UNIVERSITÄT BONN
RHEINISCHE
FRIEDRICH-WILHELMS-
UNIVERSITÄT BONN

Translation

Second Amendment to the Examination Regulations
for the Consecutive Master's Degree Programs

"Microbiology; Molecular Cell Biology; Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); and Plant Sciences"

and Reannouncement as the Examination Regulations for the Consecutive Master's Degree Programs

"Microbiology; Molecular Cell Biology; Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Paleontology; and Plant Sciences"

at the Faculty of Mathematics and Natural Sciences of the University of Bonn

This document is an official translation of the Examinations Regulations published in Amtl. Bek. der Universität Bonn, 55. Jg., Nr. 52, 29. August 2025.

Please note that only the original German version is legally binding.

January 9, 2026

**Second Amendment to the Examination Regulations
for the Consecutive Master's Degree Programs Microbiology; Molecular Cell Biology;
Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); and Plant Sciences**

**and Reannouncement as the Examination Regulations
for the Consecutive Master's Degree Programs Microbiology; Molecular Cell Biology;
Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Paleontology; and Plant Sciences**

**of the Faculty of Mathematics and Natural Sciences
at the University of Bonn**

dated August 18, 2025

By virtue of § 2, paragraph 4 and § 64, paragraph 1 of the Higher Education Act of North Rhine-Westphalia (*Hochschulgesetz*, HG) of September 16, 2014 (Legal and Regulatory Gazette of North Rhine-Westphalia (GV NRW), p. 547), most recently amended by Article 2 of the Act to Strengthen Bochum as a University Location in the Field of Health,care and to Amend Additional Provisions of Higher Education Law (*Gesetz zur Stärkung des Hochschulstandorts Bochum im Bereich des Gesundheitswesens und zur Änderung weiterer hochschulrechtlicher Vorschriften*) of December 19, 2024 (GV NRW, p. 1222), the University of Bonn Faculty of Mathematics and Natural Sciences issues the following Examination Regulations:

Contents

Part 1
Scope

§ 1
Scope

(1) Students who commence their studies in one of the consecutive master's degree programs Organismic Biology; Evolutionary Biology and Palaeobiology (OEP Biology); Microbiology; Molecular Cell Biology; Paleontology; or Plant Sciences at the University of Bonn after entry into force of these Examination Regulations are subject to these Examination Regulations.

(2) Starting on October 1, 2025, students who began their studies in the master's degree program Paleontology before winter semester 2025/2026 according to the Examination Regulations for the Consecutive Master's Degree Programs Geology, Paleontology and Geochemistry/Petrology of the Faculty of Mathematics and Natural Sciences at the University of Bonn of August 10, 2018 (Official Announcements, 48th year, no. 30 of August 16, 2018), in the following referred to as MPO PALÄO 2018, shall continue their studies according to these Examination Regulations in the master's degree program Paleontology, renamed as of winter semester 2025/2026. For these students, the following regulations shall apply:

1. Modules that were successfully completed according to the MPO PALÄO 2018 shall be included according to Annex 9 in the curriculum according to the module structure (Annex 4) for these Examination Regulations.
2. For students continuing examination procedures in modules that started according to MPO PALÄO 2018 but were not successfully completed by September 30, 2025, the following provisions apply:
    a. Examinations procedures in modules that will continue to be offered according to the module structure for these Examination Regulations are to be continued according to these Examination Regulations. For modules in which the type of examination changes with these Examination Regulations or in which multiple module examination components are replaced by one module examination, the examination board decides on how the examinations are to be retaken and announces this according to § 8, paragraph 7
    b. The examination board shall specify the procedure for retaking examinations in modules that are no longer offered according to the module structure for these Examination Regulations and announces this procedure according to § 8, paragraph 7

(3) The following shall apply to examination procedures that were begun but not yet successfully completed by March 30, 2025 for modules

- that are no longer offered based on the version of these Examination Regulations valid as of April 1, 2025; or
- for which the type of examination is changed in the Type of Examination column of the module structure based on the version of these Examination Regulations valid as of April 1, 2025:

The examination board shall specify the details for repeating the examinations and shall announce them in accordance with § 8, paragraph 7.

(4) The following shall apply to examination procedures that were begun but not yet successfully completed by September 30, 2025 for modules in the degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP-Biology); Microbiology; Molecular Cell Biology and Plant Sciences

- that are no longer offered based on the version of these Examination Regulations valid as of October 1, 2025; or
- for which the type of examination is changed in the Type of Examination column of the module structure based on the version of these Examination Regulations valid as of October 1, 2025:

The examination board shall specify the details for repeating the examinations and shall announce them in accordance with § 8, paragraph 7.

(5) In modules in which the coursework required for participation in a module examination changes in the version of these Examination Regulations valid as of April 1, 2025, students will be admitted to the module examination if, before April 1, 2025, they successfully completed all of the coursework for the corresponding module required by the version of these Examination Regulations valid at the time they completed the coursework; this only applies if all other requirements for participating in the examination are also fulfilled.

Part 2
Program objective, degree and standard period of study

§ 2
Objective of the degree program and purpose of the examination

(1) The consecutive master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Paleontology; and Plant Sciences are offered by the Faculty of Mathematics and Natural Sciences. The consecutive master's degree programs Microbiology and Molecular Cell Biology are offered jointly by the Faculty of Mathematics and Natural Sciences, the Faculty of Agricultural, Nutritional, and Engineering Sciences and the Faculty of Medicine under the leadership of the University of Bonn Faculty of Mathematics and Natural Sciences. All four master's degree programs are international and research-oriented.

(2) Students in these master's degree programs are to acquire the necessary scientific knowledge, skills and methods as well as relevant key qualifications for an occupation in the field, enabling them to conduct sound research, to critically assess and practically apply research findings and methods as well as to act responsibly. This includes taking into account any changes and requirements in the working world or in cross-disciplinary aspects, if applicable. The program objectives mainly focus on

- building expert knowledge regarding current research by expanding the students' basic knowledge;
- building methodical and analytical competences, enabling students to expand their research findings on their own authority, with a strong emphasis on research methods and strategies.

(3) Students are to learn how to approach complex problems and work on their solution beyond the existing scope of knowledge using research methods and to critically question and assess results.

(4) The master's examination shall lead to conferral of a master's degree in Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Microbiology; Molecular Cell Biology; Paleontology; or Plant Sciences, which qualifies the holder for positions demanding extensive skills in that field.

§ 3
Academic degree

Candidates who successfully complete the master's examination for the chosen degree program shall be awarded a Master of Science (MSc) degree by the University of Bonn Faculty of Mathematics and Natural Sciences.

§ 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 contents of the degree program are selected and limited in a manner that the master's examination can be completed within the standard period of study. They are organized in modules that, as a rule, consist of courses with a thematic, methodical or systematic connection.

(3) As a rule, each module is completed by passing a module examination, awarding credit points (CP) in accordance with the European Credit Transfer and Accumulation System (ECTS). One ECTS credit point is equivalent to a calculated student workload in contact hours and self-learning of 30 hours.

(4) The master's degree program Microbiology includes 45 ECTS CP for compulsory modules and 45 ECTS CP for elective modules. The master's degree program Molecular Cell Biology includes 70 ECTS CP for compulsory modules and 20 ECTS CP for elective modules. The master's degree program Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) includes 30 ECTS CP for compulsory modules and 60 ECTS CP for elective modules. The master's degree program Paleontology includes 18 ECTS CP for compulsory modules and 72 ECTS CP for elective modules. The master's degree program Plant Sciences includes 24 ECTS CP for compulsory modules and 66 ECTS CP for elective modules. All the degree programs include 30 ECTS CP for the master's thesis. Details on electives, compulsory modules, admission to courses and the amount of ECTS credit points per module are set forth in the module structures (Annexes 1 to 5).

(5) Students receive a curriculum as a recommendation on how to structure their course of studies. Students may receive an individual study schedule upon request.

(6) The language of instruction and examination for the master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Molecular Cell Biology; Paleontology; and Plant Sciences is English. The language of instruction and examination for the master's degree program Microbiology is either German or English, depending on the module. The examination board may make exceptions for individual elective modules and shall announce them before the beginning of the semester pursuant to § 8, paragraph 7.

(7) The master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Molecular Cell Biology; and Plant Sciences start only in the winter semester of each year. (9) The master's degree program Paleontology starts in the summer and winter semesters of each year.

Part 3
Admission requirements and recognition of academic achievements

§ 5
Degree program admission requirements

(1) The consecutive master's degree programs Plant Sciences; Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Molecular Cell Biology; and Microbiology are open to applications from graduates from a university undergraduate degree program in one of the life sciences or a related field. The master's degree program Microbiology requires a university undergraduate degree in biology, biochemistry, biotechnology, nutrition and food sciences, agricultural sciences, medicine or a related field. The master's degree program Paleontology is open to applications from graduates from a university undergraduate degree program in biology, geosciences or a related field.

(2) The university degree in paragraph 1 must have been completed with a grade of at least 2.7 for the degree programs Plant Sciences; Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Paleontology; and Molecular Cell Biology.

(3) For the master's degree program Microbiology, the university degree in para. 1 must provide proof of the following qualifications:
Knowledge of microbiology at the level of a bachelor's in biology equivalent to 5 ECTS CP or equivalent proof.
For the master's degree program Molecular Cell Biology, the university degree in paragraph 1 must provide proof of the following qualifications:
Practical knowledge in biochemistry, molecular biology, microbiology and cell biology at the level of a bachelor's in biology equivalent to 5 ECTS CP each (total 20 ECTS CP) or equivalent proof.

For the master's degree programs Plant Sciences and Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology), the university degree in paragraph 1 must provide proof of the following qualifications:
Knowledge of practical laboratory work equivalent to 20 CP.
For the master's degree program Paleontology, the university degree in paragraph 1 must provide proof of the following qualifications:
Knowledge in paleontology at the level of a bachelor's in geosciences equivalent to at least 10 ECTS CP or knowledge in paleontology at the level of a bachelor's in biology equivalent to at least 10 ECTS LP or equivalent proof.

(4) Applicants to the master's degree program Microbiology must have knowledge of the German language at level C1 or higher according to the Common European Framework of Reference for Languages (CEFR); a university entrance qualification acquired in the German language from a German-language institution, a German language test (e.g. DSH 2, TestDaF at level TDN 4), or equivalent qualification can be used as proof. Applicants for the master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); Molecular Cell Biology; Paleontology; and Plant Sciences do not need to show proof of German language proficiency.

(5) 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 are to be proven by submitting a recognized language certificate (e.g. TOEFL, IELTS) or equivalent proof.

(6) Foreign applicants for the degree programs Molecular Cell Biology; Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology); or Paleontology who are not given equivalent status to Germans by or based on international treaties must provide proof that they have passed the aptitude test for university studies in the degree program concerned in accordance with Annexes 7 and 8.

(7) This does not affect admission restrictions due to capacity limits (*numerus clausus*).

(8) A selection of successful applicants required due to admission restrictions is subject to the Regulations on Selection Procedures for Degree Programs with Admission Restrictions of the University of Bonn, as amended at the time of application filing.

(9) Students who do not satisfy the enrollment conditions in paragraphs 1 to 3 may already enroll if
1. at the time they apply for the master's degree program, they have already acquired 120 ECTS CP in the university undergraduate degree program specified in paragraph 1 and have received an average grade of no worse than 2.7 for the examinations completed up to that point in time based on an interim certificate; and
2. all examinations necessary to successfully complete the university undergraduate degree program indicated in paragraph 1 were completed in the semester before starting the master's degree program.

Proof that all the enrollment conditions have been satisfied must be submitted when applying for admission to the master's examination procedure. If it is not submitted to the examination board at the latest by the end of the first semester, enrollment will be revoked with effect for the future.

§ 6
Recognition of and granting credit for academic achievements

(1) Academic achievements in degree programs at other public or officially recognized universities, at public or officially recognized vocational academies, in degree programs at foreign public or officially recognized universities, or in another degree program at the University of Bonn will be recognized if the acquired skills are deemed equivalent to those that would have been acquired at the University of Bonn; an equivalency assessment is not performed. The examination board assigns credit points for these achievements to the corresponding modules defined in the curriculum. Enrollment may be denied to

applicants who failed the final attempt at an examination that cannot be compensated for in a degree program with substantial similarities in content with the chosen master's degree program.

(2) The question of recognition shall be reviewed with special regard to the significance of differences. In order to determine whether significant differences do or do not exist, the topic, scope and requirements of the academic achievement to be recognized are compared to the same aspects of the academic achievement that the former is to replace. This shall not be done by schematic comparison but rather in the form of an overall review and evaluation. A difference in the amount of awarded ECTS credit points alone does not constitute significant difference. The aforementioned regulations apply analogously to academic achievements in degree programs designed for continued education. Academic achievements are recognized to their full extent if significant differences cannot be determined. If the reviewers, in accordance with the principles described above, find that a certain academic achievement can only be recognized in part, credit points shall partially be assigned to the respective module. The respective module shall only be considered passed when all missing coursework and/or examinations are completed; only then shall ECTS credit points be awarded to the extent stipulated in these Regulations. The scope and nature of coursework and/or examinations to be completed are at the discretion of the examination board. Equivalence agreements approved by the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder of the Federal Republic of Germany and the German Rectors' Conference as well as agreements under university partnerships shall be observed.

(3) In accordance with § 8, paragraph 4, sentence 2, the examination board has authority over the processes that underlie recognition of or granting credit for academic achievements. The examination board decides which degree programs are related to or show substantial similarities in content with the chosen degree program. Representatives of the relevant departments shall be consulted when reviewing the significance of differences. In case of doubts regarding whether academic achievements completed abroad should be recognized, the Central Office for Foreign Education (ZAB) may be consulted. Students shall be notified within eight weeks of whether an academic achievement is recognized, including information on legal remedies available. If an achievement is not or only partially recognized, the examination board shall provide the reasons for its decision, thus bearing the burden of proof. If the examination board denies recognition, students may apply for an internal audit of the decision to be conducted by the Rectorate.

(4) If examinations are recognized, the same grades—provided grading systems are comparable—shall be added to the student's transcript of records and, weighted with the ECTS credit points of the module to which credit points are assigned, considered when calculating the overall grade. If study achievements are recognized, the entry "pass" shall be made in the student's certificate without assigning a grade. Should the grading systems not be comparable, the entry "pass" shall also be made in the student's certificate. Recognized academic achievements shall be identified as such in the student's certificate.

(5) If the requirements defined in paragraph 1 are met, students are legally entitled to have their academic achievements recognized. The student must provide all information on the academic achievement in question deemed necessary for recognition. Each semester, the examination board defines a deadline in that semester by which applications for recognition must be submitted. Applications submitted after that deadline cannot be processed until the subsequent semester. After registration for a module examination, it is no longer possible to submit a request for recognition for this examination (cut-off date).

(6) Applicants who, due to their performance in a placement test as per § 49, paragraph 12 of the Higher Education Act of North Rhine-Westphalia (*Hochschulgesetz*, HG), have earned the right to enter the degree program in a higher program-related semester will be granted credit for the knowledge and skills demonstrated in the placement test, with credit points being assigned to examinations that form part of the master's examination. The examination board is bound to the results of the placement test stated in the certificate.

(7) Knowledge and qualifications acquired in a manner other than academic studies will not be recognized.

§ 7
Admission to individual courses

(1) If admission to a course, due to its nature, purpose or to other reasons, needs to be limited and the number of applications exceeds the defined capacity, the teacher may file a request with the chair of the examination board or, for courses in modules imported from another degree program, the officeholder specified in the applicable examination regulations to manage admissions to that course, giving due regard to § 59 HG. Criteria for admissions in these cases are stipulated in an annex to the respective examination regulations.

(2) The officeholder per paragraph 1 shall define the maximum number of participants in courses with limited capacity. The examination board shall announce capacities at the beginning of each semester.

Part 4
Examination board and examiners

§ 8
Examination board and examination office

(1) The Faculty Council of the Faculty of Mathematics and Natural Sciences shall appoint an examination board for the master's degree program Plant Sciences and an examination board for the two master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) and Paleontology that are to organize examinations and manage the tasks outlined in these Examination Regulations. The faculty councils of the Faculty of Mathematics and Natural Sciences, Faculty of Medicine and Faculty of Agricultural, Nutritional, and Engineering Sciences shall appoint a joint examination board for each of the master's degree programs Microbiology and Molecular Cell Biology. The Dean of the Faculty of Mathematics and Natural Sciences shall ensure that the examination boards are able to duly fulfill their tasks and reliably do so. The Dean shall give appropriate instructions and provide necessary administrative support.

(2) Each examination board shall consist of seven voting members, including
- four members from the group of professors of the Faculty or, in the case of a joint examination board, of the three faculties (including the chair and deputy chair);
- one member from the group of academic staff of the Faculty; and
- two members from the group of students of the Faculty.

The chair, deputy chair and other members are appointed by the Faculty Council according to their groups; for a joint examination board, the members are appointed by the three faculty councils based on the joint nominations of the three faculties under the following conditions: All professors who teach in one of the degree programs in paragraph 1 are eligible to become members of the corresponding examination board. The chairs of the joint examination boards for the master's degree programs Microbiology and Molecular Cell Biology come from the Faculty of Mathematics and Natural Sciences; each of the three faculties should also appoint a representative from the group of professors to the examination board. From the group of academic staff, those who teach in the degree program concerned or are involved in the management of the degree program are eligible to become members. From the group of students, those enrolled in the degree program concerned are eligible to become members. For each of the seven members a deputy shall be appointed to represent the member in his or her absence; these deputy members may not assume the position of chair of the examination board. The term of office of members from the group of professors and from the group of academic staff is three years, and the term of office of the student members is one year. Members may be re-appointed.

(3) The examination board is an administrative body as defined by German administrative procedure law and the German law governing procedure in contentious administrative matters. The Faculty shall create an office (Examination Office) for administrative support of the examination board; the Examination Office acts on behalf of the examination board.

(4) The examination board shall ensure compliance with the provisions of the Examination Regulations and make certain that the examination procedure is conducted in accordance with regulations. The examination board shall appoint examiners as well as assistant examiners and is responsible in particular for recognizing academic achievements as well as handling objections against decisions made within examination procedures. It reports regularly, at least once per year, to the faculty councils on the development of the examination and studying periods including the duration of master's theses and the distribution of overall grades; the report also includes the development of digital examination offers and their impact on achieving learning objectives and on educational opportunities for students. Once a semester, the examination board shall inform the Student Registry on which students, according to final ruling by the examination board, have failed their final attempt at passing the master's examination in accordance with § 25, paragraph 6 or do not meet the requirements to be admitted to the master's examination as per § 11, paragraph 1. The examination board shall provide input for amendments to the Examination Regulations and curriculum. It may delegate clearly defined tasks to the chair, in particular the appointment of examiners and assistant examiners. The following tasks cannot be delegated:

- Decisions on objections as per sentence 2
- Reviews of decisions on disruption of examinations as per § 23, paragraph 2
- Assessments of whether a student repeatedly or otherwise seriously attempted to cheat as per § 23, paragraph 3
- Decisions on the invalidity of the master's examination and revocation of the master's degree as per § 30 and
- Mandatory reporting to the Faculty Council as per sentence 3

(5) Examination board meetings are not open to the public. All members of the examination board as well as their deputies shall be bound to confidentiality. Members who are not civil servants shall be bound to confidentiality by the chair of the examination board. Summary minutes shall be taken as record of the examination board's discussions and decisions.

(6) The examination board shall have a quorum when, in addition to the chair or their deputy, at least four more members or their deputies, including at least two members from the group of professors, are present. Resolutions shall be passed by simple majority. In the event of a tie vote, the chair's vote or, in case of his or her absence, the deputy chair's vote shall be the deciding vote. Members of the examination board have a right to attend examinations; they are to inform the chair of the examination board of their intention to attend an examination in advance.

(7) Directives, dates set and other communications of the examination board with public relevance shall be made available by public display or in electronic form with legally binding effect, giving due consideration to data protection requirements. Other additional publications are permissible but not legally binding.

(8) The examination board may hold its meetings in person, entirely by means of electronic communications as online video conferences (online meetings), or partially by means of electronic communications (hybrid meetings). The examination board chair may approve a request by a member to participate via videoconferencing technology if the meeting room meets the technical prerequisites for individual members to participate digitally in the meeting proceedings and resolution voting. For online meetings or hybrid meetings, only the video conferencing tools approved by the Rectorate may be used.

(9) Examination board resolutions may be adopted by means of electronic communications. If resolutions are adopted in an online, hybrid or in-person meeting using video conferencing technology, voting is conducted by show of hands or using an online voting tool approved by the Rectorate. When secret ballot voting is conducted in an online meeting, an online voting tool must be used. An online voting tool may also be used in meetings that are held entirely or partially in-person. The examination board may also adopt resolutions by means of a circulation procedure if none of the members objects. With regard to quorum, the rules for adopting resolutions by means of electronic communications or circulation procedure are the same as those applicable to in-person meetings. In the case of resolutions by circulation procedure, a deadline must be set for responses. If the number of responses received from members by the deadline is less than

the number of members required for a quorum, the resolution shall be deemed not to have been passed. If a member objects to the adoption of a resolution by circulation procedure before the deadline that was set for responses, the examination board chair must schedule an in-person, hybrid or online meeting to adopt the resolution. For resolutions by circulation procedure, the chair shall send the members of the examination board a specific proposed resolution to be voted on by mail or email. The voting members of the examination board shall send their personally signed votes back to the chair of the examination board by mail or fax or as a scanned copy by email. The voting results for resolutions conducted in the forms specified in sentences 1 and 5 shall be included in the minutes. Sentence 11 does not apply to resolutions conducted by circulation procedure using an online voting tool approved by the Rectorate. In this case, a voting deadline must nevertheless be set and instructions on how to vote using the online voting tool shall be provided when the proposed resolution is sent.

(10) The examination board chair shall decide whether an examination board meeting takes place as an in-person, hybrid or online meeting. The chair also decides whether resolution voting is conducted in person or by means of electronic communications or circulation procedure. This shall not affect paragraph 9, sentences 5 and 9. An examination board meeting must take place in person if requested by one-third of the members.

(11) The examination board may include examination office staff involved in the examination procedure for consultation on a regular basis or for individual meetings or agenda items. These members of staff shall have a right to speak but no right to vote.

§ 9
Examiners and assistant examiners

(1) The examiners and assistant examiners shall be appointed by the examination board. Examinations may only be held by individuals teaching at the University of Bonn and, if necessary or appropriate with regard to fulfilling the purpose of the examination, people with practical and training experience in the field. Examinations may only be graded by staff with at least the same or an equivalent qualification as the one to be determined through that examination. As minimum requirement, assistant examiners must have passed the master's examination or an equivalent examination.

