

Translation

Unofficial version of the

**Examination Regulations for the Consecutive Master's Degree Program
"Agricultural Science and Resource Management in the Tropics and Subtropics" (ARTS)**

of the Faculty of Agriculture of the University of Bonn

Version: August 22, 2022

This unofficial version takes into account:

1. The Examination Regulations for the Consecutive Master's Degree Program "Agricultural Science and Resource Management in the Tropics and Subtropics" (ARTS) of the Faculty of Agriculture of the University of Bonn dated October 16, 2020 (Official Announcements of the University of Bonn, 50th year, no. 70, dated October 21, 2020)
2. The Amendment to the Examination Regulations for the Consecutive Master's Degree Program "Agricultural Science and Resource Management in the Tropics and Subtropics" (ARTS) of the Faculty of Agriculture of the University of Bonn dated August 22, 2022 (Official Announcements of the University of Bonn, 52nd year, no. 45, dated August 30, 2022)

Note: This unofficial version is only provided for informational purposes. Only the regulations published in the Official Announcements of the University of Bonn shall be legally binding.

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Unofficial version

Part 1
Scope

§ 1
Scope

- (1) Students who commence their studies in the consecutive master's degree program Agricultural Science and Resource Management in the Tropics and Subtropics at the University of Bonn after entry into force of these Examination Regulations are subject to these Examination Regulations.
- (2) The Examination Regulations for the consecutive master's degree program Agricultural Science and Resource Management in the Tropics and Subtropics (ARTS) of the Faculty of Agriculture of the University of Bonn dated September 5, 2016 (Official Announcements of the University of Bonn, 46th year, no. 46, dated September 15, 2016), hereinafter referred to as MPO ARTS 2016, will be repealed as of September 30, 2023. Examinations in accordance with MPO ARTS 2016 will be admissible until September 30, 2022. The examination board may extend this period by six months upon valid request.
- (3) Students who, having commenced their studies prior to the coming into force of these Examination Regulations, are subject to MPO ARTS 2016 and have not yet completed all necessary examinations, may
 - a. continue their studies under MPO ARTS 2016 until the deadline stated in para. 2 or
 - b. irrevocably adopt these Examination Regulations by written request.Students who continue their studies under MPO ARTS 2016 and do not graduate by September 30, 2022 shall adopt these Examination Regulations ex officio on October 1, 2022. Credit for prior academic achievements shall be granted. Para. 2 sentence 3 shall remain unaffected; these Examination Regulations shall then be adopted ex officio on April 1, 2023.
- (4) The Examination Organization Regulations of the Faculty of Agriculture (POO-LWF), as amended, govern the subject-specific and administrative organization of examination procedures in this degree program.
- (5) The previous compulsory module Rural Development (ARTS-A02) is replaced by the new module Food Security and Sustainable Food Systems (ARTS-A06). Students who enroll in the consecutive master's degree program Agricultural Science and Resource Management in the Tropics and Subtropics at the University of Bonn in winter semester 2022/2023 or later are subject to these Examination Regulations as amended by the amendment to these Examination Regulations. Students who commenced their studies in the consecutive master's degree program Agricultural Science and Resource Management in the Tropics and Subtropics at the University of Bonn prior to winter semester 2022/2023, have not yet completed their master's examination and have not yet completed execution procedures for the compulsory module Rural Development (ARTS-A02) that were started by September 30, 2022, may complete these execution procedures by September 30, 2023 in their original version in accordance with the Examination Regulations of October 16, 2020. The examination board will handle the details in this regard and the recognition of modules that are no longer included in the curriculum.
- (6) If the Rectorate has made use of the authority to issue provisions concerning academic studies that it was granted under an ordinance issued based on § 82a of the Higher Education Act (HG), the provisions issued by the Rectorate shall supersede the corresponding provisions in these Examination Regulations for the period of validity stipulated in the ordinance.

Part 2
Academic degree

§ 2
Academic degree

Candidates who successfully complete the master's examination for the Agricultural Science and Resource Management in the Tropics and Subtropics degree program shall be awarded a Master of Science (MSc) degree by the Faculty of Agriculture of the University of Bonn.

