understanding and use of more advanced grammatical structures. Upon successful completion of this module, students should be able to navigate many everyday situations using limited means of communication, as well as produce and understand commonly used terms and phrases in German. Continued practice of learning strategies is also a central component of this module.

Level A2.2: The main objective of this module is the continued development of students' communicative skills by expanding and solidifying their passive and active vocabularies, as well as their understanding and use of advanced grammatical structures. Upon successful completion of this module, students should be able to navigate many everyday situations using limited means of communication, as well as produce and understand commonly used terms and phrases in German. Continued practice of learning strategies is also a central component of this module.

Level B1.1: The main objective of this module is the development of applied language skills so that students can communicate effectively in German both on and off campus. Developing effective writing skills receives more focus at the B1 level as well. Upon successful completion of this module, students should be able to give short presentations on specific (intercultural) topics and answer related questions from the audience.

## Reading list

Studio [21] Das Deutschbuch A1-B1/+Medienpaket
Studio d Die Mittelstufe (B2/1 oder B2/2)

## Examination

Certificate according to §§ 14 and 20 General Examination Regulations for Bachelor's and Master's Degree Programmes

A recognised certificate obtained elsewhere, confirming level B1.2 or higher, may be recognised.

## 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: May 2019

# SAg_31.3 Module from Catalogue Elective Modules 1 and 2 of Study Course Sustainable Agriculture

| | | | |
|---|---|---|---|
| **Study Semester:** | **7** (full time)<br>**9** (part time)<br>**8** (cooperative) | **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

Prof. Dr. Peter F. W. Simon

## Instructors

All lecturers of the study course

## Contents

Depending on the chosen module to be elected from catalogues Elective Modules 1 and 2 of Sustainable Agriculture

## Intended learning outcomes

On successful completion of this module, students should

- broaden their knowledge of the chosen focus fields[1]
- understand the importance of broadening their knowledge beyond their specialisation[2]
- be able to implement alternative ways and approaches to problem solving[3]
- compare contents and learning outcomes 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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 | | | |

last amended: November 2018

# SAg_31.4 Module from any Bachelor Study Course at Rhine-Waal University of Applied Sciences

| | | | |
|---|---|---|---|
| **Study Semester:** | **7** (full time)<br>**9** (part time)<br>**8** (cooperative) | **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

Prof. Dr. Peter F. W. Simon

## Instructors

All lecturers of the university

## Contents

Depending on the chosen module to be elected from any bachelor study course 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 according to §§ 14, 17–19 General Examination Regulations for Bachelor's and Master's Degree Programmes

## 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 | | | |

last amended: November 2018

# SAg_32 Bachelor Thesis

| | | | |
|---|---|---|---|
| **Study Semester:** | **7** (full time)<br>**8** (part time)<br>**8** (cooperative) | **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

*Mandatory*: Minimum of 180 ECTS

*Recommended*:

## Reading list

Depending on chosen subject/task

## Examination

Graded exam according to § 23 General Examination Regulations for Bachelor's and Master's Degree Programmes and § 7 Examination Regulations for study programme: written thesis of approx. 40–100 pages

## 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 | | | |

last amended: November 2018

# SAg_33 Colloquium

| | | | |
|---|---|---|---|
| **Study Semester:** | **7** (full time)<br>**9** (part time)<br>**8** (cooperative) | **Credit Points (ECTS):** | **3** |

## Workload

| Contact time | Self-study |
|---|---|
| Sum | Sum 90 h |

**Total workload:** **90 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

*Mandatory*: Minimum of 207 ECTS

*Recommended*:

## Reading list

## Examination

graded oral exam acc. to § 27 General Examination Regulations for Bachelor's Degree and Master's Programmes

## 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: November 2018