(2) Module examinations are usually held by the responsible teaching staff for that module. This also applies to any second examiners within the meaning of § 65, paragraph 2, sentence 1 HG. If the number of people teaching in a module is less than the number of examiners required for an examination, then the examination board appoints the additional examiners. If a teacher, due to illness or other important cause, is not able to hold module examinations in due time, the examination board shall be responsible for the appointment of another examiner for these module examinations. As a rule, these examiners should have already taught courses in the module concerned or a related module on their own authority.

(3) Examiners shall be independent of instructions in their conduct of examinations.

(4) Candidates may propose examiners for their master's thesis. A candidate's proposal should be followed whenever possible; however, it does not substantiate a claim.

(5) The examination board shall ensure that the candidate is informed of the names of the examiners in due time, as a rule at least two weeks before the date of the respective examination.

Part 5
Scope, conduct, modalities and forms of examinations

§ 10
Scope of the master's examination

(1) The master's examination is intended as proof of qualification for positions demanding extensive skills in the respective field as well as in-depth and research-oriented scientific qualification.

(2) The master's examination consists of
1. module examinations completed during the course of studies and reflecting the contents and qualification targets of the modules specified in the applicable module structure (Annexes 1 to 5);
2. proof that the requirements in the module structure for acquiring ECTS credit points instead of a module examination are satisfied;
3. the master's thesis.

All examinations are to be completed within the standard period of study stipulated in § 4 paragraph 1.

(3) Examinations are completed during the course of studies. As a rule, one module examination is assigned to each module, even when a module consists of more than one course; the grade of the module examination will be indicated on the degree certificate. Students must successfully complete a module in order to be awarded the assigned ECTS credit points. A module is considered successfully completed once
a. the assigned module examination or all of the assigned examination components of the module have been graded "sufficient" or higher; and
b. proof has been provided that the requirements in the module structure for acquiring ECTS credit points instead of a module examination are satisfied.

(4) If a module consists of more than one course, with associated module examination components, the ECTS credit points will be awarded after the last module examination component has been passed.

(5) Examinations are generally held in the language of instruction. Upon request by the student and after consultation with the examiner(s), examinations or parts of examinations can also be taken in another language. However, no right to take parts of the examination in this language exists.

§ 11
Admission to the master's examination and to module examinations

(1) The student must apply for admission to the master's examination. This application shall be submitted to the examination board in writing, at the latest with the registration for the first module examination. The application shall include the following documents as proof of meeting the admission requirements:
1. Proof of meeting the general admission requirements stipulated in § 5.
2. A certificate of enrollment as proof of enrollment as a student in the chosen degree program at the University of Bonn.
3. A statement whether the student has failed a final attempt at an examination or the final attempt at the master's examination in the chosen degree program or, at the time of registration for a module examination, is involved in another examination that, if failed, would give cause for denial of enrollment. The same applies to examination procedures of degree programs with substantial similarities in content.

(2) The examination board may only admit students to module examinations who
1. can provide proof of meeting the admission requirements as per paragraph 1;
2. meet all requirements that may be stipulated in the applicable module structure (Annexes 1 to 5) for the module and module examination.

The proof specified in sentence 1, number 1 is not required for admission to module examinations if proof of enrollment as a student in another degree program at the University of Bonn is provided and that degree

program imports the respective module in accordance with its examination regulations, or proof of admission as a cross-registered student in accordance with § 52, paragraph 1 HG is provided.

(3) Should the candidate not be able to submit documented proof as per paragraph 1, sentence 3 in the required form, the examination board may allow the candidate to provide proof in another form.

(4) Admission to the master's examination procedure or, respectively, module examinations is at the discretion of the examination board.

(5) The examination board may only deny admission to the master's examination procedure where
a. documents submitted are incomplete as per paragraph 1 and/or not submitted as requested by a certain deadline;
b. the requirements specified in paragraph 1 are not met; or
c. the student has failed a final attempt at an examination that cannot be compensated for or failed the final attempt at the master's examination in this degree program or in a degree program with substantial similarities in content to the chosen degree program.

(6) The examination board may only deny admission to a module examination where the criteria defined by paragraph 2 are not met.

§ 12
Examination modalities and compulsory attendance

(1) Module examinations cover the contents and qualification targets of the modules specified in the applicable module structure (Annexes 1 to 5).

(2) Candidates in module examinations must be students enrolled in the chosen degree program at the University of Bonn or, respectively, in a degree program at the University of Bonn of which modules are imported in accordance with the Examination Regulations, or admitted as cross-registered students as defined by § 52, paragraph 1 HG.

(3) In the module examinations, students are to demonstrate the knowledge and competences acquired in the respective module as well as their ability to understand the larger context. Module examinations can be completed by passing graded module examination components. Module examinations and module examination components can include the following:
- Written examinations
- Oral examinations
- Term papers
- Project reports
- Presentations
- Talks
- Research proposals
- Quizzes
- Posters
- Reports
- Assignments

The type of examination and, if applicable, division into module examination components is stipulated in the applicable module structure. Deviating from the specifications stipulated in the module structure is possible in accordance with § 15, paragraph 4, § 16, paragraph 4 and § 17, paragraph 10; the examination board shall, in agreement with the examiners, determine the type of examination and, in accordance with § 8, paragraph 7, announce its decision in due time at the beginning of the semester.

(4) The module structure may stipulate that students must have completed certain assessments (coursework) prior to taking a module examination. Students who do not complete this required coursework

shall not be admitted to the module examination. Upon request filed by the teacher, the examination board shall, in accordance with § 8, paragraph 7, announce the specific requirements regarding such coursework at the beginning of the semester.

(5) Two examination dates shall be set for all written and oral module examinations. As a rule, the first examination date shall be set shortly after the end of the courses in the module. The second examination date shall be set in a manner that the degree program can be properly continued and completed within the standard period of study. The examination board shall appropriately announce all examination dates as well as the lengths of individual examinations in due time at the beginning of the semester pursuant to § 8, paragraph 7. Candidates who only take the examination at one of the two examination dates and do not pass the examination are not entitled to another examination date during the current semester.

(6) For courses in which achieving the learning objectives is not possible without active student participation, mandatory regular participation (compulsory attendance) may be stipulated per the module structure as prerequisite for registering for the examination and/or the awarding of ECTS credit points.
Depending on the type of course, the following absences (including absences due to illness) are permissible:

- Field trip / field exercise: max. 10%
- Lab courses / internships: max. 10%
- Practical exercises: max. 10%
- Seminars in the degree programs Microbiology Organismic Biology, Evolutionary Biology and Palaeobiology (OEP-Biology) and Paleontology max.10%
- Seminars in the degree programs Molecular Cell Biology and Plant Sciences max. 15%

For students verifiably responsible for caring for and raising children pursuant to § 25, paragraph 5 of the Federal Education and Training Assistance Act (*Bundesausbildungsförderungsgesetz*, BAföG), or for caring or providing for a spouse, registered partner, direct relative, second-degree indirect relative or first-degree in-law, § 19, paragraph 1, sentence 5 applies accordingly.

(7) The following applies when grading examinations:

1. Examinations submitted in writing shall be graded by a minimum of one examiner. Candidates shall be informed of the result of such examinations within four weeks.
2. Oral examinations are graded by one examiner in the presence of a competent assistant examiner. A record shall be kept of the essential topics and results of each examination. Candidates shall be informed of their grade immediately following the oral examination.
3. In the module structure, for individual examinations submitted in writing a different number of examiners can be set in deviation from number 1. The examination grade is calculated as the average of the two scores respectively assigned by the examiners.
4. For individual oral examinations, the module structure may stipulate that instead of the examination requiring one examiner in the presence of a competent assistant examiner, the examination must be graded by two or another specific, higher number of examiners. The examination grade is calculated as the average of the two scores respectively assigned by the examiners.
5. Notwithstanding numbers 1 and 2 above, resit examinations that, if failed, would mean failing the final attempt at the master's examination in accordance with § 25, paragraph 6 are to be graded by two examiners; specifications of the number of examiners in accordance with numbers 3 and 4 shall remain unaffected. In these cases, the grade for the examination shall be the average of the grades of the individual examiners.
6. Rules for grading the master's thesis are set forth in § 21, paragraphs 4 and 5.

(8) The respective examiners and the examination board may use anti-plagiarism software to check for plagiarism in examinations submitted in writing—this applies in particular to term papers and the final thesis (master's thesis). The processing of personal data outside of the University of Bonn is permissible in connection with the use of this software. Any data which could potentially identify the individual (student name, student ID number, etc.) must be removed before uploading an examination paper into the plagiarism

software. The ability to internally reference an examination grade to the respective student must be ensured using other data, e.g. an assigned examination number. The plagiarism software used must fully erase checked examinations once the check is completed; examinations may not subsequently be used as training data.

§ 13
Module examinations—registration and withdrawal

(1) For each module examination, students shall electronically register with the examination board by the prescribed deadline. In justified cases, registrations may be submitted in writing.

(2) The examination board shall make the examination dates as well as registration periods available by public display or in electronic form; registration deadlines are cutoff deadlines.

(3) Candidates may withdraw from a written or oral examination without indicating reasons until one week before the examination date. This shall not affect paragraph 6. Candidates may withdraw from term papers, posters, project reports, presentations and seminar talks until one week before assignment of the topic. Candidates may withdraw from reports, quizzes, assignments and research proposals until one week after the respective course has started. This shall not affect § 22, paragraph 3. The withdrawal can be submitted in electronic form or in writing. The date of receipt by the examination board determines whether the deadline has been met. Notwithstanding sentences 3 and 4, the examination board can set extended withdrawal deadlines for seminar talks, presentations and reports for field and lab exercises. The examination board announces the separate withdrawal deadlines by public display or electronically.

(4) Rules for registration for the master's thesis are defined separately in § 20, paragraph 2.

(5) Students must register for their first attempt at an examination in compulsory modules (except for the master's thesis) by the end of the third semester after the semester in which the course to which the examination is assigned in the applicable module structure/curriculum was planned. Students who fail to register within this period lose their right to examination unless they can prove that they were not at fault for failing to register in a timely manner. If the module structure specifies two different semesters in which the course can be taken, the later semester determines the beginning of the period specified in sentence 1. Students who lose their right to examination are deregistered from the degree program by the Student Registry once the examination board's decision has come into force.

(6) In the consecutive master's degree programs Microbiology and Molecular Cell Biology, registration for a module examination that is subsequently failed is automatically considered registration for

1. the second examination date after the failed examination if two examination dates are planned per academic year for that examination; or
2. the first examination date after the failed examination if one examination date is planned per academic year for that examination.

Withdrawing without reasons is then no longer possible unless, in cases of number 1, the student registers themselves for the next possible examination date by the deadline. Automatic registration does not occur in the consecutive master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) and Plant Sciences.

§ 14
Resitting examinations

(1) Examinations that have been graded "insufficient" may only be repeated twice. Resits shall be conducted in accordance with § 13, paragraph 6. Rules for repetition of the master's thesis are defined in § 21, paragraph 7.

(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 decision that the final attempt at the master's examination has been failed has come into force.

(3) Students who fail the same elective module three times lose their right to examination in that module. Students who lose their right to examination in three elective modules are deregistered from the degree program by the Student Registry once the notification 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. Notwithstanding sentence 1, students in the degree programs Microbiology and Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) who have acquired at least 45 ECTS credit points may, upon request, repeat passed examinations in up to two compulsory modules once in order to improve their grades, provided their master's thesis has not yet been submitted. In addition and notwithstanding sentence 1, students in the degree program Paleontology who have successfully completed a written or oral examination for a module at the first possible date for the module examination or module examination component in accordance with § 12, paragraph 5 are, upon request, permitted to participate in the second examination date for the module examination or module examination component according to § 12, paragraph 5, as well for the purpose of improving their grade. The better of the two grades obtained shall apply. Repeating passed examinations is not possible otherwise.

(5) Should a student fail to attend a compulsory resit examination according to § 13, paragraph 6 without valid excuse, that examination will be graded "insufficient."

(6) In modules in which examinations spread over a whole semester or are assigned to a specific course, examinations cannot be repeated in that same semester. The module examination in such modules can only be repeated by retaking the entire module or course. Respective examinations and coursework to be repeated are designated as such in the applicable module structure.

§ 15
Written examinations

(1) In written examinations, students are to demonstrate that, within a specific period of time and with limited auxiliary means, they are capable of understanding a problem from the module's subject area and solving this problem using methods commonly used in that field. The examiners shall announce in a timely manner which auxiliary means may be used during a written examination.

(2) Written examinations may be handwritten or computer-aided examinations, both conducted under supervision. Computer-aided written examinations include in particular open question or cloze tasks that are completed using a computer.

(3) Written examinations shall last a minimum of 30 minutes and a maximum of 180 minutes. § 12, paragraph 7 applies accordingly. The examination board shall announce the specific examination date at the beginning of the semester, in accordance with § 8, paragraph 7.

(4) The examination board may, in conjunction with the examiner, decide that instead of a written examination, an oral examination shall be held that covers the module's subject area; this shall be announced in due time at the beginning of the semester pursuant to § 8, paragraph 7.

§ 16
Oral examinations

(1) In oral examinations, candidates are to demonstrate sound knowledge in the subject of examination, identify correlations and analyze specific questions arising from these as well as provide possible solutions.

(2) The minimum time per candidate and module examination is 15 minutes, the maximum time is 45 minutes. When candidates are examined in a group, each candidate within that group shall be examined for the same amount of time.

(3) Students who wish to take the same oral examination at a later date may be admitted to sit in on the examination, provided that spatial circumstances allow for it and no candidate objects to their presence. The decision shall be made by the examiners. Students sitting in on an examination shall attend neither the discussion nor the announcement of results. They shall also be prohibited from taking notes during the examination.

(4) The examination board may, in conjunction with the examiner, decide that, instead of an oral examination, a written examination shall be held that covers the module's subject area. This shall be announced in due time at the beginning of the semester pursuant to § 8, paragraph 7.

§ 17
Term papers, project reports, presentations, seminar talks, research proposals, quizzes, posters, reports and assignments

(1) For term papers, candidates are to demonstrate that they are able to perform independent research on a limited topic in one of the subject areas of the module using methods commonly used in that field and to present this in writing in a manner that satisfies scientific requirements. Each term paper shall contain a minimum of 5 and a maximum of 30 DIN A4 pages. Candidates shall have a minimum of one and a maximum of fifteen weeks to prepare a term paper after receiving the topic. As a rule, registration for a term paper, including topic specification, takes place in the semester in which the associated course is offered. The topic of the term paper must be issued in timely fashion, so that—depending on the semester of the examination registration—the latest deadline, as a rule, is March 31 in a winter semester and September 30 in a summer semester.

(2) As a rule, project reports are used to show an ability to work in a team and, in particular, the ability to develop, implement and present concepts. Candidates are to demonstrate that they can define objectives and develop interdisciplinary problem-solving approaches and concepts for a complex assignment. Candidates shall have up to six weeks to prepare a project report after receiving the topic. In the case of group project reports, it must be possible to clearly identify and grade the contribution of each individual candidate, and the contribution must satisfy the requirements in sentence 1. The presentation should be a minimum of 10 and a maximum of 30 minutes long for each candidate. As a rule, project reports must be completed by the end of the semester in which the respective course is offered (by March 31 for courses in the winter semester and by September 30 for courses in the summer semester).

(3) Presentations are oral presentations that last a minimum of 10 and a maximum of 45 minutes; candidates demonstrate their ability to comprehensibly present and discuss their own documented research results raised using scientific methods. Candidates shall have a minimum of two weeks to prepare a presentation after receiving the topic. Presentations must be held by the end of the semester in which the respective course is offered (by March 31 for courses in the winter semester and by September 30 for courses in the summer semester).

(4) Seminar talks are oral presentations that last a minimum of 10 minutes and a maximum of 45 minutes and are based on original scientific texts. In seminar talks, candidates demonstrate their ability to comprehensibly present research results and explain them in a discussion. As a rule, seminar talks are supplemented by a hand-out as defined in paragraph 5, letter d. Candidates shall have a minimum of 2 weeks to prepare an oral presentation after receiving the topic. The oral presentation for a seminar talk must, as a rule, be held during the course of the semester in which the respective course is offered (by March 31 for courses in the winter semester and by September 30 for courses in the summer semester).

(5) Research proposals are common research documents in Anglo-American academic routine; they are between 0.5 (at least 200 words) and 5 DIN A4 pages in length, and candidates have between 2 days and 2 weeks to prepare them:

a. Data sheets are research documents prepared independently by the candidate that are a maximum of two DIN A4 pages in length in which candidates formally present the results of scientific research and/or their own research relating to a biological species or a process. Data sheets have a precise layout that is given out at the beginning of the course and are aimed at creating a common pool of knowledge in a course. Candidates shall have a maximum of one week and a minimum of two days to prepare them.
b. Written graded projects are research documents prepared on a specified topic that are a maximum of 5 DIN A4 pages in length and based on original scientific texts. Written graded projects document the candidate's ability to prepare a research text as a short manuscript with an abstract, citations and figures that is correct in terms of form and content. Candidates shall have 2 weeks to prepare a written graded project after receiving the topic.
c. Abstracts are written summaries of a research text or presentation that are a maximum of 1 DIN A4 page (400 words) in length. Abstracts document the candidate's ability to summarize a long research text or presentation as an abstract that is correct in terms of form and content. Candidates shall have a maximum of one week to prepare them.
d. Hand-outs are a written summary that is 1 DIN A4 page in length, can also include graphical components and presents the key statements in a seminar talk that is based on original scientific texts.
e. Methodology worksheets are written documents on a methodological or epistemological matter, e.g. hypothesis-driven research or plagiarism, that are a maximum of 3 DIN A4 pages in length. Methodology worksheets document the candidate's basic understanding of theoretical research relationships. Candidates shall have a maximum of one week to prepare them.

(6) Quizzes are examinations that are a maximum of 15 minutes long and are aimed at checking knowledge of content that was previously learned, or the ability to transfer that knowledge to answer questions in other areas. A quiz shall consist of one knowledge-transfer test or up to 10 questions. The time provided to complete the quiz must be in proportion to the complexity of the test or questions.

(7) Posters are one-page graphical representations of an independent research project that candidates present to the examiners in a five-minute poster presentation. The poster presentation is followed by a question period lasting a maximum of five minutes. The poster and poster presentation are graded based on criteria specified at the beginning of the course and are aimed at informing the entire group about the results of individual projects. Candidates shall have a maximum of one week and a minimum of 2 days to prepare them.

(8) Reports are written summaries of individual scientific research, field trips, lab exercises, field work or field exercises in which candidates comprehensibly present the sequence and results of their work, field trips or field exercises. Reports are based on notes, original scientific texts and individual research. Their layout, structure and scope (5–30 DIN A4 pages) shall reflect that of scientific publications. Candidates shall have a minimum of two weeks to prepare a report after receiving the topic of the scientific research / field trip / lab exercise / field work / field exercise.

(9) In assignments, candidates independently provide written solutions for tasks from the respective study sections in an appropriate period of time. They are used to strengthen and consolidate knowledge acquired in the course and to test the extent to which the educational objectives have been achieved. The examiners shall specify the number of assignments and the time that candidates have to complete them and shall announce this pursuant to § 8, paragraph 7. Assignments must be submitted in the semester in which the course is offered by the deadlines indicated by the examiner.

(10) The examination board can, with the agreement of the examiners, make the following changes to the type of examination covering the subject area of the module:

a. Term papers and seminar talks are interchangeable.

b. Reports, presentations and assignments are interchangeable.
c. Written examinations and reports are interchangeable.
In accordance with § 8, paragraph 7, the change in the type of examination shall be announced in due time at the beginning of the semester.

(11) In exceptional cases the examination board may grant an extension for completing a report, project report or term paper which represents an examination achievement by up to one quarter of the total alloted time for valid reasons, which include particularly illness resulting in the inability to participate in an examination. Candidates must apply with the examination board for an extension at least three days before the submission deadline, submitting proof of the reasons without delay. In cases of illness, candidates shall present a medical certificate proving their inability to participate in the examination. The examination board may, in individual cases and at the expense of the University, require the submission of a certificate from a doctor designated by the University if there are sufficient factual indications that the candidate would in fact have been able to participate in the examination or, respectively, submit their assignment on time or if the examination board deems other proof than that defined by sentence 3 appropriate in that case. The examination board decides whether to extend a deadline based on the certificate presented. § 19 remains unaffected.

(12) When submitting an examination that was completed in the form of a report, project report, term paper, seminar talk or lab course/internship report, the candidate must attest in writing that they independently completed the work, did not use any sources or auxiliary means other than those cited and marked all passages that were taken word for word or paraphrased from published or unpublished sources written by others (including output from generative AI tools). The examination board can require the candidate to provide an affidavit to this effect.

(13) Otherwise, the provisions for grading oral and written examinations stipulated in § 12, paragraph 7 apply accordingly.

§ 18
Digital examinations

(1) Written and oral module examinations may be conducted in digital form (“online examination” in accordance with § 64, paragraph 2, sentence 2 HG).

(2) If a module examination per paragraph 1 is to be conducted in digital form, the examiner notifies students thereof at the start of the lecture period. If such notification is not possible in a given case, notification must be given no later than one week ahead of the examination date. The examiner notifies students no later than one week in advance of the digital examination regarding organizational matters pertinent to the examination and of technical requirements regarding the communication equipment to be used. Before the examination, the students should have the possibility to test the examination situation in relation to technology, equipment and the room. Digital examinations may only be conducted using video conferencing services/online tools which have been approved by the Rectorate.

(3) Digital examinations are to be completed in a set time period using electronic communication technology under video monitoring without the participants being physically present in the room of the University of Bonn at the same time. During a digital written examination, students are required to activate the camera and microphone functions of the communication devices used for the examination (video monitoring). The use of virtual backgrounds is prohibited. Candidates must position the camera so that their face, upper body and hands are visible to the exam proctors at all times. Furthermore, video monitoring must be set up in such manner as to avoid impinging on the personal sphere of privacy of exam takers more than necessary for legitimate supervision purposes. Automated evaluation of image or sound data gathered during video monitoring does not take place. Recording the examination or otherwise saving image or sound data is prohibited. Notwithstanding § 21, paragraph 1, sentence 2 of the University Digital Ordinance (*Hochschul-*

Digitalverordnung, HDVO), if it is suspected that a candidate is cheating, then he or she can be required to turn the camera 360° through the room in which he or she is sitting.

(4) Oral digital examinations are conducted in the form of a video conference. During a digital oral examination, candidates are required to activate the camera and microphone functions of the device they are using. The use of virtual backgrounds is prohibited. Candidates must position the camera so that their face, upper body and hands are visible to the examiner at all times. The examiner and candidate are prohibited from recording the examination or otherwise saving image or sound data. Notwithstanding § 21, paragraph 1, sentence 2 of the University Digital Ordinance (*Hochschul-Digitalverordnung*, HDVO), if it is suspected that a candidate is cheating, then he or she can be required to turn the camera 360° through the room in which he or she is sitting.