Part 3
Admission requirements, program structure and module examinations (registration/withdrawal)

§ 3
Degree program admission requirements

- (1) The consecutive master's program Agricultural Science and Resource Management in the Tropics and Subtropics is open to applications from graduates from a university undergraduate degree program in the field of agricultural sciences, environmental sciences, horticulture, agricultural economics or a related field.
- (2) English skills at level B2 or higher according to the Common European Framework of Reference for Languages (CEFR) are a prerequisite for admission to the degree program and to be proved by submitting a recognized language certificate (e.g. TOEFL, IELTS) or equivalent proof.
- (3) This does not affect admission restrictions due to capacity limits (*numerus clausus*).
- (4) The selection of successful applicants is subject to the Regulations on Selection Procedures for Degree Programs with Admission Restrictions of the University of Bonn.
- (5) Students who do not meet the admission requirements stated in para. 1 may already enroll for a master's degree program if there is sufficient proof of their aptitude for that degree program, which is determined with special regard to the average grade for all examinations taken to that point. Enrollment is revoked with effect for the future if necessary proof of meeting the admission requirements is not submitted to the admission office within six months after the date of enrollment.

§ 4
Standard period of study, ECTS credit point system, range of courses, program structure and language of instruction/examinations

- (1) The standard period of study, including the master's thesis, is four semesters (120 ECTS CP) when pursuing the degree program full-time.
- (2) The degree program includes 54 ECTS CP in compulsory modules, 36 ECTS CP in subject-specific and/or free elective modules and 30 ECTS CP for the master's thesis (including 10 ECTS CP for a colloquium). Elective modules worth the following number of credit points must be completed:
 - 6 ECTS CP for cross-specialization elective modules in the first semester and
 - 30 ECTS CP for specialization-specific and/or cross-specialization and/or free electives in the second and third semesters. Of these, a maximum of 12 ECTS CP may be earned from free electives.Details on modules, admission to courses and the amount of ECTS credit points per module are set forth in the module structure (Annex).
- (3) Students can choose one of the two specializations Systems Approaches to Resource Management (ARTS-BS) or Physiological and Molecular Approaches to Resource Management (ARTS-BM) in the second

program-related semester. The specialization chosen will be shown on the degree certificate if at least 24 ECTS CP are earned from modules assigned to that specialization.

- (4) The language of instruction and examinations is English. The examination board may make exceptions for individual elective modules and shall announce them in due time before the beginning of the semester, pursuant to § 8, para. 8 of the POO-LWF.
- (5) A vocational internship is recommended to complement the academic training.
- (6) The degree program starts in the winter semester of each year.

§ 5

Module examinations—registration and withdrawal

- (1) Students who have withdrawn from a module examination in accordance with § 12, para. 3 of the POO-LWF must register electronically again with the examination board for the module examination. Where justified, registrations may be submitted in writing.
- (2) Students should register to resit a failed module examination on the next scheduled examination date themselves.
- (3) In all other respects, the provisions of § 12 of the POO-LWF shall apply.

Part 4

Resitting examinations and pass requirements for the master's examination

§ 6

Resitting examinations

- (1) Examinations that have been failed may only be repeated twice. Resits shall be conducted in accordance with § 5, para. 2. Rules for repetition of the master's thesis are defined in § 23, para. 7 of the POO-LWF.
- (2) Students who fail the same compulsory module three times lose their right to examination and are deregistered from the degree program by the Student Registry once the examination board's decision that the final attempt at the master's examination has been failed has come into force.
- (3) If an elective module has been failed, or the final attempt at an elective module has been failed, the candidate can choose another, previously unchosen elective module as compensation. Such compensation is only possible once. Students who use the compensation option without success shall lose their right to examination and are deregistered from the degree program by the Student Registry once the examination board's decision that the final attempt at the master's examination has been failed has come into force.
- (4) Module examinations graded "sufficient" or higher cannot be repeated.
- (5) For modules with examinations that are taken during the semester or that are part of a course, the examination cannot be repeated in the same semester. The module examination in such modules can only be repeated by retaking the entire module or corresponding course. The examination board shall announce the respective examinations and course work to be repeated before the beginning of the semester, pursuant to § 8, para. 8 of the POO-LWF.