(5) The candidate's identity is verified (authentication) by presenting a valid official photo ID upon demand. The storage/saving of data processed for authentication purposes other than as technically necessary on a temporary basis is prohibited. Temporarily saved/cached personal data must be promptly erased.

(6) If in a digital written examination the transmission or processing of an examination question/task, the transmission of the examination element itself or video monitoring are not technically functioning at the time of the examination, the examination is to be terminated at the stage in question and the examination is not graded.

(7) If video or sound transmission is temporarily disrupted during an oral examination held in digital form, the examination is to be continued when the disruption is resolved. If technical errors remain unresolved so that the oral or practical examination cannot be properly continued, the examination is terminated to be repeated at a later date.

(8) The candidate must report immediately any technical malfunctions occurring during a digital examination for mandatory documentation by the proctor/invigilator or examiner. If a digitally held examination is terminated due to technical problems, this is not recorded as an examination attempt by the students. The above does not apply to a candidate if it is proven that they were responsible for the disruption.

(9) Personal data required for conducting a digital examination may be processed by the examiners, the examination board and the providers of the video conferencing services/online tools utilized as necessary for conducting such. If the purpose of processing no longer applies, collected data are to be erased unless their continued storage is allowed under applicable retention regulations.

(10) The Data Protection Act for the state of North Rhine-Westphalia (*Datenschutzgesetz Nordrhein-Westfalen*, DSG NRW) and the EU General Data Protection Regulation (EU GDPR) as amended remain unaffected. Individuals whose personal data is processed have rights of information, rectification, erasure, restriction of processing, data transfer, objection and complaint in accordance with Articles 15 to 18, 20 to 23 and Article 77 EU GDPR. With the exception of the right to lodge complaints, these rights can be exercised by notifying the examination board. The responsible supervisory authority for complaints is the North Rhine-Westphalia State Commissioner for Data Protection and Freedom of Information (*Landesbeauftragte für Datenschutz und Informationsfreiheit Nordrhein-Westfalen*, LDI NRW); the contact details can be found on the LDI website. The contact details of the University of Bonn's data protection officer are on the University of Bonn's website.

§ 19
Accessibility accommodations and deadline extension

(1) Students who are unable to take an examination in the designated manner due to a disability or chronic illness, or due to maternity law provisions, can submit a request for accessibility accommodations to the examination board together with suitable proof; the same shall apply to the completion of coursework as

specified in § 12, paragraph 4. Accessibility accommodations are approved on a case-by-case basis. They can, in particular, provide for differences with respect to how the examination is taken, the length of the examination and the use of aids or support persons. For students with disabilities or chronic illnesses, the entitlement to accessibility accommodations shall extend to all of the examinations to be taken during the degree program, provided no change is expected in the illness or disability; sentence 2 remains unaffected. In the case of compulsory attendance courses and compulsory practical courses, internships and study periods abroad that cannot be completed due to the impairment, even with the support of the university, alternative forms of assessment that can provide equivalent competence and qualifications shall be permitted.

(2) When determining the deadline for the first attempt at an examination in accordance with § 13, paragraph 5 as well as upon automatic registration for a resit examination in accordance with § 13, paragraph 6, the examination board shall, upon application and provision of respective proof, consider additional time for the following:

a. Caring for and raising underage children as per § 25, paragraph 5 BAföG—for three semesters per child
b. Acting as elected representative in a university body, the student body, the student body's student councils or the Studierendenwerk—for a maximum of four semesters
c. Acting as gender equality officer—for a maximum of four semesters
d. Effects of a disability or severe illness prolonging the period of study
e. Caring for spouses, registered partners, direct relatives, second-degree indirect relatives or first-degree in-laws—for a maximum of three semesters

Part 6
Master's thesis

§ 20
Registration, topic and scope of the master's thesis

(1) The master's thesis is an examination in the form of a written assignment in which candidates are to demonstrate their ability to conduct research on, develop a solution for and appropriately present a problem from the field of their chosen master's degree program within a specified period of time, on their own authority and using scientific methods.

(2) Students must register their master's thesis with the examination board. The examination board announces the deadline for registration of master's theses required in order to complete the master's degree program within the standard period of study.

(3) When registering their master's thesis, students must indicate their choice of examiner for the master's thesis.

(4) Any examiner may assign the topic for the master's thesis in accordance with § 9, paragraph 1, sentence 1. As a rule, the examiner who assigned the topic also acts as supervisor of the master's thesis.

(5) The topic for the master's thesis shall only be issued when the candidate meets all requirements for the master's thesis as stipulated in the module structure (Annexes 1 to 5). The examination board shall assign the topic for the master's thesis. A record shall be kept of the topic and the date of issue. Prior to registration of the master's thesis, students shall be given the opportunity to submit proposals for the research area from which the topic of their master's thesis shall be taken; they shall not, however, have the right to a topic from a specific area. Upon request by the student, the examination board shall ensure that the student receives a topic for their master's thesis in due time as per paragraph 9.

(6) Candidates may reject a master's thesis topic only once and only within the first two months after its issue. Rejecting a topic does not count as a failed attempt. The new topic issued to the candidate must be substantially different from the initial topic.

(7) The master's thesis cannot be approved in the form of a group thesis.

(8) The master's thesis shall contain a minimum of 40 and a maximum of 80 DIN A4 pages of text.

(9) Passing the master's thesis awards 30 ECTS CP, corresponding to 900 hours in student workload. It must be completed within a maximum of six months. The examination board shall determine the deadline by which the master's thesis must be submitted and notify the student of that deadline. Topic, task and scope of the master's thesis shall be limited in a way that candidates may complete it under reasonable requirements within the specified period. Upon valid request and in conjunction with the supervisor, the examination board may grant an extension by a maximum of six weeks. As a rule, the topic of the master's thesis is issued at the end of the third semester.

§ 21
Submission, evaluation and repetition of the master's thesis

(1) Candidates shall submit three copies of their master's thesis to the examination board (in both print and a digital format suitable for electronic evaluation); a record shall be made of the time and date of submission. Candidates may not withdraw an already submitted master's thesis. Master's theses that are not submitted by the stated deadline shall be graded "insufficient."

(2) Candidates shall declare in writing when submitting their master's thesis that the thesis is their own work, that they used only those sources and resource cited in the thesis and that they have marked all passages that were taken word for word or paraphrased from published or unpublished sources written by others (including output from generative AI tools).

(3) Master's theses shall be evaluated and graded by two examiners. One of the examiners shall be the person who assigned the topic of the master's thesis; the second examiner shall be appointed by the examination board from among the group of examiners as defined by § 9, paragraph 1. It must be ensured that at least one of the examiners is a member of the group of professors or a *Privatdozent*in* at the University of Bonn. The candidate shall be entitled to propose examiners but shall not have a right to be assigned a specific examiner.

(4) The examiners shall each grade the master's thesis separately and provide the reasons for the grade they assigned in writing in accordance with § 25, paragraph 1. If the difference between the grades is less than 2.0, the grade for the master's thesis shall be calculated as the average of the individual grades. When the difference is 2.0 or more or one of the grades is "insufficient," the examination board shall appoint a third examiner to review the master's thesis. In this case the overall thesis grade is calculated as the average of the two best individual grades given. Grades shall be averaged in accordance with § 25, paragraph 2. A master's thesis may, however, only be awarded the grade "sufficient" or higher when at least two of the individual grades were "sufficient" or higher.

(5) The candidate is to be informed of the grade for the master's thesis within eight weeks of the submission deadline.

(6) Candidates who receive a grade of "sufficient" or higher for their master's thesis are awarded 30 ECTS CP.

(7) Master's theses graded "insufficient" may be repeated once. The topic of the second master's thesis may be chosen from the same area as the topic of the first master's thesis, but must be substantially different in nature. The candidate may reject the proposed topic for their master's thesis within the period specified in § 20, paragraph 6 only if they did not make use of this option with their first master's thesis. Should the second thesis also be graded "insufficient," the candidate shall have failed their final attempt at the master's

examination, losing their right to examination and being deregistered from the degree program by the Student Registry once the examination board's decision has come into force.

Part 7
Procedural irregularities and protective regulations

§ 22
Cancellation, failure to appear, withdrawal and reprimand

(1) Candidates may electronically cancel their registration for module examinations with the examination board before the deadlines indicated in § 13, paragraph 3; if this is not possible, cancellation can also be submitted in writing. The date of receipt by the examination board determines whether the deadline has been met.

(2) If a candidate withdraws from an examination after the cancellation deadline without good cause, the examination is graded "insufficient." The same applies when a candidate fails to appear for an examination or to submit an assignment within the specified period of time (failure to appear).

(3) Candidates who have registered for an examination but have good cause to withdraw from that examination, especially due to illness resulting in an inability to participate in the examination, may do so regardless of the cancellation deadline. The examination board shall be notified of such withdrawals immediately and in writing. Candidates shall immediately provide a written statement credibly substantiating the grounds for their withdrawal or failure to appear. In cases of illness, candidates shall present a medical certificate proving their inability to participate in the examination. Candidates who withdraw from a written examination due to illness after the start of the examination and assignment of the respective task must consult a medical examiner that same day of the examination to obtain a certificate proving their inability to continue the examination. As a rule, it is not possible to withdraw from an examination after the start of the examination, especially when the candidate has already seen, or otherwise obtained knowledge of, the examination result. The examination board may, in individual cases, require the submission of a certificate from a doctor designated by the University if there are sufficient factual indications that the candidate would in fact have been able to participate in the examination or, respectively, submit their assignment on time or if the examination board deems other proof than that defined by sentence 4 appropriate in that case. The University pays the costs for obtaining such a doctor's certificate. If the examination board accepts a medical certificate allowing for withdrawal due to illness or other good cause given by the candidate, the examination attempt shall be deemed void.

(4) Candidates shall immediately reprimand any deficiencies related to an examination with the respective examiner or proctor. The reprimand shall be entered into the record and asserted in front of the examination board. If the examination board accepts the reprimand, the examination attempt shall be deemed void.

§ 23
Deception and disruption of examinations

(1) Candidates who try to influence the outcome of an examination through deception or the use of inadmissible auxiliary means can receive the grade "insufficient"; the respective examiner or proctor shall identify deception or use of inadmissible auxiliary means, include it in the record and forward it to the examination board for a decision. Prior to making a decision, the examination board shall give the candidate an opportunity to state their case.

(2) The respective examiner or proctor may bar any candidate from continuing an examination who, despite a warning, disrupts the orderly conduct of the examination; in such cases, the examination shall be graded "insufficient." A record shall be made of the reasons for barring the candidate from the examination. Candidates may, within a period of two weeks, request that the decision be reviewed by the examination board.

(3) The examination board shall determine whether the candidate's attempt at deception was repeated or otherwise serious. After hearing the candidate, in such cases the examination board can decide whether the candidate loses their right to examination in this degree program. The student will be deregistered by the Student Registry once the examination board's decision on the loss of the right to examination has come into force.

(4) Violating the provisions in these Examination Regulations regarding deception in examinations is an administrative offense. This administrative offense may be subject to a fine of up to EUR 50,000. As the competent administrative authority, the Provost of the University of Bonn shall pursue and fine administrative offenses pursuant to sentence 1.

§ 24
Protective regulations

(1) Regulations on maternity leave stipulated in the Maternity Protection Act (*Mutterschutzgesetz*, MuSchG) as amended shall be respected; students shall provide all necessary proof. All time frames stipulated in these Examination Regulations shall be suspended by maternity leave; time frames for periods of assessment shall not include periods of maternity leave. The examination board shall notify the student of newly determined examination deadlines once all necessary proof has been submitted.

(2) Allowances shall likewise be made on application for parental leave under the Parental Allowance and Parental Leave Act (*Gesetz zum Elterngeld und zur Elternzeit*, BEEG) as amended. Candidates shall notify the examination board in writing of the period(s) during which they wish to take parental leave, enclosing necessary substantiating documentation, at least four weeks prior to the date on which they wish to enter parental leave. The examination board shall determine whether the statutory requirements have been met which would lead to an employee being entitled to parental leave under the BEEG and shall inform the candidate immediately of its findings and, if applicable, any new examination deadlines. Time frames for the completion of examinations may not be interrupted by a period of parental leave. The examination topics shall be deemed not issued. The candidate shall receive a new topic at the end of their parental leave. This does not affect § 22, paragraph 3, sentence 1.

(3) Allowances shall likewise be made on application for leave taken for the care of spouses, registered partners, direct relatives, second-degree indirect relatives or first-degree in-laws who are in need of care. The examination board shall review whether the requirements defined by sentence 1 are met. The application is to be submitted as soon as these requirements are met. Relevant documentation shall be attached to the application. The examination board shall immediately notify the candidate of the result and, if applicable, of the new examination deadlines. Time frames for the completion of examinations may not be extended based on such leave taken. The examination topics shall be deemed not issued. The candidate shall receive a new topic at the end of their leave. This does not affect § 22, paragraph 3, sentence 1.

Part 8
Grading and final documentation

§ 25
Grading of examinations, grading system and pass requirements for the master's examination

(1) The grade for each examination shall be determined by the respective examiners. If the examination is conducted by more than one examiner, the grade shall be calculated using the average of the individual grades. This shall not affect § 12, paragraph 7. The following grading system shall be used:

1	very good	excellent achievement
2	good	achievement well above average requirements
3	satisfactory	achievement corresponding to average requirements

4	sufficient	achievement that still meets necessary requirements despite deficiencies
5	insufficient	achievement that does not satisfy requirements due to substantial deficiencies

In order to produce a graduated grading scale and provide a more nuanced evaluation, individual grades may be raised or lowered by values of 0.3; grades 0.7, 4.3, 4.7 and 5.3 shall not be admissible. An examination is passed if it is graded "sufficient" or higher; otherwise it is failed.

(2) Only the first decimal place after the decimal shall be used when calculating the grades for individual modules or for overall performance; all further decimal places shall be dropped without rounding off.

(3) A module examination shall be deemed passed when the module is graded at least "sufficient." If a module grade includes more than one examination component, it shall be calculated using the individual examination weights indicated in the module structure. This does not affect § 10, paragraph 3, sentence 4. The grading scale for modules is as follows:

With an average grade up to and including 1.5	= very good
With an average grade from 1.6 up to and including 2.5	= good
With an average grade from 2.6 up to and including 3.5	= satisfactory
With an average grade from 3.6 up to and including 4.0	= sufficient
With an average of 4.1 or higher	= insufficient

(4) Candidates shall have passed the master's examination when they have passed all necessary modules as per § 4, paragraph 4 as well as the master's thesis and have thus been awarded a total of 120 ECTS CP.

(5) The calculation of the overall grade shall include all graded modules. Each grade from individual modules shall be weighted by multiplying it with the number of ECTS credit points assigned to the respective module. The sum of these weighted module grades is then divided by the total number of ECTS credit points (weighted average). Paragraph 3, sentence 4 applies accordingly. By way of derogation, the overall grade is "excellent" if the calculated overall grade is no worse than 1.3 and the master's thesis was graded "very good" (1.0). Modules marked "passed" due to lack of comparability between grading systems shall not be included when calculating the overall grade.

(6) The master's examination shall be deemed failed at the final attempt when

- the candidate fails three times to pass an examination for a compulsory module per § 10, paragraph 3, sentence 4, letter a or per § 14, paragraph 2;
- the candidate has, in accordance with § 14, paragraph 3, lost their right to examination in three elective modules; or
- the master's thesis has been graded "insufficient" in the second attempt.

§ 26
Certificate

(1) The candidate shall, upon request, be notified of the results of their successful master's examination in a provisional certificate as soon as all grades have been submitted. A certificate shall thereafter be issued in German. An English translation of the certificate is also issued. The certificate shall include the following information:

- All modules for which ECTS credit points were earned
- The semester in which ECTS credit points were earned
- All grades from individual modules
- The topic and grade of the master's thesis
- The date of the last examination
- The overall grade of the master's examination

On application by the candidate, results from additional examinations as per § 31 may also be included in the certificate; these shall not be included when calculating the overall grade.

(2) The certificate shall state the date of issue. The certificate shall be stamped with the seal of the Faculty of Mathematics and Natural Sciences and signed by the chair of the examination board.

(3) Candidates who have failed their final attempt at the master's examination shall be issued a written notification thereof by the examination board, including information on legal remedies available.

(4) Students who leave the University without acquiring a degree can, after deregistering, receive by request a transcript stating all completed coursework and examinations. This transcript only states those parts of the student's chosen degree program that were successfully completed. In addition, a notification may be issued upon request that indicates which examinations the student did not pass or still needs to complete in order to pass the master's examination.

§ 27
Master's diploma

Along with the certificate for the master's examination, candidates shall receive a master's diploma issued the same day in German with an English translation stating that the candidate has been awarded the academic degree as per § 3. Master's diplomas shall be signed by the Dean of the Faculty of Mathematics and Natural Sciences at the University of Bonn and by the chair of the examination board as well as stamped with the seal of the Faculty.

§ 28
Diploma supplement

The master's diploma shall be augmented by a diploma supplement. The diploma supplement is a standard document in English and German that shall include the following information:
- Essential contents of the program underlying the degree
- The course of studies
- The competences acquired with the degree
- Information on the accreditation of the chosen degree program
- Information on the university awarding the degree

The diploma supplement shall give a relative classification of the overall grade of the master's examination on the ECTS grading scale.

§ 29
Access to examination records

(1) Candidates shall, on application, be granted access to their examinations, the examiners' written reviews as well as records of oral examinations; applications must be submitted within three months after notification of the examination result. This does not affect § 29 of the Administrative Procedure Act (*Verwaltungsverfahrensgesetz*, VwVfG).

(2) Candidates shall, on written application within three months after the examination board has issued the certificate as per § 26, be granted access to their examination records. This does not affect § 29 VwVfG.

(3) The examination board shall determine when and where the examination records may be accessed and notify the candidate of this in due time. The examination board shall determine the details concerning the possibility of preparing copies or other true reproductions, and shall announce them in accordance with § 8, paragraph 7. Copies and other reproductions of examination records or parts of the records are only intended for candidates to pursue their own rights arising under the legal examination relationship and are therefore only to be used by the candidates, or made available to individuals engaged by the candidates to safeguard their legal interests. Any other duplication or distribution of copies or other reproductions is not permitted.

§ 30
Invalidity of the master's examination and revocation of the master's degree

(1) Should it become known after the certificate has been issued that the candidate used deception in an examination, the examination board may correspondingly correct the grades for those examinations in which the candidate used deception as well as the overall grade and declare the examination or parts of the examination failed.

(2) Should it become known after the certificate has been issued that the candidate had not met the requirements for admission to an examination, and should this have happened without any fraudulent intent on the part of the candidate, this defect shall be remedied by the candidate's successful completion of the examination. Should the candidate have wrongfully secured admission with intent, the examination board shall decide on the legal consequences in accordance with the VwVfG.

(3) Candidates shall be heard before the examination board makes a decision.

(4) The incorrect certificate shall be withdrawn and, where applicable, a new certificate shall be issued. If one or more examinations are declared failed due to deception, the incorrect certificate also makes the master's diploma and all other graduation documentation void. Decisions in accordance with paragraph 1 and paragraph 2, sentence 2 may be made only for a period of five years after the certificate has been issued.

(5) Should the master's examination be deemed altogether failed, the master's degree shall be revoked and the master's certificate, master's diploma as well as all other graduation documentation shall be withdrawn.

§ 31
Additional examinations

Students may, until the end of the semester in which they complete the master examination as per § 10, paragraph 2, extend their standard scope of studies on application by up to 20 ECTS CP in additional modules. These may be modules from the chosen master's degree program as well as other modules for which credit would otherwise not be granted, provided that they are offered at the University of Bonn and eligible as additional module for the chosen degree program. Credit can only be granted for modules that are completed within one and a half times the standard period of study. The results of additional examinations shall be included in the certificate in accordance with § 26 on application by the candidate, however it shall not be included when calculating the overall grade.

Part 9
Entry into force

§ 32
Entry into force and publication

These Regulations enter into force on October 1, 2025. Public notice of these Regulations will be given in the Official Announcements of the University of Bonn.

W. Witke

The Dean
of the Faculty of Mathematics and Natural Sciences
at the University of Bonn
Professor Dr. Walter Witke

This document was prepared and executed pursuant to the resolution of the Faculty Council of the Faculty of Mathematics and Natural Sciences of July 2, 2025, the decision of the Faculty Council of the Faculty of Agricultural, Nutritional, and Engineering Sciences of July 2, 2025, the decision of the Faculty Council of the Faculty of Medicine of July 7, 2025, the expedited decision of the Dean of the Faculty of Mathematics and Natural Sciences of July 16, 2025, and the resolution of the Rectorate of July 22, 2025.

Bonn, August 18, 2025

M. Hoch

The Rector
of the University of Bonn
Professor Dr. Dr. h.c. Michael Hoch

Annex 1: Module structure for the consecutive master's degree program Microbiology

Module structure key:

- Abbreviations of course types: FT = field trip, C = colloquium, LC = lab course/internship, S = seminar, E = exercise, V = lecture.
- Marked with asterisk (*): courses with compulsory attendance as a prerequisite for taking the module examination and earning credit, in accordance with § 12, paragraph 6. In these cases, compulsory attendance is an additional requirement to other listed assessments.
- 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 program-related semester (PRS).
- The Coursework column shows requirements that must be met for admission to certain examinations pursuant to § 12, paragraph 4 or, respectively, to acquire credit points in modules without an examination. Coursework that is required for admission to certain examinations and must be repeated in case that examination is failed is marked with the letter "r" (^{r}).
- In the Type of Examination column, examinations as defined by § 14, paragraph 6 that cannot be repeated within one semester but must rather be repeated along with the entire module or, respectively, the corresponding course are marked with the letter "r" (^{r}). Examinations that are assessed by two examiners in accordance with § 12, paragraph 7, nos. 3 and 4 are marked with "^{2E}."

The examination board shall make further details on individual modules, especially regarding the courses offered within or required for completion of a module, available in a module guide before the beginning of the respective semester pursuant to § 8, paragraph 7.

Compulsory Modules

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB1	General and Molecular Microbiology and its Methods Theory Module	L, E*	None	D: 1 sem. PRS: 1st sem.	Detailed theoretical knowledge in general and molecular microbiology.	None	Written examination	6
MIB2	General and Molecular Microbiology Lab	L, LC*	None	D: 1 sem. PRS: 1st sem.	Students are familiarized with the principles of general and molecular microbiology. They also acquire a sound knowledge of spectroscopic and spectrometric analytics, genetic techniques, plasmids, expression and the specific physiological characteristics, regulatory mechanisms and DNA transfer of the major prokaryotes.	Report	Written examination (50%) Report (50%)	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB3	Medical Microbiology (bacteriology, parasitology, immunology)	L, LC*, S*	None	D: 1 sem. PRS: 1st sem.	Upon completing the course, students will have learned the basics of medical bacteriology, parasitology and immunology. They study normal human flora, pathogenic bacteria and parasites that produce infectious diseases, their diagnosis in a clinical laboratory and the interaction between host and pathogen. Students learn a variety of methods used to identify bacteria and parasites and how to prepare various antibiotic resistance tests. They also learn the basic immunological tests. Their level of knowledge at this point will allow them to apply to a clinical laboratory for advanced training as a microbiology specialist (*Fachmikrobiologe*) in the future.	Report	Written examination	9
MIB4	Agricultural and Food Microbiology Lecture Series	L	None	D: 2 sem. PRS: 1st and 2nd sem.	Basic knowledge of the role and function of microorganisms in food production and processing; the occurrence and importance of phytopathogenic organisms, prevention strategies and control options.	None	2 written examinations (50% each)	6
MIB5	Agricultural and Food Microbiology Lab	LC*	None	D: 1 sem. PRS: 2nd sem.	Microbiological detection methods in food microbiology and the diagnosis and epidemiology of phytopathogens.	None	Report	6
MIB6	Virology Lecture	L	None	D: 1 sem. PRS: 2nd sem.	Students will have sound theoretical knowledge in the field of virology at the end of this module.	None	Written examination	4
MIB7	Virology—Basic Laboratory Techniques	LC*, S*	None	D: 1 sem. PRS: 2nd sem.	Students are familiarized with various techniques used in basic viral research and/or viral diagnostics. When combined with lecture MIB6, students will be able to design their own approaches to solving research and diagnostic problems.	Report	Written examination	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB8	Microbiology Field Trip	FT*	None	D: 1 sem. PRS: 2nd sem.	The microbiology field trips ensure that the degree program has practical relevance. They provide information on the use of microbiological methods and offer insights into potential lines of work.	Students participate in a total of three field trips, one in each of three of the four following areas: (1) General and applied microbiology (2) Agricultural and food microbiology (3) Virology and (4) Medical microbiology Criteria for awarding credit points: Report for a field trip (ungraded)	None	3
MIB49	Master's Thesis		MIB1–MIB7 and 60 CP	D: 1 sem. PRS: 4th sem.	Students independently plan and evaluate an experiment and prepare a research paper.	None	Master's thesis	30

Elective Modules A (total of at least 30 ECTS CP)

At least 30 ECTS CP must be obtained from Elective Modules A. A maximum of 2 lab exercises can be taken in two different working groups (different module numbers, A and B versions of modules with the same base number cannot be taken at the same time) for a total of 18 ECTS CP. One lab is to be taken in the master's thesis working group.

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB56	Literature Research and Database Analysis	E	MIB1 to MIB7, the module may not be taken at the same time as the master's thesis	D: 1 sem. PRS: 3rd sem.	Students learn to use literature research and database analysis to theoretically examine a microbiological topic of limited scope and present it in writing in a manner that satisfies scientific requirements.	None	Term paper[2E]	6
MIB60	Research and Industry Internship (in a non-University research organization or industrial company performing research)	LC*	At least three of the compulsory modules MIB1–MIB7	D: 1 sem. PRS: 3rd sem.	Students have the opportunity to make contact with the working world at an early stage in their careers so that they can subsequently work in science and industry. The internship is aimed at putting students in a situation where they can apply the knowledge they have acquired to practical problems in a typical professional environment. Students learn to apply microbiological processes, principles and systems in practice by working on a project assigned by the company and approved by the University. By preparing a report, students learn to professionally present the results of their own work in writing.	Criteria for awarding credit points: Report (ungraded)	None	6
General Microbiology Area (Faculty of Mathematics and Natural Sciences)								
MIB12	Genetic Manipulation of Prokaryotes	LC*, S*, L	MIB1 and MIB2	D: 1 sem. PRS: 2nd sem.	Students learn how foreign DNA can be introduced into bacteria and made to function.	Seminar talk	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB13	Cellular Microbiology	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 1st or 3rd sem.	Students are introduced to the molecular interactions between mammalian host cells and intracellular pathogens. They learn about culturing mammalian cells, *in vitro* infection with harmless and pathogenic bacteria, fluorescence microscopy, electron microscopy and cell vitality assays.	Presentation	Seminar talk (50%), report (50%)	6
MIB14	Chemistry of Natural Products	LC*	MIB72	D: 1 sem. PRS: 3rd sem.	This course deals with the analysis and biosynthesis of natural products. Students study chromatographic (HPLC, GC, DC) and spectroscopic methods (NMR, UV) used to isolate and chemically analyze natural products. The second part of the course deals with methods used to analyze proteins and biosynthetic genes (PCR, electrophoresis).	None	Written examination (50%), report (50%)	6
MIB15	Proteobacteria Non-Model Organisms as Platforms for Protein Purification and Analysis	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 3rd sem.	The participants understand that many bacterial proteins, especially those that contain complex prosthetic groups, are not amenable to recombinant production in *Escherichia coli* and simple purification using affinity chromatography. Students learn techniques for efficient purification of pure proteins from non-model organisms using FPLC (Fast Performance Liquid Chromatography). After the module, participants can operate a modern Äkta FPLC system independently and sensibly combine modern high-performance materials (Q Sepharose, Sephadex G75, etc.). In addition, they can apply affinity-chromatographic techniques to non-model organisms. After the module, participants can also apply UV using spectroscopic, electrophoretic, enzyme-kinetic and immunological techniques to characterize the purified proteins.	None	Seminar talk (25%), report (75%)	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB76	Bacterial Cell Biology Using Fluorescence Methods	LC*, S*	MIB1 and MIB3	D: 1 sem. PRS: 1st or 3rd sem.	Participants become familiar with various fluorescence methods commonly used in (micro)biology to study cell biology—e.g. to measure molecular organization within cells, protein-protein interactions or protein stoichiometry. The module enables participants to select the optimal fluorescence technique for various research questions and to use spectrometers and fluorescence microscopes. In addition, the module teaches how experiments are set up and carried out in practice and how the data is analyzed.	Seminar talk	Report	6
MIB67-A	Microbial Physiology Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	Students learn to address a research question in the field of microbial physiology (e.g., adaptation to changing environmental conditions, stress adaptation, survival strategies, etc.). This includes acquiring theoretical background knowledge, planning experimental procedures and critically analyzing the data acquired.	Presentation	Report	6
MIB67-B	Microbial Physiology Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	Students learn to address a research question in the field of microbial physiology (e.g., adaptation to changing environmental conditions, stress adaptation, survival strategies, etc.). This includes acquiring theoretical background knowledge, planning experimental procedures and critically analyzing the data acquired. Unlike the alternative lab with the same name, MIB67-A, an in-depth experimental analysis of the problem is performed in module MIB67-B. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB17-A	Growth and Metabolism of Methanogens and Intestinal Bacteria Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in general, applied and molecular microbiology using the example of methanogens and intestinal bacteria. Students acquire theoretical (e.g. literature search and oral presentations) and practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area.	Presentation	Report	6
MIB17-B	Growth and Metabolism of Methanogens and Intestinal Bacteria Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in general, applied and molecular microbiology using the example of methanogens and intestinal bacteria. Students acquire theoretical (e.g. literature search and oral presentations) and detailed practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area. Unlike the alternative lab with the same name, MIB17-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB18-A	Biotransformation of Acetic Acid Bacteria Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in general, applied and molecular microbiology using the example of acetic acid bacteria. Students acquire theoretical (e.g. literature search and oral presentations) and practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area.	Presentation	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB18-B	Biotransformation of Acetic Acid Bacteria Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in general, applied and molecular microbiology using the example of acetic acid bacteria. Students acquire theoretical (e.g. literature search and oral presentations) and detailed practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area. Unlike the alternative lab with the same name, MIB18-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB53-A	Microbial Sulfur Metabolism Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in general, applied and molecular microbiology using the example of microbial sulfur metabolism. Students acquire theoretical (e.g. literature search and oral presentations) and practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area.	Presentation	Report	6
MIB53-B	Microbial Sulfur Metabolism Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in general, applied and molecular microbiology using the example of microbial sulfur metabolism. Students acquire theoretical (e.g. literature search and oral presentations) and detailed practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area. Unlike the alternative lab with the same name, MIB53-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB20-A	Cellular Microbiology Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in cellular microbiology. Students acquire theoretical (e.g. literature search and oral presentations) and practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area.	Presentation	Report	6
MIB20-B	Cellular Microbiology Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in cellular microbiology. Students acquire theoretical (e.g. literature search and oral presentations) and detailed practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area. Unlike the alternative lab with the same name, MIB20-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB64-A	Pharmaceutical Biology Lab	LC*	MIB1	D: 1 sem. PRS: 2nd or 3rd sem.	Microorganisms produce many pharmaceutically important secondary metabolites. This lab gives students the opportunity to take part in current research in the field of natural product biosynthesis, in particular using polyketide synthases (PKS) and non-ribosomal peptide synthetases (NRPS). Students work on subprojects by jointly planning and then performing experiments. This allows them to learn molecular biological, analytical and *in silico* methods. The experiments performed and the results achieved are documented and discussed.	None	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB64-B	Pharmaceutical Biology Lab	LC*	MIB1	D: 1 sem. PRS: 2nd or 3rd sem.	Microorganisms produce many pharmaceutically important secondary metabolites. This lab gives students the opportunity to take part in current research in the field of natural product biosynthesis, in particular using polyketide synthases (PKS) and non-ribosomal peptide synthetases (NRPS). Students work on subprojects by jointly planning and then performing experiments. This allows them to learn molecular biological, analytical and *in silico* methods. The experiments performed and the results achieved are documented and discussed. Unlike the alternative lab with the same name, MIB64-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use techniques with such proficiency that reliable results are achieved.	None	Report	9
Medical and Pharmaceutical Microbiology Area (Faculty of Mathematics and Natural Sciences)								
MIB77-A	Quantitative Microbial Cell Biology Lab	LC*, S*	MIB1 and MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This module offers the opportunity to work under supervision on a current experimental project with a scientific question from the main areas of research in quantitative microbial cell biology. Qualification objectives: Students acquire the necessary skills for the completion of a scientifically oriented, written project in quantitative microbial cell biology: Problem-oriented planning of experimental approaches under supervision and carrying out of experiments; ability to critically analyze relevant literature; ability to document results scientifically.	Presentation	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB77-B	Quantitative Microbial Cell Biology Lab	LC*, S*	MIB1 and MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This module offers the opportunity to work under supervision on a current experimental project with a scientific question from the main areas of research in quantitative microbial cell biology. Qualification objectives: Students acquire the necessary skills for the completion of a scientifically oriented, written project in quantitative microbial cell biology: Problem-oriented planning of experimental approaches under supervision and carrying out of experiments; ability to critically analyze relevant literature; ability to document results scientifically Unlike the alternative lab with the same name, MIB77-A, an in-depth experimental analysis of the problem is performed in this module. Students acquire competence in confidently carrying out complicated lab techniques, enabling them to obtain detailed, reliable results.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB78-A	Single-Molecule Microbiology Lab	LC*, S*	MIB76	D: 1 sem. PRS: 2nd or 3rd sem.	Single-molecule microscopy and spectroscopy provide detailed insights into the molecular organization and dynamic processes of (micro)biological systems. In order to achieve the high resolutions of these techniques, single-molecule experiments are highly fine-tuned processes that require ad hoc decisions with a high degree of precision before and during the measurement. Many post-processing and analysis steps are also finely calibrated. This module offers the opportunity to work on a current project of the working group using high-resolution techniques and to learn these techniques under supervision. Qualification objectives: Students acquire the necessary skills for the completion of a scientifically oriented, written project using single-molecule techniques: problem-oriented planning of experimental approaches under supervision and carrying out of experiments; work with software and scripting (mostly Python); ability to critically analyze relevant literature; ability to document results scientifically.	Presentation	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB78-B	Single-Molecule Microbiology Lab	LC*, S*	MIB76	D: 1 sem. PRS: 2nd or 3rd sem.	Single-molecule microscopy and spectroscopy provide detailed insights into the molecular organization and dynamic processes of (micro)biological systems In order to achieve the high resolutions of these techniques, single-molecule experiments are highly fine-tuned processes that require ad hoc decisions with a high degree of precision before and during the measurement. Many post-processing and analysis steps are also finely calibrated. This module offers the opportunity to work on a current project of the working group using high-resolution techniques and to learn these techniques under supervision. Qualification objectives: Students acquire the necessary skills for the completion of a scientifically oriented, written project using single-molecule techniques: Problem-oriented planning of experimental approaches under supervision and carrying out of experiments; work with software and scripting (mostly Python); ability to critically analyze relevant literature; ability to document results scientifically. Unlike the alternative lab with the same name, MIB78-A, an in-depth analysis of the problem is performed in this module. Students acquire competence so they can confidently carry out complicated analyses and evaluations, enabling them to obtain detailed, reliable results.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB79-A	Microscopy of Viral Infections Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	High-resolution modern light microscopy methods provide detailed insights into the molecular organization and dynamic processes of (micro)biological systems. These methods enable students to visualize and measure highly complex events during viral replication such as the assembly and transport of new virus particles. Qualification objectives: Students acquire the necessary skills for the completion of a scientifically oriented, written project using single-molecule techniques: Problem-oriented planning of experimental approaches under supervision and carrying out of experiments; work with software and scripting (mostly ImageJ); ability to critically analyze relevant literature; ability to document results scientifically.	Presentation	Report	6
MIB79-B	Microscopy of Viral Infections Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	High-resolution modern light microscopy methods provide detailed insights into the molecular organization and dynamic processes of (micro)biological systems. These methods enable students to visualize and measure highly complex events during viral replication such as the assembly and transport of new virus particles. Qualification objectives: Students acquire the necessary skills for the completion of a scientifically oriented, written project using single-molecule techniques: Problem-oriented planning of experimental approaches under supervision and carrying out of experiments; work with software and scripting (mostly ImageJ); ability to critically analyze relevant literature; ability to document results scientifically. Unlike the alternative lab with the same name, MIB79-A, an in-depth analysis of the problem is performed in this module. Students acquire competence so they can confidently carry out complicated analyses and evaluations, enabling them to obtain detailed, reliable results.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB80-A	Molecular Physiology of Microalgae and Cooperation Partners Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	In this lab, students focus on researching the photoautotrophic green alga *Chlamydomonas reinhardtii* and its interactions and cooperation with other microorganisms. The aim is to apply modern research techniques from molecular biology, biochemistry, physiology and cell biology in order to understand complex processes. By participating in ongoing research projects, students acquire the skills to develop and implement experimental approaches and critically evaluate results. The aim is also to engage with relevant specialist literature and develop the ability to document and present findings scientifically in English.	Presentation	Report	6
MIB80-B	Molecular Physiology of Microalgae and Cooperation Partners Lab	LC*, S*	MIB1 and MIB2	D: 1 sem. PRS: 2nd or 3rd sem.	In this lab, students focus on researching the photoautotrophic green alga *Chlamydomonas reinhardtii* and its interactions and cooperation with other microorganisms. The aim is to apply modern research techniques from molecular biology, biochemistry, physiology, and cell biology in order to understand complex processes. By participating in ongoing research projects, students acquire the skills to develop and implement experimental approaches and critically evaluate results. The aim is also to engage with relevant specialist literature and develop the ability to document and present findings scientifically in English. Unlike the alternative lab with the same name, MIB80-A, an in-depth analysis of the problem is performed in this module. Students acquire competence so they can confidently carry out complicated analyses and evaluations, enabling them to obtain detailed, reliable results.	Presentation	Report	9
MIB23	Bacterial Pathogenicity Mechanisms and Antibiotic Resistance	LC*, L, S*	MIB3	D: 1 sem. PRS: 2nd sem.	Students learn the main bacterial virulence factors that mediate colonization, adhesion, invasion and resistance to the host immune system. They also study the mechanisms that mediate antibiotic resistance and those that promote the evolution of this resistance.	Seminar talk and report	Written examination	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB24	Aspects of Parasitic Immunology	LC*, L, S*	MIB3	D: 1 sem. PRS: 2nd sem.	Students are familiarized with the basic aspects of immunology and the techniques used in parasitic immunology. They study the molecular and cell biological mechanisms underlying inflammatory and immune-mediated responses during parasitic infection and how dysfunction of these processes can lead to serious host pathology. Students will be able to describe animal models of parasitic diseases, such as those used for malaria or helminth infections. They also acquire conceptual and methodological skills based on discussions of current scientific literature during the course.	Presentation	Written examination	6
MIB25	Parasitic Protozoa and Helminths	P*, L, S*	MIB3	D: 1 sem. PRS: 3rd sem.	Students study the different modes of transmission of medically relevant vector-mediated diseases and deepen their knowledge of parasitic biology. They gain an understanding of the special characteristics of pathogens and vector-parasite interactions and their epidemiological relationships. This module teaches students to classify ectoparasites and the pathogens they transmit and use histological specimens to identify parasites and classify their relevance for human infections.	Report and seminar talk	Written examination	6
MIB26-A	Antibiotic Biosynthesis and Antibiotic Resistance Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research on antibiotic resistance mechanisms or the isolation and design of new antibiotically active peptides. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (lab experiments using sophisticated techniques).	Presentation	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB26-B	Antibiotic Biosynthesis and Antibiotic Resistance Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research on antibiotic resistance mechanisms or the isolation and design of new antibiotically active peptides. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (detailed lab experiments using sophisticated techniques). Unlike the alternative lab with the same name, MIB26-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB27-A	Cell Wall Biosynthesis and Mechanisms of Antibiotic Action Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research on cell wall biosynthesis and antibiotics that target this metabolic pathway. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (lab experiments using sophisticated techniques).	Presentation	Report	6
MIB27-B	Cell Wall Biosynthesis and Mechanisms of Antibiotic Action Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research on cell wall biosynthesis and antibiotics that target this metabolic pathway. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (detailed lab experiments using sophisticated techniques). Unlike the alternative lab with the same name, MIB27-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB28-A	Parasitology Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This module gives students the opportunity to take part in a current project in the field of antihelminthic drug development. Students learn to theoretically plan and implement a research question.	Presentation	Report	6
MIB28-B	Parasitology Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This module gives students the opportunity to take part in a current project in the field of antihelminthic drug development. Students learn to theoretically plan and implement a research question. Unlike the alternative lab with the same name, MIB28-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB55-A	Public Health-Related Microbiological Hygiene Testing Methods Lab	LC*, S*	MIB1, MIB2, participation in MIB3 recommended	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in the area of microbiological hygiene testing, in particular water hygiene. Students acquire theoretical (e.g. literature search) and practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area.	Presentation	Report	6
MIB55-B	Public Health-Related Microbiological Hygiene Testing Methods Lab	LC*, S*	MIB1, MIB2, participation in MIB3 recommended	D: 1 sem. PRS: 2nd or 3rd sem.	This lab focuses on learning research project management and experimental procedures in the area of microbiological hygiene testing, in particular water hygiene. Students acquire theoretical (e.g. literature search) and practical knowledge (e.g. modern laboratory techniques and quality standards) in this research area. The specific questions that are dealt with experimentally and theoretically come from the field of microbiological hygiene and concern in particular drinking water and bodies of water. In addition to classical cultural methods and morphological and physiological differentiation, molecular biological and flow cytometric methods can also be used.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB70-A	One Health Lab	LC*, S*	MIB3, MIB4, MIB5, MIB6, MIB7	D: 1 sem. PRS: 2nd or 3rd sem.	This lab introduces students to the structural planning, preparation, implementation and evaluation of various One Health related topics. Students use theoretical (e.g. literature research) and practical methods (e.g. current lab techniques) to learn about the broad diversity of this research focus.	Presentation	Report	6
MIB70-B	One Health Lab	LC*, S*	MIB3, MIB4, MIB5, MIB6, MIB7	D: 1 sem. PRS: 2nd or 3rd sem.	This lab introduces students to the structural planning, preparation, implementation and evaluation of various One Health related topics. Students use theoretical (e.g. literature research) and practical methods (e.g. current lab techniques) to learn about the broad diversity of this research focus. Unlike the alternative lab with the same name, MIB70-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB74-A	Experimental Immunology and Immune Modulation of Neglected Tropical Diseases (NTDs) and Helminths Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This module offers the opportunity to participate in a current project on the immunology of neglected tropical diseases (NTDs), such as helminth infections or podoconiosis. Participants acquire knowledge about the theoretical planning and implementation of a scientific research question. Students are independently involved in ongoing international and national research projects. The thematic focus is on host immunomodulation by NTDs and helminth infections.	Presentation	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB74-B	Experimental Immunology and Immune Modulation of Neglected Tropical Diseases (NTDs) and Helminths Lab	LC*, S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	This module offers the opportunity to participate in a current project on the immunology of neglected tropical diseases (NTDs), such as helminth infections or podoconiosis. Participants acquire knowledge about the theoretical planning and implementation of a scientific research question. Students are independently involved in ongoing international and national research projects. The thematic focus is on host immunomodulation by NTDs and helminth infections. Unlike the alternative lab with the same name, MIB74-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
Virology Area (Faculty of Medicine)								
MIB29	Virology—Molecular Biological and Immunobiochemical Techniques	LC*, S*, L	MIB6 and MIB7	D: 1 sem. PRS: 2nd sem.	This course is intended for advanced students and focuses on molecular techniques in virology (e.g. reverse genetics) and aspects related to the innate immune response.	Report	Written examination	6
MIB30-A	Molecular Biology and Innate Immune Response in Virology Lab	LC*, S*	MIB6, MIB7 and MIB29	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in ongoing research in the field of plus-strand RNA viruses. Students use reverse genetics and other molecular biological techniques to study the functions of viral proteins. Other projects deal with the molecular characterization of virus-host interactions, with a focus on the innate immune system of bats. Students acquire theoretical (literature research, data analysis, reporting, presentations) and practical knowledge (experimental lab work, special lab techniques) in these research areas.	None	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB30-B	Molecular Biology and Innate Immune Response in Virology Lab	LC*, S*	MIB6, MIB7 and MIB29	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in ongoing research in the field of plus-strand RNA viruses. Students use reverse genetics and other molecular biological techniques to study the functions of viral proteins. Other projects deal with the molecular characterization of virus-host interactions, with a focus on the innate immune system of bats. Students acquire theoretical (literature research, data analysis, reporting, presentations) and detailed practical knowledge (experimental lab work, special lab techniques) in these research areas. Unlike the alternative lab with the same name, MIB30-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	None	Report	9
MIB81-A	Virus-Host Interactions and Viral Immune Evasion Lab	LC*, S*	MIB6, MIB7 and MIB29	D: 1 sem. PRS: 3rd sem.	The course gives students the opportunity to participate in the working group's current research in the field of cytomegaloviruses. Students acquire knowledge in the field of molecular biology and viral immunology. The working group's projects focus on analyzing immune evasion proteins of herpes viruses and investigating the adaptive immune response and viral latency. Within the scope of the module, students acquire theoretical knowledge (literature research, experimental design, data analysis) and practical skills in experimental work.	None	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB81-B	Virus-Host Interactions and Viral Immune Evasion Lab	LC*, S*	MIB6, MIB7 and MIB29	D: 1 sem. PRS: 3rd sem.	The course gives students the opportunity to participate in the working group's current research in the field of cytomegaloviruses. Knowledge in the field of molecular biology and viral immunology is imparted. The working group's projects focus on analyzing immune evasion proteins of herpes viruses and investigating the adaptive immune response and viral latency. Within the scope of the module, students acquire theoretical knowledge (literature research, experimental design, data analysis) and practical skills in experimental work. Unlike the alternative lab with the same name, MIB81-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	None	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
Agricultural and Food Microbiology Area (Faculty of Agricultural, Nutritional, and Engineering Sciences)								
MIB31	Molecular Methods in Microbial Ecology—Focus on Soil Microbiology	LC*, L	None	D: 1 sem. PRS: 2nd sem.	Students learn classical and current methods of soil microbiology and their specific uses for studying microbial populations and their activities in the soil ecosystem. The course has a special focus on molecular methods for characterizing microbial communities in soils. Students acquire practical skills by using selected methods for the analysis of soil-dwelling microorganisms in the exercises.	None	Report	6
MIB33	Plant-Pathogen Interactions	L, S*, LC*	MIB4, 1st part	D: 1 sem. PRS: 2nd or 4th sem.	Students acquire in-depth knowledge of the emergence and development of interactions between crops and pathogenic organisms, the biology of infection, the colonization and damaging effects of phytopathogenic fungi and oomycetes on crops, (resistance) reactions of host plants to infestation at the microscopic and molecular levels, interactions and mutual influence of plants and pathogens. After completing the module, students will be able to understand the infectious behavior of various pathogens, assess host-pathogen interactions at different levels and develop strategies to prevent pathogen infestation of plants.	Presentation	Written examination	6
MIB34	Plant Pathology Project Work	L, S*, LC*	None	D: 1 sem. PRS: 2nd or 3rd sem.	Students perform experimental work on questions in the field of plant pathology and plant protection, perform experiments in the laboratory and greenhouse, collaborate on research projects, plan, perform, document and interpret research experiments and apply new or project-specific methods. After completing the module, students will be able to formulate research questions, assess and apply research methods and interpret the results of their own experiments based on the literature.	Presentation	Term paper[2E]	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB35-A	Agricultural and Food Microbiology Lab	LC*, S*	MIB4 and MIB5	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research in the field of agricultural and food microbiology. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (lab experiments using sophisticated techniques).	Presentation	Report	6
MIB35-B	Agricultural and Food Microbiology Lab	LC*, S*	MIB4 and MIB5	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research in the field of agricultural and food microbiology. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (detailed lab experiments using sophisticated techniques). Unlike the alternative lab with the same name, MIB35-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9
MIB54	Phytomedicine Lab	LC*	None	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research in the field of phytomedicine. Students acquire theoretical knowledge (literature research, data mining, record keeping, presentation techniques) and practical skills (detailed lab experiments).	Presentation	Report	9
MIB63-A	Soil Microbiology Lab	LC*, S*	MIB1	D: 1 sem. PRS: 2nd or 3rd sem.	The course gives students the opportunity to work on a current research project related to soil-dwelling or plant-associated microorganisms. Students acquire theoretical knowledge (literature research, data analysis, record keeping, presentation techniques) and practical skills (planning and performing lab experiments).	Presentation	Report	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB63-B	Soil Microbiology Lab	LC*, S*	MIB1	D: 1 sem. PRS: 2nd or 3rd sem.	The course gives students the opportunity to work on a current research project related to soil-dwelling or plant-associated microorganisms. Students acquire theoretical knowledge (literature research, data analysis, record keeping, presentation techniques) and practical skills (planning and performing lab experiments). Unlike the alternative lab with the same name, MIB63-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to produce reliable results that can also be evaluated statistically.	Presentation	Report	9
MIB66-A	Microbiological Aspects of Food Technology Lab	LC*, S*	MIB4 and MIB5	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research on the microbiological aspects of food technology. Students acquire theoretical knowledge (literature research, record keeping, presentation techniques) and practical skills (lab experiments using sophisticated techniques).	Presentation	Report	6
MIB66-B	Microbiological Aspects of Food Technology Lab	LC*, S*	MIB4 and MIB5	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research on the microbiological aspects of food technology. Students acquire theoretical knowledge (literature research, record keeping, presentation techniques) and practical skills (detailed lab experiments using sophisticated techniques). Unlike the alternative lab with the same name, MIB66-A, an in-depth experimental analysis of the problem is performed in this module. This broadens the learning objectives, since students gain the skills to use complicated laboratory techniques with such proficiency that detailed, reliable results are achieved.	Presentation	Report	9