§ 7

Pass requirements for the master's examination

- (1) Candidates shall have passed the master's examination when they have passed all necessary modules as per § 4, para. 2 as well as the master's thesis and have thus been awarded a total of 120 ECTS CP.
- (2) The final attempt at the master's examination shall be deemed failed when
 - the candidate has failed to pass a compulsory module three times, as specified in § 6, para. 2;
 - the compensation option for electives has been used without success as specified in § 6, para. 3; or
 - the master's thesis has been graded "insufficient" in the second attempt in accordance with § 23, para. 7 of the POO-LWF.

Part 5
Entry into force

§ 8

Entry into force and publication

These Examination Regulations shall enter into force on the day after their publication among the Official Announcements of the University of Bonn.

Annex: Module structure for the consecutive master's degree program Agricultural Science and Resource Management in the Tropics and Subtropics

Module structure key:

- Abbreviations of course types: F = field trip, C = colloquium, I = internship, prE = practical exercise, Proj = project, PS = proseminar, S = seminar, E = scientific exercise, L = lecture.
- Marked with asterisk (*): Courses that require compulsory attendance as a prerequisite for participation in the module examination in accordance with § 13, para. 6. In these cases, compulsory attendance is an additional requirement to the other coursework listed.
- The "Course Type" column shows the type of a course within the module.
- The "Duration/Program-Related Semester" column shows the duration (D) of the module (in semesters) and assigns it to a specific program-related semester (PRS).
- The "Coursework" column shows requirements that must be met for admission to certain examinations pursuant to § 13, para. 4 of the POO-LWF or, respectively, to acquire ECTS credit points in modules without an examination.

Further details on individual modules, especially regarding the courses offered within or required for completion of a module, are described in the module guide, which the examination board will make available before the beginning of the respective semester, pursuant to § 8, para. 8 of the POO-LWF.

Compulsory modules for the first semester (ARTS-A) (24 ECTS CP)

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--|-------------|------------------------|-----------------------------------|--|------------|---|---------|
| ARTS-A01 | Ecological Conditions and Climate Change | L, E, S | None | D: 1 PRS: 1 st | After completing the module, students will be able to - understand and recognize ecological processes and interactions for agricultural production; - classify, interpret, compare and critically assess climate observations and trends; - summarize and explain observations using an example case study from their home country. | None | Written examination [75%] Seminar talk [25%] | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--|-------------|------------------------|-----------------------------------|---|------------|---|---------|
| ARTS-A06 | Food Security and Sustainable Food Systems | L | None | D: 1 PRS: 1 st | After completing the module, students will be able to - define key terms related to food security and sustainable diets; - explain how food systems relate to the different Sustainable Development Goals (SDGs); - identify policy needs and analyze the sustainability impact of specific interventions; - evaluate the arguments in the public debate about sustainable agriculture and nutrition; - prepare and use dietary surveys and nutrition assessment tools. | None | Written examination | 6 |
| ARTS-A03 | Conservation and Use of Genetic Resources | L, S* | None | D: 1 PRS: 1 st | After completing the module, students will be able to - demonstrate basic knowledge of plant and animal genetics for agriculture; - demonstrate knowledge of current methods for the conservation and use of genetic diversity for agriculture; - name the state-of-the-art biotechnological approaches in agriculture; - critically assess, compare and justify different biotechnological approaches and their use in agriculture; - use their knowledge of different genetic and biotechnological approaches to develop strategies for the conservation and use of genetic resources. | None | Presentation [0%] Written examination [100%] | 6 |
| ARTS-A04 | Agricultural Production Systems | L | None | D: 1 PRS: 1 st | After completing the module, students will be able to - recognize different types of production systems; - understand interactions between system components. | None | Written examination | 6 |

Cross-specialization elective modules for the first semester (ARTS-A)
(Two modules worth a total of 6 ECTS CP must be completed.)

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|------------------------|-------------|------------------------|-----------------------------------|--|------------|---|---------|
| ARTS-AM05a | Crop Physiology | L | None | D: 1 PRS: 1 st | After completing the module, students will be able to - describe key metabolic pathways; - explain how plants acquire resources from the environment; - describe and explain physiological adaptations underlying the development of consumable parts. | None | Written examination | 3 |
| ARTS-AM05b | Crop Breeding Research | L | None | D: 1 PRS: 1 st | After completing the module, students will be able to - explain the genetic basis of crop genetic resources; - discuss the relevance of crop traits in breeding programs; - explain and differentiate between breeding methods; - discuss the impact of modern approaches on breeding. | None | Written examination | 3 |
| ARTS-AS05a | Production Ecology | L, E | None | D: 1 PRS: 1 st | After completing the module, students will be able to - reproduce the main aspects of biotic and abiotic interactions and their underlying mechanisms in cropping systems; - understand the components and complexity of biotic interactions in cropping systems; - analyze and evaluate the potential of a diversified cropping system—e.g. as described in a scientific article—with regard to biotic interactions; - design a diversified cropping system based on ecological theories. | None | eExam [75%] Project report [25%] | 3 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|-----------------------|-------------|------------------------|-----------------------------------|---|------------|---|---------|
| ARTS-AS05b | Resource Conservation | L, E | None | D: 1 PRS: 1 st | After completing the module, students will be able to - reproduce the main aspects of abiotic interactions and their underlying mechanisms in cropping systems; - understand the components and complexity of abiotic interactions in cropping systems; - analyze and evaluate the potential of a cropping system—e.g. as described in a scientific article—to conserve resources; - design a sustainable cropping system based on resource conservation. | None | eExam [75%] Project report [25%] | 3 |

The examination board may approve further elective modules and shall announce them in due time before the beginning of the semester pursuant to § 8, para. 8 of the POO-LWF.

**Specialization-specific and cross-specialization elective modules for the second and third semesters:
Modules worth 18–30 ECTS CP can be chosen.**

**Elective modules for the second and third semesters (ARTS-B)—System Approaches to Resource Management
(Modules worth up to 30 ECTS CP can be chosen. The System Approaches to Resource Management specialization will only be indicated if 24 ECTS CP are completed in that specialization.)**