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB75-A	Gut Microbiome Analysis Lab	LC*	MIB1, MIB4 and MIB5	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research in the field of microbiome analysis. One focus is on the gut microbiome in interaction with nutrition. This also includes studies with prebiotics and probiotics. Furthermore, the latest sequencing methods are developed and established. In addition to theoretical knowledge (bioinformatics (programming), literature research, writing lab reports, presentation techniques), students also acquire applied laboratory skills (advanced techniques, laboratory work with pipetting robots).	Presentation	Report	6
MIB75-B	Gut Microbiome Analysis Lab	LC*	MIB1, MIB4 and MIB5	D: 1 sem. PRS: 2nd or 3rd sem.	This course gives students the opportunity to take part in current research in the field of microbiome analysis. One focus here is on the gut microbiome in interaction with nutrition. This also includes studies with prebiotics and probiotics. Furthermore, the latest sequencing methods are developed and established. In addition to theoretical knowledge (bioinformatics (programming), literature research, writing lab reports, presentation techniques), students also acquire applied laboratory skills (advanced techniques, laboratory work with pipetting robots). Unlike the alternative lab with the same name, MIB75-A, an in-depth experimental analysis is performed in this module. The expansion of the learning objectives is therefore intended to consolidate the techniques to such an extent that reliable results can be achieved.	Presentation	Report	9

Elective Modules B—a maximum of 5 of the 13 modules are to be chosen (total of 15 ECTS CP)

A maximum of 15 ECTS CP can be obtained from modules in Elective Modules B.

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB36	Microbiology Seminar and Colloquium	S*, C*	MIB1–MIB7 and another 18 CP from other modules	D: 1 sem. PRS: 4th sem.	During one semester, students attend 10–14 colloquia by research groups in the Institute of Microbiology and Biotechnology and national and international guests. Students also present their master's thesis in the colloquium. During the discussions following the lectures, students learn to critically assess their own research work and the work presented by others. Students also take part in the seminars for their respective research groups for master's and doctoral students. The topics and current results of the students' master's and doctoral theses are presented and discussed during these seminars, and current literature in the area of research is presented and critically examined.	Criteria for awarding credit points: Two presentations[r] (ungraded)	None	3
MIB65	Current Topics in General and Applied Microbiology	S*	None	D: 1 sem. PRS: 2nd sem.	Students learn about current topics in general and molecular microbiology.	None	Seminar talk[r]	3
MIB43	Bioinformatics 1	L	None	D: 1 sem. PRS: 3rd sem.	Basic knowledge of applied bioinformatics	None	Written examination	3
MIB45	Mechanisms of Antibiotic Action and Resistance	S*	MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire an in-depth understanding of the molecular mode of action of antibiotics and build on this to learn the strategies and mechanisms bacteria use to develop resistance. This knowledge is then used in discussions about the optimal use of antibiotics.	None	Seminar talk[r]	3
MIB46	Viral Infection Strategies	S*	None	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire in-depth knowledge of virology during the seminar. They learn, in particular, how viruses in individual virus families differ with respect to certain aspects of the viral life cycle. This knowledge is then used in discussions about the possibility of establishing antiviral strategies.	Preparation of a hand-out for the presentation	Seminar talk[r]	3

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB47	Zoonoses	S*, FT*	None	D: 1 sem. PRS: 4th sem.	After completing the module, students will understand the basics of infection transmission between animals and humans, be familiar with the clinical picture and modes of infection of the main zoonoses (e.g. BSE, salmonellosis), have an interdisciplinary understanding of public health, the legal basis and enforcement of required measures and know the importance of feed and food logistics in the spread of zoonoses.	None	Seminar talk[r]	6
MIB68	Health and Crisis Management	L, E*	None	D: 1 sem. PRS: 4th sem.	After completing the module, students will know the basics and principles of occupational health and crisis management and be able to use scientific findings and methods to plan, implement and evaluate occupational health management measures and apply the various methods and concepts used in risk analysis.	Presentation	Oral examination	6
MIB59	Ecologies of Health and Disease	S*	None	D: 1 sem. PRS: 3rd sem.	Students acquire in-depth knowledge of the ecologies of health and disease. This knowledge is then used in discussions about possible health-related risk management.	None	Seminar talk[r] (40%) Term paper (60%)	6
MIB62	Oral Microbiology Seminar	S*, L	MIB1 and MIB3	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire theoretical skills related to microbial interactions with eukaryotic cells, in particular inflammatory processes and tumor development, and the methods for studying them.	None	Written examination	3
MIB23T	Bacterial Pathogenicity Mechanisms and Antibiotic Resistance: Theory Section	S*, L	MIB3	D: 1 sem. PRS: 2nd sem.	The theory part of course MIB23 includes the seminar and students. Students learn the basics of immunology and the main virulence factors of pathogenic bacteria that mediate colonization, adhesion, invasion and resistance to the host immune system. They also gain an understanding of the mechanisms that mediate antibiotic resistance and the evolution and selection of this resistance.	Seminar talk	Written examination	3

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MIB69	Bacteria as Pathogens in the Tropics	S*	None	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire in-depth knowledge of the bacterial pathogens of topical diseases during the seminar. They also gain insights into the detection of these pathogenic bacteria in rural settings and an overview of major epidemics and current crisis areas. This knowledge is then used to discuss strategies for rational antibiotic therapy and resistance containment in the tropics.	None	Seminar talk[r]	3
MIB72	Chemistry of Natural Products Seminar	S*	None	D: 1 sem. PRS: 3rd sem.	This seminar deals with the analysis and biosynthesis of natural products. Students acquire theoretical knowledge about the isolation and chemical analysis of natural products. They also acquire theoretical knowledge about biosynthetic genes and proteins.	None	Seminar talk[r]	3
MIB48	Research and Industry Internship (in a non-University research organization or industrial company performing research)	LC*	Students must have passed at least three of the compulsory modules MIB1–MIB7	D: 1 sem. PRS: 3rd sem.	Students have the opportunity to make contact with the working world at an early stage in their careers so that they can subsequently work in science and industry. The internship is aimed at putting students in a situation where they can apply the knowledge they have acquired to practical problems in a typical professional environment. Students learn to apply microbiological processes, principles and systems in practice by working on a project assigned by the company and approved by the University. By preparing a report, students learn to professionally present the results of their own work in writing.	Criteria for awarding credit points: Report (ungraded)	None	6

The examination board may approve further elective modules and shall announce them before the beginning of the semester pursuant to § 8, paragraph 7.

Annex 2: Module structure for the master's degree program Molecular Cell Biology

Module structure key:

- Abbreviations for course types: L = lecture, LC = lab course/internship, S = seminar
- An asterisk (*) designates: courses with compulsory attendance as a prerequisite for taking the module examination and earning credit, in accordance with § 12, paragraph 6. In these cases, compulsory attendance is an additional requirement to other listed assessments.
- The courses comprising the module appear in the Course Type column.
- The Duration/Program-Related Semester column shows the duration (D) of the module (in semesters) and assigns it to a program-related semester (PRS).
- The Coursework column shows requirements that must be met for admission to certain examinations pursuant to § 12, paragraph 4 or, respectively, to acquire ECTS credit points in modules without an examination. Coursework that is required for admission to certain examinations and must be repeated in case that examination is failed is marked with the letter "r" (^{r}).
- In the Type of Examination column, examinations as defined by § 14, paragraph 6 that cannot be repeated within one semester but must rather be repeated along with the entire module or, respectively, the corresponding course are marked with the letter "r" (^{r}). Examinations that are assessed by two examiners in accordance with § 12, paragraph 7, numbers 3 and 4 are marked with "^{2E}."

The examination board shall make further details on individual modules, especially regarding the courses offered within or required for completion of a module, available in a module guide before the beginning of the respective semester pursuant to § 8, paragraph 7.

1st and 2nd Academic Year—Compulsory Modules

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject of Examination (Content) and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-P1	Biochemistry	L, S*	None	D: 1 sem. PRS: 1st sem.	Deeper understanding of the biochemical basis of the cell. Characteristics and biosynthesis of proteins, nucleic acids and lipids. Energy metabolism pathways, enzymes, enzyme reactions and co-enzymes. Post-translational modifications as a regulatory principle, detection methods.	None	Written examination	4

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject of Examination (Content) and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-P2	Molecular Genetics	L, S*	None	D: 1 sem. PRS: 1rd sem.	Understanding of the principles of gene regulation and the methods of molecular genetics. Translation of genetic information, regulation of gene expression, translational control, post-transcriptional mechanisms, epigenetics. Methods of molecular biology, manipulation of nucleic acids, genome editing. Recombinant proteins, techniques and principles. Working with genomic data and databases. Basics of the immune system with respect to antibody production. Antibody production and applications.	None	Written examination	4
MCB-P3	Developmental Biology and Physiology	L, S*	None	D: 1 sem. PRS: 1st sem.	Understanding of cellular and molecular biological requirements for multicellularity and for organismal processes during development. Knowledge of the methodology for analyzing these processes. General principles of development; signaling pathways and decision mechanisms of cell differentiation, cell division: mitosis, meiosis, germ cells; understanding of the principles of development processes in animals and plants; pattern formation, tissue differentiation, organ development; tissue homeostasis and germ cells; cellular aging; reproductive medicine.	None	Written examination	4
MCB-P4	Molecular Cell Biology	L, S*	None	D: 1 sem. PRS: 1st sem.	Deeper understanding of cell organization and cellular processes. Organelles and compartments and their function. Cytoskeleton and motors as organizing elements, membrane transport and general transport processes, ion channels. Protein sorting and proteostasis, apoptosis.	None	Written examination	4

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject of Examination (Content) and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-P5	Biophysics and Statistics	L, S*	None	D: 1 sem. PRS: 1st sem.	Insights into biophysical methods and introduction to the statistical analysis of experiments. Introduction to biophysical and chemical calculations, biophysical principles of optics and microscopy, enzyme kinetics, spectroscopic methods in molecular biology, theory and methods of molecular interactions, separation methods of macromolecules, application of statistical methods to experimental data sets.	None	Written examination	4
MCB-MBC	Mandatory Basic Course	LC	None	D: 1 sem. PRS: 1st sem.	Basic methods of molecular biology are learned in practice and performed independently. The course lays the foundation for subsequent elective modules. It covers: cell culture techniques, cell fractionation methods, isolation of nucleic acids and cloning, buffer calculations, protein biochemistry techniques, application of antibodies, histology and microscopic methods. Detection and quantification of gene expression.	Regular participation in practical exercises	Report	8
MCB-XM	Examination Module		Taking MCB-P1 to MCB-P5 and passing 4 of 5 examinations from MCB-P1 to P5	D: 1 sem. PRS: 1st sem.	Proof of the qualification objectives of compulsory modules MBC-P1 to MCB-P5.	None	Oral examination	2
MCB-TSS	Teacher Seminar Series	S*	None	D: 1 sem. PRS: 2nd sem.	The teachers present special topics in molecular biology and current research results in this seminar series.	None	Research proposal (abstract)	2
MCB-SSC	Soft Skills/Bioethics	L, S*	None	D: 1 sem. PRS: 2nd sem.	Presentation, lab reports, scientific paper, bioethics.	None	Poster (50%), written examination (50%)	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject of Examination (Content) and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-SJC	Seminars/Journal Club	S*	None	D: 1 sem. PRS: 2nd sem.	Seminar attendance, participation in journal clubs on current research topics.	None	Research proposal (abstract)	3
MCB-SP	Student Presentation	S	MCB EM 91 or MCB EM 92 or MCB-PE	D: 1 sem. PRS: 3rd sem.	Presentation of results from the Rotation and Project/Exchange modules.	None	Presentation	2
MCB-MT	Master's Thesis		Passing the basic modules MCB-P1 to P5, Mandatory Basic Course MCB-MBC and Examination Module MCB-XM and a minimum of 78 CP	D: 1 sem. PRS: 4th sem.	The knowledge and practical skills acquired during the student's studies are applied to a defined research question, experiments are planned and performed independently and a research paper is prepared.	Presentation generally two weeks before submission of the master's thesis	Master's thesis[r]	30
MCB-EM91	Rotation 1	LC*	Passing grades for basic modules MCB-P1 to MCB-P5, Mandatory Basic Course MCB-MBC and Examination Module MCB-XM	D: 1 sem. PRS: 3rd sem.	Participation in ongoing research projects.	None	Report	8

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject of Examination (Content) and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM92	Rotation 2	LC*	Passing grades for basic modules MCB-P1 to MCB-P5, Mandatory Basic Course MCB-MBC and Examination Module MCB-XM	D: 1 sem. PRS: 3rd sem.	Participation in ongoing research projects.	None	Report	8
MCB-PE	Project/Exchange	LC*	Passing grades for basic modules MCB-P1 to MCB-P5, Mandatory Basic Course MCB-MBC and Examination Module MCB-XM and a minimum of 60 CP	D: 1 sem. PRS: 3rd sem.	Independent experimental work in the laboratory.	None	Report	12

1st and 2nd Academic Year—Elective Modules

Modules with a total of 20 ECTS CP must be chosen.

For the elective modules, there is a difference between the modules from Biology (A) and modules from other subjects (B). Students must complete a total of 4 elective modules, of which at least 1 module must come from biology (A module).

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM1	The Molecular Basis for Spinal Muscular Atrophy (A module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Culture techniques for different cell lines, live cell imaging, manipulation of intracellular proteins with RNAi, gene knockout and small-molecule inhibitors, protein detection and quantification after knockdown or knockout, light microscopy including indirect immunofluorescence, quantitative image analysis. Use of sophisticated molecular biological techniques, independent planning and performance of experiments.	None	Poster (50%), oral examination (50%)	5
MCB-EM2	Optogenetics (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Purification of nucleic acids, cell culture techniques, transfection, gene expression studies, microscopy and fluorescence-based imaging, optogenetics. Use of optogenetics in tissue culture, use of sophisticated molecular biological techniques, independent planning and performance of experiments.	None	Seminar talkr	5
MCB-EM3	Molecular Biology of the Cell (A module)	LC*, S*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Cell culture techniques, differentiation and manipulation of cultured cells, cell transfection and transduction, knockdown of gene expression, high-resolution live cell microscopy of fluorescent proteins, analysis of protein localization, interaction and dynamics in living cells. Use of sophisticated molecular biological techniques, independent planning and performance of experiments.	None	Report	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM4	Mechanical Stress Protection (A module)	LC*, S*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Cell culture techniques, recombinant protein expression, protein purification, muscle cell differentiation, electropulse stimulation as a training model, immunoprecipitation and the yeast 2-hybrid system, microscopic imaging techniques, analysis of protein degradation pathways. Advanced biochemical and cell biology methods for studying the molecular mechanisms of mechanical stress protection.	None	Report (70%), seminar talk[r] (30%)	5
MCB-EM5	Neuronal Cell Biology (A module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Neuronal cell culture, transfection of neurons, immunocytochemistry, fluorescence microscopy, live cell imaging, tissue imaging. Use of sophisticated neuronal cell biology techniques, independent planning and performance of experiments.	None	Report (50%), oral examination (50%)	5
MCB-EM6	Transport Physiology (A module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Examples of plant-environment interactions from the molecular to the organismal level, water and salt stress, effects of xenobiotics on plants, plant-microorganism interactions and plant secondary metabolites. Use of modern techniques of molecular plant physiology, independent planning and performance of experiments.	None	Written examination	5
MCB-EM7	Pharmacology & Metabolism (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Study of major metabolic pathways using small-molecule modulators in the mouse model, handling of experimental animals, extraction of murine primary adipocytes, use of *in vivo*, *ex vivo* and *in vitro* model systems, culture of human adipocytes; seminar on signal transduction, metabolism and pharmacology.	None	Report	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM8	Plant Transformation (A module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Plant transformation with reporter constructs (leaf discs), *Agrobacterium*-mediated transformation, cloning in *Escherichia coli* and *Agrobacterium tumefaciens*, detection of transgenic organisms.	None	Report	5
MCB-EM9	Quantitative Fluorescence Microscopy (B module)	L, LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Transient and stable expression of fluorescent proteins, SNAP, halo and clip-tag labeling, high-resolution confocal laser scanning microscopy, FRAP, analysis of intracellular protein mobility, FRET, quantitative image analysis, 3D image reconstruction. Use of sophisticated light microscopy techniques of molecular cell biology, independent planning and performance of experiments.	None	Report	5
MCB-EM11	Molecular Membrane Biology (A module)	LC*, S*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Cell culture with macrophages and epithelial cells, subcellular fractionation and analysis of fractions, membrane purification, membrane fusion with purified components, knockdown of gene expression with siRNA, fluorescence microscopy, electronic image analysis. Use of sophisticated techniques of molecular cell biology, independent planning and performance of experiments.	None	Report (70%), seminar talk[r] (30%)	5
MCB-EM17	Preventive, Predictive and Personalized Medicine (B module)	LC*, S*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Pathogenesis mechanisms of secondary cardiovascular complications in type II diabetes mellitus, neurodegenerative diseases and selected tumors, stress and repair mechanisms, tissue reconstitution, pathology-specific expression patterns.	None	Report (60%), seminar talk[r] (20%), written examination (20%)	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM18	Cell Mechanics (A module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 3rd sem.	Analysis of various mechanical signals in animal organisms, combination of chemical and mechanical signals, cellular mechanics in adhesion and migration processes, response of animal cells, substrate elasticity, topography, analysis of viscosity and elasticity in cells.	None	Report	5
MCB-EM20	Fluorescent Protein-based Biosensors (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 3rd sem.	Biotechnological production and validation of biosensors, use of GFP-based probes for dynamic *in vivo* measurements of physiological parameters and the analysis of membrane proteins.	None	report	5
MCB-EM21	Genome Stability (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Experimental approach to questions of telomere biology, independent experimental planning using yeast as a model system, protein purification and molecular biological methods.	None	report	5
MCB-EM22	Reconstructive Neurobiology (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Genome editing with CRISPR/Cas9 and generation of neuronal iPS in regard to brain development and pathology, immunochemistry, *in situ* hybridization and cell culture as basic methods.	None	Seminar talk[r]	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM23	Applications of CrispR/Cas to Study Neuronal Function (B module)	LC*, L, S*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Use of CRISPR/Cas9, viral vector production in neurobiological research, introduction to data analysis.	None	Report (50%) Seminar talk[r] (50%)	5
MCB-EM24	Methods in Developmental and Tumor Pathology (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Isolation of RNA from animal cells or tissue, reverse transcription, PCR, gene-specific PCR reactions, quantitative real-time PCR, gel electrophoresis, *in situ* hybridization, fragment sequencing.	None	Report	5
MCB-EM25	Molecular Haematology (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Identification of coagulopathies, detection of coagulation factor inhibitory antibodies; DNA preparation from blood, PCR, sequencing, analysis of identified mutation to characterize the phenotype; cloning of cDNA into a vector using restriction-free cloning PCR, mutagenesis PCR, transfection and expression in mammalian and CRISPR/Cas9-modified cell lines, coagulation assays; induction, characterization and culture of pluripotent stem cells (iPS) for reprogramming human and murine (WT) blood, differentiation into endothelial cells, protein modeling of WT and mutant protein.	None	Report	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM26	Mitochondrial Biology (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Isolation of mitochondria, blue native electrophoresis for visualization of mitochondrial protein complexes, activity testing of respiratory chain complexes, measurement of membrane protein potential, characterization of growth defects in yeast mutants, analysis of mitochondrial morphology.	None	Report	5
MCB-EM27	Tumor Immunology (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Test for NK cell activity on tumor cells, isolation of peripheral lymphocytes, test of T cell activation and cytokine activity, flow cytometry of T cells, flow cytometry: strategies and analysis.	None	Seminar talk[r]	5
MCB-EM28	Protein Biochemistry (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Basic cloning strategies, cell culture of bacteria and insect cells for heterologous expression of proteins, transformation and infection of cells, storage of viral particles, protein expression, purification, and crystallization, analysis of protein complexes, kinase assays.	None	Report	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MCB-EM29	Brown Fat RNA Dynamics (B module)	LC*	Taking MCB-P1 to P5 and passing 4 of 5 examinations in MCB-P1 to P5; passing the Mandatory Basic Course MCB-MBC	D: 1 sem. PRS: 2nd sem.	Localization-specific detection of mRNAs with fluorescent probes in mouse tissue sections (RNAScope) - RNAScope of mRNA targets in brown adipose tissue of mice exposed to cold compared to control tissue - Comparison of mRNA and protein levels using immunofluorescence microscopy - High-resolution microscopy of brown adipose tissue - Translation dynamics of mRNAs under cold stress using polysome fractionation and RT-qPCR - Luciferase mRNA reporter assays for the translational dynamics of adipose tissue-relevant target genes in adipocytes or murine endothelial cell lines - Integrative quantification and analysis of primary data and design of illustrations	None	Report (50%) Written examination (50%)	5

The examination board may approve further elective modules and shall announce them before the beginning of the semester pursuant to § 8, paragraph 7.

Annex 3: Module structure for the consecutive master's degree program Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology)

Module structure key:

- Abbreviations for course types: FT = field trip, FW = field work, LC = lab course/internship, prE = practical exercise, S = seminar, T = tutorial, E = scientific exercise, L = lecture, C = colloquium.
- An asterisk (*) designates: courses with compulsory attendance as a prerequisite for taking the module examination and earning credit, in accordance with § 12, paragraph 6. In these cases, compulsory attendance is an additional requirement to other listed assessments.
- The courses comprising the module appear in the Course Type column.
- The Duration/Program-Related Semester column shows the duration (D) of the module (in semesters) and assigns it to a program-related semester (PRS).
- The Coursework column shows requirements that must be met for admission to certain examinations pursuant to § 12, paragraph 4 or, respectively, to acquire ECTS credit points in modules without an examination. Coursework that is required for admission to certain examinations and must be repeated in case that examination is failed is marked with the letter "r" (^{r}).
- In the Type of Examination column, examinations as defined by § 14, paragraph 6 that cannot be repeated within one semester but must rather be repeated along with the entire module or, respectively, the corresponding course are marked with the letter "r" (^{r}). Examinations that are assessed by two examiners in accordance with § 12, paragraph 7, numbers 3 and 4 are marked with "^{2E}."

The examination board shall make further details on individual modules, especially regarding the courses offered within or required for completion of a module, available in a module guide before the beginning of the respective semester pursuant to § 8, paragraph 7.

Compulsory Modules

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-M1	Biodiversity and Evolution	L*, S*, FT*	None	D: 1 sem. PRS: 1st sem.	Students acquire basic knowledge of plant and animal biodiversity and evolution, practice presenting and assessing literature sources and learn how to systematically process animal and plant species.	Presentation, research proposal (data sheets)	Written examination	10
OEP-M2/ MP 26	Fundamentals of Evolutionary Biology	L, S*, prE*	None	D: 1 sem. PRS: 1st sem.	Students learn the basics of evolutionary theory, phylogenetics, ecology, paleontology and physiology. They practice critically assessing current literature based on key evolutionary biology concepts and perform computational cladistic analysis.	Presentation	Written examination	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-M3/ MP27	Scientific Communication	L, S*, prE*	None	D: 1 sem. PRS: 1st sem.	Students train in the practice and theory of communication in the evolutionary sciences and learn to write abstracts and publications and design posters and presentations.	None	Seminar talk (50%), research proposals (written graded projects (25%), abstracts (10%), 2 methodology worksheets (each 7.5%))	5
OEP-M4	Biological Colloquium	C*	None	D: 3 sem. PRS: 1st, 2nd or 3rd sem.	Speakers from outside the university present current topics in organismic biology in individual sessions. Students develop a culture of critical inquiry and learn different styles of presentation.	Research proposal (abstracts)	None	2
OEP-M5	Thesis Defense	S*	OEP-M4	D: 2 sem. PRS: 4st sem.	Students defend their own research results in their master's thesis; students should present an overview of current and past biodiversity and evolutionary constraints and processes.	Presentation	Oral examination	3
OEP-M6	Master's Thesis		OEP-M1 to OEP-M4 and 60 CP	D: 1 sem. PRS: 4st sem.	Students independently plan and evaluate an experiment and prepare a research paper.	None	Master's thesis	30

Elective Modules

Modules totaling 60 ECTS CP must be chosen from Elective Modules A, B, C, with a minimum of 15 and a maximum of 30 ECTS CP in each area.

Elective Modules A (teaching of methods)—modules totaling a minimum of 15 and a maximum of 30 ECTS CP are to be chosen

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-A01/ MP28	Analysis of Form and Function in Living Systems	L, S*, E	OEP-M1	D: 1 sem. PRS: 2nd or 3rd sem.	Students study morphology, class. mechanics, statistics, programming (R) and quantitative image analysis by means of experiments on different insects.	Research proposal (data sheet)	Oral examination	10
OEP-A02	Bioinformatics for Master Students—Beginner's Course	L, LC*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students gain the skills needed for many of today's bioinformatic challenges. They learn the PYTHON programming language to perform basic analyses with sequence data and implement automated database queries.	Research proposal (data sheet)	Written examination	10
OEP-A03	Beginner's Course: Programming in C/C++	L, LC*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students learn the fundamentals of the C/C++ programming language and design and develop algorithms to solve simple problems.	Research proposal (data sheet)	Written examination	5
OEP-A04	Theory and Practice of Phylogenetic Systematics	L, S*, LC*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students gain a broad overview of the theoretical concepts on the use and application of real data sets. Knowledge of these theoretical aspects is necessary for successful analysis of molecular data sets.	Report, presentations, research proposal (data sheet)	Written examination	10
OEP-A05	Principles of Taxonomy: Weekend Seminar	S*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This seminar focuses on general principles of taxonomy and classification, including zoological nomenclature and scientific theory, procedures and methods of taxonomy and species delimitation.	None	Written examination	2.5
OEP-A06	Bioinformatics and Evolutionary Genomics	L, LC*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module introduces approaches and methods for understanding evolutionary processes using molecular sequences and genomic data sets. It introduces bioinformatic principles, databases and freely available software packages, and teaches creative use of the Unix environment and command line-based programming.	None	Report (50%) Presentation (50%)	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-A08/ MP29	Phenotypisation and Cladistic Analysis of Morphological Characters	L, LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module aims to improve understanding of how comparative morphology is applied to phylogenetic systematics. The main objectives are to learn how coding strategies in morphology impact on cladistic analyses, and test published results on and the effect of cladograms on the interpretation of phenotypic evolution.	Presentation, research proposal (data sheet)	Written examination	10
OEP-A12	DNA Barcoding: Identifying and Describing Biodiversity	L, LC*	OEP-M1	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides insights into different species concepts and the use of modern molecular methods for identifying and describing animal species. Examples from current literature are presented and discussed. Students also analyze their own data sets to gain practical experience with DNA barcoding.	Presentation	Report	5
OEP-A15/ PBCO1	Geographic Information Systems (GIS) for Plant Biogeography & Conservation	LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 3rd sem.	This module teaches students how to design and perform analyses in the fields of macroecology, biogeography and nature conservation using geographical information systems (GIS). The module combines an introduction to mapping and spatial data analysis with theory and exercises from the fields of macroecology and biogeography. A special focus is placed on analyses of the impact of global environmental change on biodiversity.	None	Presentation (60%) Reports (40%)	5
OEP-A16/ PBCO2	Biodiversity Informatics: Data Analyses for Ecology and Biogeography	LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 3rd sem.	Students learn to design and perform analyses in the fields of (macro)ecology and biogeography using code-based analysis software such as R or Julia. The module provides an overview of the methods commonly used to analyze and model data in the fields of ecology (incl. macroecology) and biogeography.	None	Presentation (60%) Reports (40%)	5
OEP-A17/ TPP	Transport Physiology	LC*	OEP-B11/ PBPM0, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Interactions between plants and their environment are studied experimentally from the molecular to the organismic level. This includes studies of water and salt stress, the effects of xenobiotics on plants, interactions with microorganisms and secondary plant metabolism. Modern methods of molecular plant physiology and ecology are introduced. Students learn different methods of transport physiology, gain experience in planning and performing experiments independently and learn how to present their own experimental results.	Statistical and graphical analysis and presentation of own experimental results	Written examination	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-A18/ MBRE	Modern Biodiversity Research: From Population Genetics to Phylogenomics	LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 3rd sem.	Students gain an in-depth understanding of molecular evolutionary processes based on changes in DNA sequences. The focus is on using this information for phylogenetic and evolutionary analyses.	None	Presentation (30%) Rreports (70%)	10
OEP-A21	Advanced Methods in Organismic Biology, Evolutionary Biology or Paleobiology	LC*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students gain experimental skills for analyzing biodiversity and evolution and learn about functional constraints, evolutionary adaptations and structural details of surviving and extinct animals and plants. The module focuses on teaching methodological skills. The module is a lab course and is individually arranged.	None	Report	10
OEP-A22	Advanced Computer Skills in Organismic Biology, Evolutionary Biology or Paleobiology	LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 3rd sem.	This module deals with specific topics concerning the use of (bio)informatics for the visualization of structures and modeling of evolutionary processes and the relationships between structure and function. The course focuses on learning specific informatics skills.	None	Report	10
OEP-A23	Advanced Bioinformatics in Phylogenetics, Evolutionary Biology and Biodiversity Research	LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 3rd sem.	This module deals with specific topics concerning the use of (bio)informatics for the analysis of evolution, phylogenetics, biogeography and biodiversity monitoring. The course focuses on learning specific bioinformatics skills.	None	Report	10
OEP-A24	Experimental Design and Statistics with R	L, LC*	None	D: 1 sem. PRS: 2nd or 3rd sem.	The module teaches the basics of statistical data analysis and experimental design using the statistics program R. The focus is on parametric statistics based on clearly formulated hypotheses. More complex methods are derived from linear statistical models (generalized linear models, mixed models). The application of the methods is illustrated using a wide range of data sets from ecology, biodiversity research and comparable disciplines.	None	Report	5
OEP-A25	Introduction to Machine Learning (with Python)	S*, LC*	None	D: 1 sem. PRS: 2nd or 3rd sem.	The module provides an initial understanding of the concepts and programming strategies of machine learning. With the help of machine learning, methods for finding differences between data sets can be developed quickly, e.g., to distinguish between images, DNA, or protein sequences, by having the software “learn” patterns during the process.	None	Seminar talk (50%) Presentation (50%)	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-A26	Developing Scalable Non-invasive Adaptable Portable (SNAP) Methods for Biodiversity Monitoring	S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd sem.	The module provides insights into the ecological context and practical requirements for measuring biological diversity and changes to it. Students gain practical experience in developing, building, and testing devices for collecting soundscape, image or eDNA data.	None	2 seminar talks (each 50%)	5
OEP-A27/ MP23	High-Resolution Biostratigraphy and Structural Analyses of Larger Foraminifera	L, E*	None	D: 1 sem. PRS: 1st or 3rd sem.	High-resolution biostratigraphy and structural analyses of larger foraminifera.	None	Report	6

Elective Modules B (modules with fieldwork < 50%)—modules totaling a minimum of 15 and maximum of 30 CP are to be chosen

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-B01	Environment and Behavior: Theory	S*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module teaches concepts and methods in all areas of behavioral biology, such as classical ethology, sociobiology, behavioral physiology and neuroethology. Behavioral biology is presented as a hypothesis-driven science that follows either a proximate or ultimate approach.	None	2 seminar talks (each 50%)	5
OEP-B04	Behavioral Ecology Theory	S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire a basic knowledge of behavioral ecology, a field that studies the evolution of adaptive behavior in an ecological context. Basic behavioral science concepts are presented and discussed in seminar format, such as the function or survival value of sexual selection or host-parasite coevolution.	None	2 seminar talks (each 50%)	5
OEP-B05	Neuroanatomy	L, S*, LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students learn experimental neuroanatomical techniques for studying the histology and connectivity of brains using tracer experiments with fluorescent and stable light reactions and histochemical analysis of neurotransmitter-related enzymes. The model focuses on the evolution of structure-function relationships in the fish nervous system.	None	Report	10
OEP-B06/ MP40	Palaeobiology of Invertebrates	L, prE*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Evolution, phylogeny and paleobiology of invertebrates.	Research proposal (data sheet)	Written examination	6
OEP-B07/ MP38	Vertebrate Comparative Anatomy and Functional Morphology	L, LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students gain an understanding of the vertebrate body plan and its specializations in different subgroups by dissecting selected representatives and preparing selected tissues for histology. Differences in the organization and morphology of the major organ systems are evaluated in the context of functional constraints.	None	Written examination	10
OEP-B09/ PSBE	Diversity, Systematics and Evolution of Plants	S*	OEP-M1	D: 1 sem. PRS: 2nd sem.	Students learn about the systematics, morphology and ecology of the main groups of land plants. The focus is on the applied aspects of biodiversity research.	None	Seminar talk	3

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-B10/ OB2	Organismic Botany 2: Vegetation and Plant Ecology	L	OEP-M2	D: 1 sem. PRS: 2nd sem.	This module provides an overview of the distribution and composition of the major terrestrial biomes. The focus is on the influence of abiotic factors on plant communities and vegetation structure and the anthropogenic influence on terrestrial ecosystems.	None	Written examination	5
OEP-B11/ PBPM0	Plant Biochemistry, Physiology and Molecular Biology	L*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module consists of a series of lectures addressing all the major topics of plant biochemistry, physiology and molecular biology and provides insights into the evolutionary significance of, among other things, abiotic and biotic environmental interactions, physiological stress, plant-microbe interactions and plant pathogens.	None	Written examination	5
OEP-B12/ PBIO	Systematics and Biology of Plants	LC*	OEP-M1	D: 1 sem. PRS: 2nd sem.	This module provides an introduction to the major groups and families of land plants and their systematics, morphology and ecology, including methods and terminology in descriptive and functional morphology, taxonomy and systematics.	None	Presentation (50%) Report (50%)	10
OEP-B13/ PAPA	Palaeobotany and Palynology	L, LC*	OEP-M1	D: 1 sem. PRS: 2nd or 3rd sem.	Students learn about the fundamental role that palaeobotany and palynology play in understanding the evolution of plants. Fossil material is used to present plant evolution in the context of time, climate change and mass extinctions. The module focuses on periods of major evolutionary change and addresses the rates and timing of evolutionary change.	None	Written examination (50%) Report (50%)	5
OEP-B14/ PBDC	Plant Biodiversity and Conservation	S*	OEP-M1	D: 1 sem. PRS: 3nd sem.	This module teaches the concepts and tools of nature conservation at the national and international levels and provides an overview of international environmental agreements and organizations.	None	Seminar talk	3
OEP-B15/ MP10	Vertebrate Palaeontology I: Palaeobiology and Evolution of the Vertebrates	L, E*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students gain a general understanding of the evolutionary history, phylogeny and historical biogeography of the vertebrates and learn the theoretical background of the evolutionary history of the vertebrates. They gain detailed knowledge of the comparative anatomy and functional morphology of the tetrapod skeletal system and study vertebrate fossil deposits in the field.	Seminar talk	Written examination	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-B16	Evolution and Biodiversity of Lower Vertebrates	L, S*, LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides an overview of the patterns of diversity, systematics and evolution of fishes, amphibians and reptiles ("lower vertebrates") and explains the systematic and adaptive significance of morphological traits. The module teaches methods for collection-based research, important procedures for evolutionary and systematic studies and practical aspects relevant to zoos.	None	Seminar talk (50%) Report (50%)	10
OEP-B17	Evolution, Diversity, and Biology of Arthropods	L, S*, LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides detailed insights into the evolution, diversity and biology of anthropods in general, with special attention to spiders, millipedes, beetles and wasps. Students learn to identify anthropods and understand their evolutionary history based on comparative and phylogenetic trait analyses.	None	2 seminar talks (each 20%) Written examination (60%)	10
OEP-B18	Speciation in Fishes: Patterns and Processes	S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module deals with speciation theory and encourages critical discussion of alternative hypotheses on the origin of diversity in the context of fish model systems. The examples considered range from adaptive radiations in African rift lakes and the evolution of species pairs to recently discovered cases of hybrid speciation.	None	Seminar talk	2.5
OEP-B19	Patterns and Processes Shaping Biodiversity	S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides an introduction to the fields of historical biogeography and speciation of vertebrates, which are discussed in terms of species richness patterns, ecology and phylogeography. It addresses plate tectonics and distribution patterns, the biogeographical history of ecoregions, the mechanism generating diversity patterns, climate history, speciation and adaptations to ecologically extreme habitats.	None	Seminar talk	2.5
OEP-B20	Form & Function in Birds: An Evolutionary Perspective	L, S*, prE*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module deals with the basics of species diversity and bird classification. Students develop an understanding of avian morphology as the result of adaptation processes shaped by ecological and behavioral constraints over time. They learn about the evolutionary and functional relationships of selected bird groups by performing their own hands-on studies. The module includes a field trip to the Cologne Zoo.	None	Written examination (50%) Presentation (25%) Seminar talk (25%)	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-B21/ MP13	Specialization in Vertebrate Paleontology (Mammals)	L, S*, prE*	None	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire advanced knowledge of paleobiogeography of mammals and mammalian dentition, and comparative odontology of mammals.	None	Written examination (60%) Presentation (30%) Seminar talk (10%)	6
OEP-B23/ MP11	Vertebrate Palaeontology II	L, S, FT, FW*	None	D: 1 sem. PRS: 2nd or 3rd sem.	In-depth study of the most important fossil deposits in the history of the Earth (collection material, terrain, and specialist literature).	Seminar talk	Written examination (50%) Report on FW (50%)	6
OEP-B26	Evolution of Mammals	L, S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This weekly lecture provides an overview of mammalian evolution, phylogeny and diversity. In the seminar that follows this one, selected objects are shown and discussed in order to improve understanding of the lecture content and illustrate the features.	None	Written examination	5
OEP-B27	Evolution of Mammals—Form and Function	LC*, FT*	None	D: 1 sem. PRS: 3rd sem.	This module provides an overview of the worldwide diversity, phylogeny and evolution of mammals and a basic understanding of the evolutionary processes enabling mammals to adapt to various environments. It uses phylogenetic reconstruction to examine morphology and molecular data and comparative morphology.	Essay	Written examination (30%) Report (55%) Seminar talk (15%)	10
OEP-B28	Experimental Behavioral Ecology	S*, LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides an overview of the field of behavioral ecology, with a special focus on the hypothesis-driven experimental approach. Students plan small experiments. Sticklebacks, cichlids and gammarids are available as experimental animals. Many topics are offered and analyzed using current statistical methods.	None	Report (70%) Presentation (30%)	10
OEP-B29	Genomics of Behavior	S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides background knowledge on the connection between genomics and behavioral approaches. Students gain insights into how they can be used to shed light on the genomic basis of behavior in different animal groups.	None	Seminar talk	2.5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-B30	Advanced Course in Combining Field and Lab Techniques and Methods in Organismic Biology, Evolutionary Biology or Paleobiology	LC*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module addresses specific topics in the laboratory and the field concerning the evolution, phylogenetics, biogeography and visualization of structures, the modeling of evolutionary processes and the relationships between structure and function. The course is aimed at teaching skills to students, collecting data in the field and analyzing it in the laboratory.	None	Report	10
OEP-B31	Bee Hotels as a Model System for Field Ecology and Insect Interactions	LC*	OEP-M1, OEP-M2	D: 1 sem. PRS: 3rd sem.	In this module, students receive an introductory overview of ecological field studies: experiment planning, data collection, evaluation, and presentations—oral and written. On a technical level, the course focuses on classical entomology, palynology and statistics. The aim of the module is to give students an understanding of the complexity of animal-animal and animal-plant interactions caused by biotic and abiotic environmental conditions.	None	Poster (33%) Seminar talk (33%) Report (34%)	10
OEP-B32	History of the Evolutionary Thinking	L, S*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd sem.	This module examines the origins of modern evolutionary biology and traces how ideas have developed over the centuries, particularly in relation to evolutionary developmental biology (evo-devo). The module consists of a series of lectures and a seminar. The seminar focuses on evolutionary and developmental biology and offers a series of presentations, each of which examines the genetic basis of evolutionarily novel traits. The main objectives of this module are 1) to help students connect the many disciplines that make up the field of evolutionary biology and develop an integrative perspective, and 2) to equip students with fundamental concepts for reading the evo-devo literature.	None	2 seminar talks (each 25%) Written examination (50%)	5

The examination board may approve further elective modules and shall announce them before the beginning of the semester pursuant to § 8, paragraph 7.