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|---|-------------|--|-----------------------------------|--|--------------|--|---------|
| ARTS-BS01 | Soil Resources of the World | L, S*, I* | ARTS-A01, A02, A03, A04, AS05a and AS05b | D: 1 PRS: 2 nd | After completing the module, students will be able to - describe the major soil properties and classification of soil types occurring around the world; - compare soils according to their potential use for production; - identify risks associated with different types of land use on these soils; - demonstrate soil classification procedures for the major reference groups. | Presentation | Written examination | 6 |
| ARTS-BS02 | Crop Ecology, Water Management and Bioclimatology | L, E, S | ARTS-AS05a and AS05b | D: 1 PRS: 2 nd | After completing the module, students will be able to - understand the key concepts and implications of bioclimatology; - apply water management concepts; - use water models to analyze water demand; - relate botanical attributes to the ecological requirements of crops; - evaluate interactions between climate, management attributes and land use systems. | None | Term paper [70%] Presentation [30%] | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--|-------------|--|-----------------------------------|--|------------|--|---------|
| ARTS-BS03 | Land Use Systems in the Tropics and Subtropics | L, E, S | ARTS-A01, A02, A03, A04, AM05a and AM05b | D: 1 PRS: 2 nd | After completing the module, students will - understand the impact of land use on ecosystem services and threats to biodiversity; - understand key attributes of the major types of production systems and their interactions with management; - be able to apply concepts of ecosystem services and adapted land use practices to case study examples; - be able to analyze production and land use systems to develop sustainable alternatives to current land use; - be familiar with and capable of independently developing sustainable alternatives to traditional land use in the tropics and sub-tropics. | None | Term paper [70%] Presentation [30%] | 6 |
| ARTS-BS04 | Animal Production Systems in the Tropics | L | ARTS-A01, A02, A03, A04, AM05a and AM05b | D: 1 PRS: 2 nd | After completing the module, students will be able to - classify and understand animal production systems in the tropics and subtropics; - characterize challenges of animal production systems in tropical climate. | None | Written examination | 6 |
| ARTS-BS05 | Element Cycles in Tropical Agroecosystems | L, S | ARTS-A01, A02, A03, A04, AS05a and AS05b | D: 1 PRS: 2 nd | After completing the module, students will be able to - assess and analyze the availability of major (nutrient) elements in a range of environments; - determine the quantity and quality of organic matter and various secondary raw materials; - plan intervention strategies for improved crop plant nutrition in environments with variable ecological conditions; - prepare and present secondary information on topics related to element cycles in the form of a seminar presentation. | None | Seminar talk | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|---|-------------|------------------------|-----------------------------------|---|------------|--|---------|
| ARTS-BS06 | Organic Agriculture in the Tropics and Subtropics | L, S | None | D: 1 PRS: 3 rd | After completing the module, students will be able to - demonstrate extensive knowledge of the challenges of tropical agriculture; - understand the principles of field trial design and management; - give a scientific presentation in English; - analyze cropping systems from an agronomic and ecological perspective. | None | Written examination | 6 |
| ARTS-BS07 | Crop and Ecosystem Analysis and Modeling | L, prE | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - distinguish between different types of systems and models and give examples; - construct simple models of cropping systems based on defined assumptions; - apply dynamic simulation models; - understand the principles of dynamic modeling; - use dynamic models to analyze crops and ecosystems. | None | Presentation [50%] Report [50%] | 6 |
| ARTS-BS08 | Horticultural Production and Research | L, S | None | D: 1 PRS: 3 rd | After completing the module, students will be able to - critically interpret horticultural literature; - explain how major horticultural commodities are produced and provide examples of various production systems; - analyze horticultural production systems and identify strengths and weaknesses; - assess horticultural literature and provide a balanced and logically rigorous evaluation; - prepare a scientifically sound paper on selected topics based on an extensive analysis of published sources. | None | Presentation [20%] Term paper [40%] Assignment [40%] | 6 |

Elective modules for the second and third semesters (ARTS-B)—Physiological and Molecular Approaches to Resource Management
(Modules worth up to 30 ECTS CP can be chosen. The Physiological and Molecular Approaches to Resource Management specialization will only be indicated if 24 ECTS CP are completed in that specialization.)

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|-----------------------------------|-------------|--|-----------------------------------|--|------------|---|---------|
| ARTS-BM01 | Genome Analysis in Plant Breeding | L, I | ARTS-A01, A02, A03, A04, AM05a and AM05b | D: 1 PRS: 3 rd | After completing the module, students will be able to - understand and apply DNA marker techniques; - understand and apply high throughput genotyping; - understand and apply genomic analysis using next generation sequencing methods; - understand and apply genetic linkage analysis and linkage map development; - understand and apply trait analysis using gene association analysis (QTL mapping, GWAS); - understand and apply gene mapping in connection with qualitative and quantitative traits; - understand and apply the isolation of genes and their allelic diversity; - understand and apply marker-assisted selection and the transfer of favorable alleles into plant varieties; - understand and apply molecular breeding and the development of improved plant varieties. | None | Written examination [100%] Seminar talk [0%] | 6 |
| ARTS-BM02 | Crop Abiotic Stresses | I* | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - prepare and perform stress experiments with crops; - diagnose and analyze the stress response of plants; - compare and evaluate the stress response of different genotypes; - conceptualize and design informative stress experiments with crops; - summarize, report and note the results and draw conclusions based on them. | None | Presentation [50%] Report [50%] | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--|-------------|--|-----------------------------------|--|------------|---|---------|
| ARTS-BM04 | Soil Microbiology | L, E, S | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - demonstrate knowledge of the life of microorganisms in soil, the functions that microorganisms perform in soil and the methods used to study soil microorganisms; - summarize the findings of and discuss research articles in the field of soil microbiology; - prepare and present research results and discuss them with the audience; - critically evaluate research articles. | None | Presentation [50%] Written examination [50%] | 6 |
| ARTS-BM05 | Animal Breeding and Genetics | L, S | ARTS-A01, A02, A03, A04, AM05a and AM05b | D: 1 PRS: 2 nd | After completing the module, students will be able to - understand the scientific explanation of animal breeding and genetics; - understand breeding strategies; - understand various animal genetic resources and how to use them effectively. | None | Written examination [70%] Presentation [30%] | 6 |
| ARTS-BM06 | Theriogenology | L, I, S | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - understand positive and negative factors that affect fertility; - develop strategies to improve fertility; - understand reproductive biology, including physiology, pathology and biotechnology. | None | Written examination [80%] Presentation [20%] | 6 |
| ARTS-BM07 | Advances in Plant Breeding Methodology | L, S | None | D: 1 PRS: 2 nd | After completing the module, students will - know and understand innovations in breeding methodology; - be able to name and understand field evaluations for an optimized selection process; - know and understand high-throughput phenotyping; - know and understand genetic gain and selection theory; - know and understand future breeding methods; - know and understand the precision breeding made possible by CRISPR-Cas. | None | Project report [100%] Seminar talk [0%] | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--------------------------------------|-------------|------------------------|---|---|------------|--|---------|
| ARTS-BM08 | Projects in Crop Protection Research | Proj, S | None | D: 1 PRS: 2 nd /3 rd | After completing the module, students will be able to - appropriately select and apply specific laboratory methods; - understand and analyze scientific literature; - prepare a basic plan for a scientific project. | None | Seminar talk [80%] Assignment [20%] | 6 |