Elective Modules C (modules with field work > 50%)—modules totaling a minimum of 15 and maximum of 30 ECTS CP are to be chosen

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-C02	Zoogeography and Ecology of Marine Organisms in Tropical Habitats (with a Field Trip to the Red Sea, Dahab, Egypt)	L, S*, LC*, FT*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module provides an introduction to the abiotic conditions and fauna of tropical coral reefs at all biological levels, including the identification and qualitative assessment of the different invertebrates and vertebrates. It teaches standards for studying the social behavior of various fish species.	None	Report (50%) Seminar talk (50%)	10
OEP-C05	Fauna of the North Atlantic Coastline with a Field Trip to Roscoff, Brittany	L, S*, LC*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module introduces the marine macro- and megafauna of North Brittany. Students learn how to identify organisms and perform short quantitative experiments and diversity assessments at selected levels in marine habitats and for selected groups of organisms.	3 reports	Written examination (50%) Presentation (50%)	10
OEP-C06	Ecology and Zoogeography of the Pannonian Region, with a Field Trip to Lake Neusiedler	L, S*, LC*, FT*	OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students learn about the special ecological and biogeographical features of the Pannonian region and nearby Eastern Alps by studying the Lake Neusiedler area. Comparisons with habitats in Central Hungary help them understand the connection between central and peripheral areas.	Report	Seminar talk	10
OEP-C07	Biodiversity of the Tropics, with a Field Trip to Ecuador	S*, LC*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module focuses on the special characteristics of the tropics and provides deeper insights into the taxonomy and ecology of selected metazoan groups. Students are trained in methods related to field work and study adaptations in behavior and life history strategies. The causes and consequences of current environmental threats are discussed with the students.	None	Seminar talk (50%) Report (50%)	10
OEP-C09/ PBEC	Vegetation Ecology (including Field Trip)	E*, LC*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire regional floristic and vegetation knowledge and a basic understanding of biogeography and learn techniques of floristic, vegetation and ecological field research.	None	Presentation (50%) Reports (50%)	10
OEP-C16	Advanced Field Methods in Organismic Biology, Evolutionary Biology or Paleobiology	LC*, FT*	OEP-M1, OEP-M2	D: 1 sem. PRS: 2nd or 3rd sem.	This module deals with specific topics related to field work in paleontology, phylogenetics, biogeography, monitoring and the relationships between organisms and the environment. The course focuses on learning skills for field work. The module can include laboratory components, which must account for less than 50% of the time invested.	None	Report	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OEP-C17	Animal Ecology and Methods in Biodiversity Monitoring	L, LC*	None	D: 1 sem. PRS: 2nd sem.	The module provides a comprehensive overview of animal ecology and introduces modern methods of biodiversity assessment. Based on the fundamentals of animal ecology, the course covers biotic communities, ecosystems and biodiversity, as well as land use change and global environmental change. In addition, methods for measuring population sizes, biodiversity and multitrophic interactions in various terrestrial habitats are taught. The range of methods extends from traditional methods to acoustic or optical sensors. The data collected in the field will then be statistically evaluated.	None	Report	5

The examination board may approve further elective modules and shall announce them before the beginning of the semester pursuant to § 8, paragraph 7.

Annex 4: Module structure for the consecutive master's degree program Paleontology

Module structure key:

- Abbreviations for course types: FT = field trip, FW =field work, C =colloquium, LC = lab course, I = internship, prE = practical exercise, S = seminar, GS = guided independent study, E = scientific exercise, L = lecture.
- An asterisk (*) designates: courses with compulsory attendance as a prerequisite for taking the module examination and earning credit, in accordance with § 12, paragraph 6. In these cases, compulsory attendance is an additional requirement to other listed assessments.
- The courses comprising the module appear in the Course Type column.
- The Duration/Program-Related Semester column shows the duration (D) of the module (in semesters) and assigns it to a program-related semester (PRS). The information on placement in a semester refers to students starting their studies in the winter semester.
- The Coursework column shows requirements that must be met for admission to certain examinations pursuant to § 12, paragraph 4 or, respectively, to acquire ECTS credit points in modules without an examination. Coursework that is required for admission to certain examinations and must be repeated in case that examination is failed is marked with the letter "r" (^{r}).
- In the Type of Examination column, examinations as defined by § 14, paragraph 6 that cannot be repeated within one semester but must rather be repeated along with the entire module or, respectively, the corresponding course are marked with the letter "r" (^{r}). Examinations that are assessed by two examiners in accordance with § 12, paragraph 7, numbers 3 and 4 are marked with "^{2E}."

The examination board shall make further details on individual modules, especially regarding the courses offered within or required for completion of a module, available in a module guide before the beginning of the respective semester pursuant to § 8, paragraph 7.

I. Compulsory Modules

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MP01	Geoscientific-Paleontological Research	C	None	D: 2 sem. PRS: 1st and 4th sem.	Presentation on the results of the completed geoscience bachelor's thesis and presentation on the status of the master's thesis.	None	Presentation BSc (50%) Presentation MSc (50%)	6
MP02	Paleontological and Geological Field Work	S*, FW*	None	D: 1 sem. PRS: 1st to 3rd sem.	Investigation and analysis of complex geoscientific issues in the field and scientific discussions about these issues.	Seminar talk	Presentation^{r} (50%) Report on FW^{r} (50%)	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MP08 (642170800)	Paleontological Project Work	LC	None	D: 1 sem. PRS: 4th sem.	Research proposal for the master's thesis with research question, discussion of current state of the art, structure of the paper with a time line and initial reference list.	Research proposal for master's thesis	Project report	6
MP09 (642170900)	Master's Thesis		60 CP from the modules in the first 3 semesters	D: 1 sem. PRS: 4th sem.	A paleontological question is prepared and worked on independently, and the results are recorded in writing in accordance with scientific requirements.	None	Master's thesis	30

II. Elective Modules (modules totaling 72 ECTS CP must be chosen)

Subject-Specific Elective Modules

At least 48 ECTS CP must be obtained from subject-specific elective modules. When choosing the subject-specific elective modules, at least 2 of the 4 paleontological sub-areas (vertebrates[1], invertebrates[2], micropaleontology[3], terrestrial paleoecology[4]) must be covered.

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MP10/ OEP-B15 (642171000)	Vertebrate Palaeontology I: Palaeobiology and Evolution of the Vertebrates[1]	L, E*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students gain a general understanding of the evolutionary history, phylogeny and historical biogeography of the vertebrates and learn the theoretical background of the evolutionary history of the vertebrates. They gain detailed knowledge of the comparative anatomy and functional morphology of the tetrapod skeletal system and study vertebrate fossil deposits in the field.	Seminar talk	Written examination	6
MP11/ OEP-B23 (642171100)	Vertebrate Palaeontology II[1]	L, S, FT, FW*	None	D: 1 sem. PRS: 2nd sem.	In-depth study of the most important fossil deposits in the history of the Earth (collection material, terrain, and specialist literature).	Seminar talk	Written examination (50%) Report on FW (50%)	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MP13/ OEP-B21 (642171300)	Specialization in Vertebrate Paleontology (Mammals)[1]	L, S*, prE*	None	D: 1 sem. PRS: 2nd sem.	Students acquire advanced knowledge of paleobiogeography of mammals and mammalian dentition, and comparative odontology of mammals.	None	Written examination (60%) Presentation (30%) Seminar talk (10%)	6
MP20 (642172000)	Industrial Micropaleontology[3]	E*	None	D: 1 sem. PRS: 1st sem.	Industrial applications of microfossils in practice, biosteering, exploration of hydrocarbon deposits, preparation of expert reports, environmental impact assessments.	None	Report	6
MP23/ OEP-A27 (642172300)	High-Resolution Biostratigraphy and Structural Analyses of Larger Foraminifera[3]	L, E*	None	D: 1 sem. PRS: 3rd sem.	High-resolution biostratigraphy and structural analyses of larger foraminifera.	None	Report	6
MP30 (642173000)	Terrestrial Paleoecology and Climatology[4]	L, prE*	None	D: 1 sem. PRS: 1st or 3rd sem.	Insight into multidisciplinary working methods in terrestrial paleoecology and paleoclimatology	None	Written examination	6
MP40/ OEP-B06 (642174000)	Palaeobiology of Invertebrates[2]	L, prE*	None	D: 1 sem. PRS: 1st or 3rd sem.	Evolution, Phylogeny and Paleobiology of Invertebrates	Research proposal (data sheet)	Written examination	6
MP16	Practical Teaching Experience	GS	None	D: 1 sem. PRS: 1st to 4th sem.	Design and implementation of a course under guidance in the form of tutorials, review courses, or field supervision.	Tutorials and teaching supervision with 15 h of contact time.	Report[r]	6
MP03 (642150400)	Practical Work Experience	I*, S*	None	D: 1 sem. PRS: 1st to 3rd sem.	Applying theoretical knowledge in the workplace, as well as learning about work processes and geoscientific issues as they relate to businesses.	Internship in geosciences lasting at least 4 weeks.	Report[r]	6
MP14	Advanced Course in Combining Field and Lab Techniques and Methods in Paleontology	FW*, prE*	None	D: 1 sem. PRS: 2nd or 3rd sem.	The module looks at specific topics from paleontology in the lab and in the field. The course is aimed at teaching skills to students, collecting data in the field and analyzing it in the laboratory.	None	Report	6
MP15	Advanced Methods in Organismic Biology, Evolutionary Biology or Paleobiology	L, E*	None	D: 1 sem. PRS: 2nd or 3rd sem.	This module teaches experimental skills for analyzing paleontological and paleobiological data on extinct animals and plants. The module focuses on teaching methodological skills. The module is a lab course and is individually arranged.	None	Report	6
MP21 (642172100)	Micropaleontology in the Field and Lab[3]	FT, S*	None	D: 1 sem. PRS: 4th sem.	Analysis of marine habitats in the field and laboratory to understand selected geological processes and ecological concepts.	None	Project work related to the field work	6

Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology

From the interdisciplinary elective modules, modules totaling a maximum of 24 ECTS LP may be completed from the master's degree programs Geology (MG and M), Geochemistry/Petrology (MGP), Physics of the Earth and Atmosphere (PEA), and OEP-Biology (OEP) (a maximum of 18 ECTS LP from the master's degree programs Geology, Geochemistry/Petrology and Physics of the Earth and Atmosphere and a maximum of 20 ECTS LP from the master's degree program OEP-Biology).

Module Code	Module Name	Duration/ Program-Related Semester	Course Type	Admission Requirements	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
M88 (642158200)	GIS Applications in the Geosciences	D: 1 sem. PRS: 1st or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MG41 (642164100)	Introduction to Geological 3D-Modelling	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MG53 (642165300)	Geological Natural Hazards	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MG30 (642163000)	Sedimentary Facies and Facies Architecture	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
M85 (642158500)	Geodynamics	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Physics of the Earth and Atmosphere master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MG20 (642162000)	Working methods in Sediment Geochemistry	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6

Module Code	Module Name	Duration/ Program-Related Semester	Course Type	Admission Requirements	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MG21 (642162100)	Lab Methods in Sediment Petrology	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MG22	Marine Sediments as Environmental Archives	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MGP12 (642181200)	Isotope Geochemistry	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geochemistry/Petrology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MGP21 (642182100)	Volcanology	D: 1 sem. PRS: 1st or 2nd or 3rd sem.	The legal provisions on examinations for the Geochemistry/Petrology master's degree program in the corresponding examination regulations, as amended on the date of registration for the module examination, apply to this module.					6
MP26/ OEP-M2	Fundamentals of Evolutionary Biology	D: 1 sem. PRS: 1st or 3rd sem.	L, S* prE*	None	Students learn the basics of evolutionary theory, phylogenetics, ecology, paleontology and physiology. They practice critically assessing current literature based on key evolutionary biology concepts and perform computational cladistic analysis.	Presentation	Written examination	10
MP27/ OEP-M3	Scientific Communication	D: 1 sem. PRS: 1st or 3rd sem.	L, S* prE*	None	Students train in the practice and theory of communication in the evolutionary sciences and learn to write abstracts and publications and design posters and presentations.	None	Seminar talk (50%), research proposals (written graded projects (25%), abstracts (10%), 2 methodology worksheets (each 7.5%))	5
MP28/ OEP-A01	Analysis of Form and Function in Living Systems	D: 1 sem. PRS: 2nd or 3rd sem.	L, S*, E	None	Students study morphology, class. mechanics, statistics, programming (R) and quantitative image analysis by means of experiments on different insects.	Research proposal (data sheet)	Oral examination	10

Module Code	Module Name	Duration/ Program-Related Semester	Course Type	Admission Requirements	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MP29/ OEP-A08	Phenotypisation and Cladistic Analysis of Morphological Characters	D: 1 sem. PRS: 2nd or 3rd sem.	L, LC*	None	This module aims to improve understanding of how comparative morphology is applied to phylogenetic systematics. The main objectives are to learn how coding strategies in morphology impact on cladistic analyses, and test published results on and the effect of cladograms on the interpretation of phenotypic evolution.	Presentation, research proposal (data sheet)	Written examination	10
MP31/ OEP-A15/ PBCO1	Geographic Information Systems (GIS) for Plant Biogeography & Conservation	D: 1 sem. PRS: 3st sem.	LC*	None	This module teaches students how to design and perform analyses in the fields of macroecology, biogeography and nature conservation using geographical information systems (GIS). The module combines an introduction to mapping and spatial data analysis with theory and exercises from the fields of macroecology and biogeography. A special focus is placed on analyses of the impact of global environmental change on biodiversity.	None	Presentation (60%) Reports (40%)	5
MP32/ OEP-A16/ PBCO2	Biodiversity Informatics: Data Analyses for Ecology and Biogeography	D: 1 sem. PRS: 3rd sem.	LC*	None	Students learn to design and perform analyses in the fields of (macro)ecology and biogeography using code-based analysis software such as R or Julia. The module provides an overview of the methods commonly used to analyze and model data in the fields of ecology (incl. macroecology) and biogeography.	None	Presentation (60%) Reports (40%)	5
MP33/ OEP-B13/ PAPA	Palaeobotany and Palynology	D: 1 sem. PRS: 2nd or 3rd sem.	L, LC*	None	Students learn about the fundamental role that palaeobotany and palynology play in understanding the evolution of plants. Fossil material is used to present plant evolution in the context of time, climate change and mass extinctions. The module focuses on periods of major evolutionary change and addresses the rates and timing of evolutionary change.	None	Written examination (50%) Report (50%)	5

Module Code	Module Name	Duration/ Program-Related Semester	Course Type	Admission Requirements	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MP36/ OEP-B16	Evolution and Biodiversity of Lower Vertebrates	D: 1 sem. PRS: 2nd or 3rd sem.	L, S*, LC*	None	This module provides an overview of the patterns of diversity, systematics and evolution of fishes, amphibians and reptiles ("lower vertebrates") and explains the systematic and adaptive significance of morphological traits. The module teaches methods for collection-based research, important procedures for evolutionary and systematic studies and practical aspects relevant to zoos.	None	Seminar talk (50%) Report (50%)	10
MP37/ OEP-B17	Evolution, Diversity, and Biology of Arthropods	D: 1 sem. PRS: 2nd or 3rd sem.	L, S*, LC*	None	This module provides detailed insights into the evolution, diversity and biology of anthropods in general, with special attention to spiders, millipedes, beetles and wasps. Students learn to identify anthropods and understand their evolutionary history based on comparative and phylogenetic trait analyses.	None	2 seminar talks (each 20%) Written examination (60%)	10
MP38/ OEP-B07	Vertebrate Comparative Anatomy and Functional Morphology	D: 1 sem. PRS: 2nd or 3rd sem.	L, LC*	None	Students gain an understanding of the vertebrate body plan and its specializations in different subgroups by dissecting selected representatives and preparing selected tissues for histology. Differences in the organization and morphology of the major organ systems are evaluated in the context of functional constraints.	None	Written examination	10

The examination board may approve further elective modules and shall announce them before the beginning of the semester pursuant to § 8, paragraph 7.

Annex 5: Module structure for the consecutive master's degree program Plant Sciences

Module structure key:

- Abbreviations of course types: L = lecture, S = seminar, LC = lab course, C = colloquium, FT = field trip.
- Marked with asterisk (*): courses with compulsory attendance as a prerequisite for taking the module examination and earning credit, in accordance with § 12, paragraph 6. In these cases, compulsory attendance is an additional requirement to other listed assessments.
- 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 program-related semester (PRS).
- The Coursework column shows requirements that must be met for admission to certain examinations pursuant to § 12, paragraph 4 or, respectively, to acquire credit points in modules without an examination. Coursework that is required for admission to certain examinations and must be repeated in case that examination is failed is marked with the letter "r" (^{r}).
- In the Type of Examination column, examinations as defined by § 14, paragraph 6 that cannot be repeated within one semester but must rather be repeated along with the entire module or, respectively, the corresponding course are marked with the letter "r" (^{r}). Examinations that are assessed by two examiners in accordance with § 12, paragraph 7, numbers 3 and 4 are marked with "^{2E}."

The examination board shall make further details on individual modules, especially regarding the courses offered within or required for completion of a module, available in a module guide before the beginning of the respective semester pursuant to § 8, paragraph 7.

Compulsory Modules

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PBPM0	Plant Biochemistry, Physiology and Molecular Biology	L	None	D: 1 sem. PRS: 1st sem.	This lecture addresses all major topics related to plant biochemistry, physiology and molecular biology. Students gain solid basic knowledge of the physiological processes in plants based on the current state of research on molecular structures, reactions and processes in plant cells, tissues and organs.	None	Written examination	7
OB1	Organismic Botany 1— Plant Systematics and Biodiversity	L	None	D: 1 sem. PRS: 1st sem.	This module provides an overview of plant systematics, morphology and ecology, with a focus on the systematics, diversity and evolution of flowering plants. Students also learn the basics of morphology, taxonomy and systematics.	None	Written examination	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
OB2/ OEP-B10	Organismic Botany 2—Vegetation and Plant Ecology	L	None	D: 1 sem. PRS: 2st sem.	This module provides an overview of the distribution and composition of the major terrestrial biomes. The focus is on the influence of abiotic factors on plant communities and vegetation structure and the anthropogenic influence on terrestrial ecosystems.	None	Written examination	5
PGMA	Plant Genetics, Morphology and Cell Architecture	L	None	D: 1 sem. PRS: 2st sem.	This lecture covers the basics of plant genetics and molecular biology and the structure of cells and tissues, endosymbiotic theory, biomembranes and compartments, signaling and communication, the cell cycle and plant movement.	None	Written examination	7
Master	Master's Thesis Work		At least 60 CP OB1, OB2, PBPM0, PGMA	D: 1 sem. PRS: 4th sem.	Students independently plan and evaluate an experiment and prepare a research paper	None	Master's thesis	30

Elective Modules

At least 3 modules must be chosen from each of Elective Modules B and Elective Modules C, for a total of at least 39 ECTS CP. At least 27 additional credit points must be obtained from other elective modules (Elective Modules D, E or further modules from Elective Modules B and C).

Elective Modules B (theoretical elective modules)—a minimum of 3 and maximum of 5 modules are to be chosen (9 to 15 ECTS CP)

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PBPM1	Plant Molecular Physiology & Technology	S*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students gain an in-depth understanding of plant development and assembly processes, their regulation by hormones and environmental factors and the biotechnological approach to manipulating them.	None	Seminar talk[r]	3
BPM2	Transgenic Plant Research	S*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students search, summarize, present and discuss current literature on new research in plant molecular biology concerning the production and/or analysis of genetically modified plants in applied or basic research.	None	Seminar talk[r]	3

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PBPM3	Ecophysiology	S*	None	D: 1 sem. PRS: 1st or 3rd sem.	Various aspects of plant-environment interactions are covered. These include the effects of abiotic and biotic environmental factors on plants and the corresponding reactions by plants from the molecular to the organismal level. Students gain a basic understanding of plant-environment interactions and how plants react to various environmental factors.	None	Seminar talk[r]	3
PLSM	Plant Secondary Metabolism	S*	None	D: 1 sem. PRS: 3rd sem.	Students gain an overview of the secondary metabolites produced by plants. The general and special functions of certain secondary metabolites are discussed.	None	Seminar talk[r]	3
PBDC/ OEP-B14	Plant Biodiversity and Conservation	S*	None	D: 1 sem. PRS: 1st or 3rd sem.	This module teaches the concepts and tools of nature conservation at the national and international levels and provides an overview of international environmental agreements and organizations.	None	Seminar talk[r]	3
PSBE/ OEP-B09	Diversity, Systematics and Evolution of Plants	S*	OB1	D: 1 sem. PRS: 2nd sem.	Students learn about the systematics, morphology and ecology of the main groups of land plants. The focus is on the applied aspects of biodiversity research.	None	Seminar talk[r]	3
PLOS	Plant Organelles—Structure and Function	S*	None	D: 1 sem. PRS: 2nd sem.	Students acquire advanced knowledge of the structure and function of plant organelles. They work together and individually to gain an understanding of the role that organelles play in different tissues and in relation to various cellular processes. They also further develop their ability to present and discuss scientific issues in English in a comprehensible manner, both in written and oral form.	None	Seminar talk[r]	3
PMBG	Plant Molecular Biology and Genetics	S*	None	D: 1 sem. PRS: 2nd sem.	Plant molecular biology, genetics, biochemistry, biotechnology	None	Seminar talk[r]	3

Elective Modules C (practical elective modules)—a minimum of 3 modules are to be chosen (minimum 30 ECTS CP)

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PCE	Physiological and Chemical Ecology	LC*	PBPM0	D: 1 sem. PRS: 1st or 3rd sem.	Purification and isolation of plant natural products, chromatography techniques, gene expression studies, microscopy, photometry, quantitative transport physiology. Use of sophisticated molecular biological techniques in plant physiology. Experience in independent experimental planning, performance and record keeping. Critical data interpretation and presentation.	Participation in an experiment	Poster (50%), report (50%)	10
PLCS	Plant Cellular Signaling	LC*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students gain insights into plant signaling with a special focus on calcium-mediated signaling pathways in the stress response. The course presents possible strategies and experimental approaches that allow certain research questions to be addressed. They learn to design and perform appropriate experiments and interpret the results obtained.	None	Presentation (50%), report (50%)	10
PPCB	Plant Physiology and Cell Biology	LC*	None	D: 1 sem. PRS: 1st or 3rd sem.	Plant molecular biology, cells, callus, protoplasts, plant transformation, reporter constructs, PCR.	None	Presentation (50%), report (50%)	10
MBRE/ OEP-A18	Modern Biodiversity Research: From Population Genetics to Phylogenomics	LC*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students gain an in-depth understanding of molecular evolutionary processes based on changes in DNA sequences. The focus is on using this information for phylogenetic and evolutionary analyses.	None	Presentation (30%), reports (70%)	10
PBCO1/ OEP-A15	GIS for Plant Biogeography & Conservation	LC*	None	D: 1 sem. PRS: 1st or 3rd sem.	This module teaches students how to design and perform analyses in the fields of macroecology, biogeography and nature conservation using geographical information systems (GIS). The module combines an introduction to mapping and spatial data analysis with theory and exercises from the fields of macroecology and biogeography. A special focus is placed on analyses of the impact of global environmental change on biodiversity.	None	Presentation (60%), reports (40%)	5