The examination board may approve further elective modules and shall announce them in due time before the beginning of the semester pursuant to § 8, para. 8 of the POO-LWF.

**Cross-specialization elective modules for the second and third semesters
(Modules worth up to 30 ECTS CP can be chosen.)**

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--|-------------|------------------------|-----------------------------------|--|--------------------------------------|--|---------|
| ARTS-BC02 | Land Use and Land Degradation | F | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - apply resource management strategies in the area of land use; - analyze the impacts of different strategies; - prepare a case study and present it to a plenary session. | None | Presentation [0%] Report [100%] | 6 |
| ARTS-BC03 | Development Economics | L, E | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - describe key concepts and the structure of economic growth models and drivers of socio-economic development; - explain the role of institutions, labor markets, migration and sustainable natural resource management for economic development; - apply the concepts that have been learned to the analysis of development policies; - compare methods for researching sustainable natural resource management topics; - evaluate empirical examples using case studies; - generalize lessons learned from case studies to broader development issues. | None | Written examination | 6 |
| ARTS-BC05 | Decision Analysis and Forecasting in Agriculture | L, PS | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - understand the value of decision analysis approaches for agricultural research; - recognize their own biases and provide accurate range estimates for uncertain variables; - analyze a decision context; - draw conclusions from a decision model and recommend appropriate measures; - develop decision models, evaluate their results in detail and prepare a report on the model they develop. | Completed project; project report | Project report [0%] Report [100%] | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|-------------------------|-------------|------------------------|-----------------------------------|--|------------|--|---------|
| ARTS-BC06 | Agricultural Entomology | L, E, S | None | D: 1 PRS: 2 nd | After completing the module, students will be able to - demonstrate specific entomological knowledge; - present and explain complex biological interactions; - present and explain specific problems concerning the control or use of insects. | None | Seminar talk [80%] Assignment [20%] | 6 |
| ARTS-BC07 | Agricultural Nematology | L, E, S | None | D: 1 PRS: 3 rd | After completing the module, students will be able to - demonstrate specific nematological knowledge; - present and explain complex biological interactions; - present and explain specific problems concerning the control or use of nematodes | None | Seminar talk [80%] Assignment [20%] | 6 |

The examination board may approve further elective modules and shall announce them in due time before the beginning of the semester pursuant to § 8, para. 8 of the POO-LWF.

Compulsory modules for the second and third semesters (ARTS-C) (30 ECTS CP)

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|---------------------------------------|-------------|-------------------------------|---|--|--|---------------------|---------|
| ARTS-C01 | Current Issues of Research Management | L, S* | None | D: 2 PRS: 2 nd +3 rd | After completing the module, students will be able to - explain current resource management challenges; - demonstrate their abilities when discussing resource management measures; - analyze and summarize the information obtained at the <i>Tropentag</i> conference. | None | Presentation | 6 |
| ARTS-C02 | Scientific Communication | L, I | All compulsory ARTS-A modules | D: 1 PRS: 3 rd | After completing the module, students will be able to - explain scientific communication strategies; - target research journals based on aim and scope; - structure scientific data for oral presentations; - arrange research data in the form of posters; - analyze research papers; - prepare their own research papers. | Submission of three group work reports | None | 6 |
| ARTS-C03 | Sustainability and Risk | L | None | D: 1 PRS: 3 rd | After completing the module, students will be able to - understand and evaluate relevant details, their interrelationships and the overall interdisciplinary picture with regard to the concepts of sustainability and risk; - identify and assess the drivers of, and barriers to, sustainable development; - analyze concrete (or local) issues of sustainability and risk from the perspective of various social actors and find solutions by applying established generic (or global) tools; - critically reflect on all the models, instruments etc. discussed during the course. | None | Written examination | 6 |

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|--|--------------|-------------------------------|-----------------------------------|---|--|---|---------|
| ARTS-C04 | International Research Management and Proposal Writing | L, E*, S, PS | All compulsory ARTS-A modules | D: 1 PRS: 3 rd | After completing the module, students will - know about donors and potential partners; - be able to effectively select and approach donors and partners; - be able to plan and develop elements of a research proposal; - be able to effectively review and assess the work of others (peer review); - be able to formulate a research proposal and target it to donors; - be able to present and defend the proposal to a donor or reviewer. | Homework assignment on project structure, Gantt chart budget table, presentation of at least 1 homework assignment | Project report [100%] Assignment [0%] Colloquium [0%] | 6 |
| ARTS-C05 | Data Analysis and Visualization | L, I | At least five ARTS-A modules | D: 1 PRS: 3 rd | After completing the module, students will be able to - generate and interpret box plots, histograms and scatter plots; - perform and interpret basic hypothesis testing, ANOVA and linear regression. | None | Assignment | 6 |

Free elective modules (Modules worth 0 to 12 ECTS CP can be chosen; modules that have already been completed in another elective area cannot be chosen.)

Up to 12 ECTS CP can be earned for free electives. Modules that can be chosen in this area are shown in the module guide. Modules from other degree programs at the University of Bonn that have been approved by the examination board can also be chosen in this area (import modules). The examination board shall announce the approved elective modules before the beginning of the semester. The examination board can approve other elective modules upon request by individual students. The import modules are governed by the provisions of the examination regulations for the degree programs in which the modules are originally based.

| Module Number | Module Name | Course Type | Admission Requirements | Duration/ Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------|-------------------------|-----------------------------------|-----------------------------------|---|--|-----------------------------------|-----------------------------------|----------------|
| fWP5 | Free elective module(s) | According to the modules selected | According to the modules selected | According to the modules selected | Acquire interdisciplinary academic competences according to the modules selected | According to the modules selected | According to the modules selected | Up to 12 |

Master's thesis and colloquium

| Module Number/Abbreviation | Module Name | Course Type | Admission Requirements | Duration/Program-Related Semester | Subject (Content) of Examination and Qualification Objective | Coursework | Type of Examination | ECTS CP |
|----------------------------|------------------------------|-------------|--|-----------------------------------|---|------------|---------------------|---------|
| ARTS-D1 | Master's Thesis | | All compulsory modules (54 ECTS CP) and at least 24 ECTS CP for elective modules | D: 1 PRS: 4 th | After completing the module, students will be able to - independently formulate a research question; - perform research under guidance; - summarize and present results to the public. Candidates shall have a minimum of two and a maximum of six months for completion. | None | Master's thesis | 20 |
| ARTS-D2 | Colloquium and Doctoral Viva | C | All compulsory modules (54 ECTS CP) and at least 24 ECTS CP for elective modules | D: 1 PRS: 4 th | Ability to present key research findings in a public colloquium. | None | Colloquium | 10 |