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PBCO2/ OEP-A16	Biodiversity Informatics: Data Analyses for Ecology and Biogeography	LC*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students learn to design and perform analyses in the fields of (macro)ecology and biogeography using mainly code-based analysis software such as R or Julia. The module provides an overview of the methods commonly used to analyze and model data in the fields of ecology (incl. macroecology) and biogeography.	None	Presentation (60%), reports (40%)	5
MCPB	Molecular Cell Physiology & Biotechnology	LC*	None	D: 1 sem. PRS: 2nd sem.	Plant molecular biology, biochemical analytics: DC, HPLC, GC-MS.	None	Presentation (50%), report (50%)	10
PBB	Protein Biochemistry and Biotechnology	LC*	None	D: 1 sem. PRS: 1st, 2nd, 3rd or 4th sem.	Students learn to describe and explain basic concepts and methods of protein biochemistry and apply the methodological knowledge they acquire in practice. They gain an understanding of the individual process steps, from expression and purification of a protein to the structure and kinetic characteristics and can perform the individual steps independently. Students can accurately document, evaluate and assess the experiments performed.	None	Written examination (50%) Presentation (20%) Report (30%)	10
TPP	Transport Physiology	LC*	PBPM0	D: 1 sem. PRS: 2nd or 4th sem.	Interactions between plants and their environment are studied experimentally from the molecular to the organismic level. This includes studies of water and salt stress, the effects of xenobiotics on plants, interactions with microorganisms and secondary plant metabolism. Modern methods of molecular plant physiology and ecology are introduced. Students learn different methods of transport physiology, gain experience in planning and performing experiments independently and learn how to present their own experimental results.	Statistical and graphical analysis and presentation of own experimental results	Written examination	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PMSA	Plant Morphology and Structural Adaptation	LC*	None	D: 1 sem. PRS: 1st or 3rd sem.	Students gain insights into the rich world of morphological and cellular adaptations to different lifestyles and environmental conditions. They mainly use light microscopic methods in their studies. They receive guidance in selecting and analyzing suitable plant material for a specific research question.	None	Presentation (50%), report (50%)	10
SORT	Plant Gene Expression and Protein Sorting	LC*	None	D: 1 sem. PRS: 2nd sem.	In this module, students gain an overview of protein sorting in plant cells. Proteins are examined with regard to the expression of their genes and their subcellular localization. In addition to bioinformatic methods, cell and molecular biology methods such as fluorescence microscopy and cell fractionation are also used. Students should use the methods taught to conduct experiments independently in order to answer protein-specific questions.	None	Presentation (50%), report (50%)	10
PBIO/ OEP-B12	Systematics and Biology of Seed Plants	LC*	OB1	D: 1 sem. PRS: 2nd or 4th sem.	This module provides an introduction to the major groups and families of land plants and their systematics, morphology and ecology, including methods and terminology in descriptive and functional morphology, taxonomy and systematics.	None	Presentation (50%), report (50%)	10

Elective Modules D (optional electives)

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PBEC/ OEP-C09	Vegetation Ecology (incl. Field Trip)	FT*, S*, LC*	OB1	D: 1 sem. PRS: 2nd or 3rd sem.	Students acquire regional floristic and vegetation knowledge and a basic understanding of biogeography and learn techniques of floristic, vegetation and ecological field research.	None	Presentation (50%), report (50%)	10

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
PAPA	Paleobotany & Palynology	L*, LC*	None	D: 1 sem. PRS: 2nd or 4th sem.	Students learn about the fundamental role that palaeobotany and palynology play in understanding the evolution of plants. Fossil material is used to present plant evolution in the context of time, climate change and mass extinctions. The module focuses on periods of major evolutionary change and addresses the rates and timing of evolutionary change.	None	Written examination (50%), report (50%)	5
GAPB (NPW-048)	Genome Analysis in Plant Breeding	L*, LC*	None	D: 1 sem. PRS: 3rd sem.	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	6

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
MAGF (NPW-042)	Molecular Analysis of Gene Function	LC*	PBPMO or Crop Physiology; at least one practical lab course	D: 1 sem. PRS: 3rd sem.	After completing the module, students will be able to - describe and analyze the phenotype of wild-type plants and mutants; - extract and test genomic DNA for mutations; - develop and test hypotheses to explain gene function; - use chemical probes and genetically coded probes for live cell imaging; - apply statistical analysis to results and test hypotheses; - demonstrate improved research writing skills; - apply experimental forward and reverse genetic approaches.	Seminar talk	Presentation (50%), report (50%)	6
CRPS	Colloquium Reports in the Plant Sciences	C*	None	D: 2 sem. PRS: 1st, 2nd or 3rd sem.	Students take part in presentations of current research papers by invited speakers. They learn how to follow a current research presentation, become familiar with different styles of presentation to improve their own, learn to formulate questions and contributions for discussions and summarize a research topic area in the abstract style used by scientific publications.	Participation in 8 botanical colloquia	Term paper[2E]	5

Elective Modules E (optional electives)—FREE1, FREE3 and FREE4 modules can be chosen up to a maximum of 10 ECTS CP each, FREE2 modules up to a maximum of 20 ECTS CP. At most one FREE2 internship can be done at an institution that is not involved in the degree program (e.g. Max Planck Institute). § 31 remains unaffected.

Module Code	Module Name	Course Type	Admission Requirements	Duration/ Program-Related Semester	Subject (Content) of Examination and Qualification Objective	Coursework	Type of Examination	ECTS CP
FREE1	FREE1—General Plant Sciences[1]	L/LC/S, as indicated in the degree program concerned	As indicated in the degree program concerned	PRS: 1st, 2nd or 3rd sem.	This module gives students the opportunity to acquire in-depth knowledge in the field of botany in a plant sciences module. Students acquire theoretical knowledge (literature research, data analysis, record keeping, presentation techniques).	As indicated in the degree program concerned	As indicated in the degree program concerned	1–10, as indicated in the degree program concerned
FREE2	FREE2—Internship in Plant Sciences[2]	LC*	As indicated in the degree program concerned	D: 1 sem. PRS: 1st, 2nd or 3rd sem.	This module gives students the opportunity to perform hands-on work on a current plant science research project in a plant science research group. Students acquire practical skills (planning and performing lab experiments, including data analysis).	None	Report	3–10
FREE3	FREE3—Related Natural Sciences[3]	L/LC/S, as indicated in the degree program concerned	As indicated in the degree program concerned	PRS: 1st, 2nd or 3rd sem.	This module gives students the opportunity to acquire in-depth knowledge in related natural science modules (see footnote). Students acquire theoretical knowledge (literature research, data analysis, record keeping, presentation techniques) or practical skills (planning and performing lab experiments).	As indicated in the degree program concerned	As indicated in the degree program concerned	1–10, as indicated in the degree program concerned
FREE4	FREE4—Related Academic Studies[4]	L/LC/S, as indicated in the degree program concerned	As indicated in the degree program concerned	PRS: 1st, 2nd or 3rd sem.	This module gives students the opportunity to acquire knowledge in related academic areas (see footnote). Students acquire theoretical knowledge (literature research, data analysis, record keeping, presentation techniques).	As indicated in the degree program concerned	As indicated in the degree program concerned	1–10, as indicated in the degree program concerned

The examination board may approve other elective modules. The examination board shall announce the approved elective modules before the beginning of the semester pursuant to § 8, paragraph 7.

[1] Any plant sciences module from an accredited master's degree program in the European Higher Education Area can be chosen as a FREE1 elective module, e.g. modules from the Crop Science master's degree program at the University of Bonn.

[2] Individually agreed research projects and lab work in research groups working in the plant sciences at universities or research institutes (e.g. Max Planck Institute) in the European Higher Education Area can be chosen as FREE2 elective modules. As a rule, the duration is six weeks for 10 ETCS CP.

[3] Modules in related sciences (e.g. biochemistry, pharmacy, geosciences, biotechnology, agriculture) that are offered in an accredited master's degree program in the European Higher Education Area and have a connection to the plant sciences (e.g. phytochemistry) can be chosen as FREE3 elective modules.

[4] Suitable modules (those with a connection to the plant sciences, related subject) from accredited master's degree programs outside the natural sciences (e.g. law, economics) in the European Higher Education Area can be chosen as FREE4 elective modules (e.g. patent law).

Annex 6: Regulations for admission to courses

If admission to a course, due to its nature, purpose or to other reasons, needs to be limited and the number of registrations exceeds the defined capacities, it is handled as follows:

Applicants shall be admitted in the following order:

- **Group 1:**
  Students who are enrolled at the University of Bonn, for whom, according to the curriculum, participation in this course is mandatory and who are in the same or a higher program-related semester as/than the one specified for participation in the curriculum, provided they
  a. were kept from registering for the course due to a delay in the first semester; or
  b. were not selected in a random selection procedure at least once in the past

- **Group 2:**
  Students who are enrolled at the University of Bonn and who are in the same or a higher program-related semester as/than the one specified for participation in the curriculum, and who do not belong to Group 1

- **Group 3:**
  All other students enrolled at the University of Bonn who are eligible for participation in this course pursuant to the curriculum

- **Group 4:**
  All other students

This does not affect further admission requirements. Within the groups—except Group 4—students who have collected the largest number of ECTS credit points for the chosen degree program or for another degree program at the University of Bonn that imports modules from the chosen degree program shall have priority. Remaining places are allocated by drawing lots.

Annex 7: Procedure in accordance with § 5, paragraph 6 for the aptitude test for foreign applicants to the consecutive master's degree program Molecular Cell Biology who are not given equivalent status to Germans by or based on international treaties

I. General principles

(1) The admission requirements in § 5 of the Examination Regulations must be satisfied for admission to the consecutive master's degree program Molecular Cell Biology. Under § 5, paragraph 6 of the Examination Regulations, foreign applicants who are not given equivalent status to Germans by or based on international treaties must pass a special aptitude test for university studies.

(2) This Annex sets down the provisions governing the aptitude test for university studies specified in paragraph 1.

(3) The objective of the procedure is to determine whether applicants have the aptitude necessary to be expected to successfully graduate from the degree program.

(4) §§ 6 (Recognition of and granting credit for academic achievements), 8 (Examination board), 9 (Examiners and assistant examiners), 29 (Access to examination records) and 30 (Invalidity of the master's examination and revocation of the master's degree) of these Examination Regulations shall apply accordingly.

II. Eligibility and application procedure/admission to the examination procedure

(1) Foreign applicants who satisfy the other admission requirements in § 5 of the Examination Regulations and who are not given equivalent status to Germans by or based on international treaties can participate in the examination procedure for the aptitude test for university studies specified in Part I, paragraph 3. Sentence 2 of paragraph 5 remains unaffected.

(2) Applications for admission to the examination procedure must be submitted electronically in German or English using the application forms provided by the examination board. Admission takes place each winter semester. The application deadline is March 31. The time of electronic receipt by the University of Bonn determines whether the application deadline has been met. The application deadline and issuing of the notices in Part VI shall be coordinated with the enrollment deadline.

(3) The following documents shall be included in German or English in electronic form with the application:
1. Proof of formal qualification in accordance with § 5, paragraphs 1 to 4 of the Examination Regulations or a provisional certificate in accordance with paragraph 5, sentence 2
2. A completed admission application form
3. A curriculum vitae with a detailed description of prior education
4. Proof of English language proficiency in accordance with § 5, paragraph 5 of the Examination Regulations

(4) The chair of the examination board established in accordance with § 8 of the Examination Regulations shall make the decision on the application for admission to the examination procedure.

(5) Admission shall be rejected if the application is incomplete. If the documents specified in paragraph 3 are not yet available at the time the application is submitted, a corresponding certificate from the university concerned and a list of the subjects and modules completed and their grades shall be sufficient for the application. The applicant must submit formal proof immediately upon receipt.

III. Performing the examination procedure

(1) The examination board formed in accordance with § 8 of the Examination Regulations is responsible for organizing and carrying out the examination procedure. The examination board shall hold discussions and make decisions in closed meetings. It shall appoint a committee to perform a preliminary examination based on the application documents to determine whether the applicant has the knowledge in the fields specified in Part IV, paragraph 1 of this Annex that is required to successfully complete the master's degree program. The committee shall consist of a chair and at least two other members from the group of professors in the Molecular Cell Biology degree program. Decisions shall be made by simple majority. In the event of a tie vote, the chair's vote shall be the deciding vote.

(2) The examination board appoints the examiners for the examination procedure. § 9 of the Examination Regulations applies accordingly.

IV. Examination procedure

(1) The application documents will be checked to determine the level of education achieved in in the first degree in the subjects listed below. Particular attention will be given to whether the applicant has the knowledge in the following areas that are required for successfully completing the consecutive master's degree program Molecular Cell Biology:

- Biochemistry
- Molecular biology
- Microbiology
- Cell biology

The standard used shall be the level of knowledge reached in the Biology bachelor's degree program at the University of Bonn at the end of the 5th semester. The committee appointed by the examination board decides whether the aptitude test for university studies must be taken in order to assess the qualifications of the applicant based on the criteria above.

(2) Applicants who completed their bachelor's studies in the Biology degree program or in a related or comparable degree program at another institution of higher education within the scope of the German Basic Law (*Grundgesetz*) or at an institution of higher education in a member state of the European Union or a state that has ratified the Convention on the Recognition of Qualifications concerning Higher Education in the European Region (Lisbon Recognition Convention) have already proven their aptitude for university studies and are exempt from the test.

(3) Written examinations shall be a maximum of three hours in length. Oral examinations shall be a maximum of one hour in length. Applicants who satisfy the admission requirements for the aptitude test for university studies in Part II shall be notified in writing of the type of examination and examination date. Examinations shall take place in English.

V. Grading of examinations

(1) A point score is assigned for the written or oral examination. The highest possible score is 100 points. The assessment is considered passed if a score of at least 50 points is achieved.

(2) Applicants who try to influence the outcome of a written examination through deception or the use of inadmissible auxiliary means shall receive an overall score of “0” (zero) points on the written examination. If a proctor determines that such deception has taken place, the applicant can request that the examination board review the decision.

(3) Written examinations shall be graded by two examiners. The two examiners assign separate point scores for the examination. The overall score for the paper is calculated as the arithmetic average of the individual scores assigned by the two examiners.

(4) The oral examination is completed as an individual or group examination with two examiners (§ 9, paragraph 1 of these Examination Regulations).

VI. Notification of the results and repetition of the examination procedure

(1) Candidates shall be informed of their results on the oral examination immediately following the examination. The examination board shall also notify the applicant in writing of the results of the examination. A rejection notification must be accompanied by advisory of legal recourse. The reasons for the negative decision must be included.

(2) Applicants who do not pass the examination procedure may repeat the examination on the date in the following semester at the earliest; a new application is required. A second repetition is not possible.

VII. Students who change the location of their studies

For students who change the location of their studies and were previously enrolled in a master’s degree program in molecular cell biology or a comparable degree program at another institution of higher education, the examination board shall assess their individual qualifications, including an examination procedure if one was performed. If the examination board decides that the degree program and examination procedure are equivalent, the applicant will be exempt from participating in the examination procedure at the University of Bonn.

Annex 8: Procedure in accordance with § 5, paragraph 6 of these Examination Regulations for the aptitude test for foreign applicants to the consecutive master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) and Paleontology who are not given equivalent status to Germans by or based on international treaties

I. General principles

(1) The admission requirements in § 5 of the Examination Regulations must be satisfied for admission to the consecutive master's degree programs Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) and Paleontology. Under § 5, paragraph 6 of the Examination Regulations, foreign applicants who are not given equivalent status to Germans by or based on international treaties must pass a special aptitude test for university studies.

(2) This Annex sets down the provisions governing the aptitude test for university studies specified in paragraph 1.

(3) The objective of the procedure is to determine whether applicants have the aptitude necessary to be expected to successfully graduate from the degree program.

(4) §§ 6 (Recognition of and granting credit for academic achievements), 8 (Examination board), 9 (Examiners and assistant examiners), 29 (Access to examination records) and 30 (Invalidity of the master's examination and revocation of the master's degree) of these Examination Regulations shall apply accordingly.

II. Eligibility and application procedure/admission to the examination procedure

(1) Foreign applicants who satisfy the other admission requirements in § 5 of these Examination Regulations and who are not given equivalent status to Germans by or based on international treaties can participate in the examination procedure for the aptitude test for university studies specified in Part I, paragraph 3. Sentence 2 of paragraph 5 remains unaffected.

(2) Applications for admission to the examination procedure must be submitted electronically in German or English using the application forms provided by the examination board. Admission to the consecutive master's degree program in Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) takes place each winter semester. The application deadline is April 15. Admission to the consecutive master's degree program Paleontology takes place each summer and winter semester. The application deadline for the winter semester is April 14 of each year; the application deadline for the summer semester is October 15. The time of electronic receipt by the University of Bonn determines whether the application deadline has been met. The application deadline and issuing of the notices in Part VI shall be coordinated with the enrollment deadline.

(3) The following documents shall be included in German or English in electronic form with the application:
1. Proof of formal qualification in accordance with § 5, paragraphs 1 to 4 of the Examination Regulations or a provisional certificate in accordance with paragraph 5, sentence 2
2. A completed admission application form
3. A curriculum vitae with a detailed description of prior education
4. Proof of English language proficiency in accordance with § 5, paragraph 5 of the Examination Regulations

(4) The chair of the examination board established in accordance with § 8 of the Examination Regulations shall make the decision on the application for admission to the examination procedure.

(5) Admission shall be rejected if the application is incomplete. If the documents specified in paragraph 3 are not yet available at the time the application is submitted, a corresponding certificate from the university concerned and a list of the subjects and modules completed and their grades shall be sufficient for the application. The applicant must submit formal proof immediately upon receipt.

III. Performing the examination procedure

(1) The examination board formed in accordance with § 8 of the Examination Regulations is responsible for organizing and carrying out the examination procedure. The examination board shall hold discussions and make decisions in closed meetings. It shall appoint a committee to perform a preliminary examination based on the application documents to determine whether the applicant has the knowledge in the fields specified in Part IV, paragraph 1 of this Annex that is required to successfully complete the master's degree program. The committee shall consist of a chair and at least two other members from the group of professors in the Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) and Paleontology degree programs. Decisions shall be made by simple majority. In the event of a tie vote, the chair's vote shall be the deciding vote.

(2) The examination board appoints the examiners for the examination procedure. § 9 of the Examination Regulations applies accordingly.

IV. Examination procedure

(1) The application documents will be checked to determine the level of education achieved in in the first degree in the subjects listed below. Particular attention will be given to whether the applicant has the knowledge in the following areas that are required for successfully completing the Organismic Biology, Evolutionary Biology and Palaeobiology (OEP Biology) consecutive master's degree program:

- Evolutionary biology
- Zoology
- Botany
- Paleontology

Particular attention will be given to whether the applicant has the knowledge in the following areas that are required for successfully completing the Paleontology consecutive master's degree program:

- Geology and petrology
- Paleozoology
- (Paleo)botany
- Paleontology and evolutionary biology

The standard used shall be the level of knowledge reached in the Biology or Geosciences bachelor's degree program at the University of Bonn at the end of the 5th semester. The committee appointed by the examination board decides whether the aptitude test for university studies must be taken in order to assess the qualifications of the applicant based on the criteria above.

(2) Applicants who completed their bachelor's studies in the Biology or Geosciences degree program or in a related or comparable degree program at another institution of higher education within the scope of the German Basic Law (*Grundgesetz*) or at an institution of higher education in a member state of the European Union or a state that has ratified the Convention on the Recognition of Qualifications concerning Higher Education in the European Region (Lisbon Recognition Convention) have already proven their aptitude for university studies and are exempt from the test.

(3) Written examinations shall be a maximum of three hours in length. Oral examinations shall be a maximum of one hour in length. Applicants who satisfy the admission requirements for the aptitude test for university studies in Part II shall be notified in writing of the type of examination and examination date. Examinations shall take place in English.

V. Grading of examinations

(1) A point score is assigned for the written or oral examination. The highest possible score is 100 points. The assessment is considered passed if a score of at least 50 points is achieved.

(2) Applicants who try to influence the outcome of a written examination through deception or the use of inadmissible auxiliary means shall receive an overall score of “0” (zero) points on the written examination. If a proctor determines that such deception has taken place, the applicant can request that the examination board review the decision.

(3) Written examinations shall be graded by two examiners. The two examiners assign separate point scores for the examination. The overall score for the paper is calculated as the arithmetic average of the individual scores assigned by the two examiners.

(4) The oral examination is completed as an individual or group examination with two examiners (§ 9, paragraph 1 of these Examination Regulations).

VI. Notification of the results and repetition of the examination procedure

(1) Candidates shall be informed of their results on the oral examination immediately following the examination. The examination board shall also notify the applicant in writing of the results of the examination. A rejection notification must be accompanied by advisory of legal recourse. The reasons for the negative decision must be included.

(2) Applicants who do not pass the examination procedure may repeat the examination on the date in the following semester at the earliest; a new application is required. A second repetition is not possible.

VII. Students who change the location of their studies

For students who change the location of their studies and were previously enrolled in a master’s degree program in organismic biology, paleontology/geosciences or a comparable degree program at another institution of higher education, the examination board shall assess their individual qualifications, including an examination procedure if one was performed. If the examination board decides that the degree program and examination procedure are equivalent, the applicant will be exempt from participating in the examination procedure at the University of Bonn.

Annex 9: Provisions for the transition period for students from the Examination Regulations for the Consecutive Master's Degree Programs Geology, Palaeontology and Geochemistry/Petrology of the Faculty of Mathematics and Natural Sciences at the University of Bonn from August 10, 2018, in accordance with § 1, paragraph 2, sentence 2, number 1.

Modules that were successfully completed in the Paleontology master's degree program before October 1, 2025, in accordance with the module structure (Annex 2) of the Examination Regulations for the Consecutive Master's Degree Programs Geology, Paleontology and Geochemistry/Petrology of the Faculty of Mathematics and Natural Sciences at the University of Bonn of August 10, 2018 (Official Announcements, 48th year, no. 30 dated August 16, 2018) (Module Structure OLD), are counted as follows in the curriculum in accordance with the module structure for these Examinations Regulations in Annex 4 (Module Structure NEW):

Module Code according to Module Structure OLD	Module Code according to Module Structure NEW (if the module is still offered)	Modules according to Module Structure NEW among which a module successfully completed according to Module Structure OLD is counted	If applicable, new module name according to Module Structure NEW
M01	MP01	Compulsory Modules	Geoscientific-Paleontological Research
M02	MP02	Compulsory Modules	Paleontological and Geological Field Work
MP08	MP08	Compulsory Modules	Paleontological Project Work
MP09	MP09	Compulsory Modules	Master's Thesis
MP10	MP10	Subject-Specific Elective Modules	Vertebrate Palaeontology I
MP11	MP11	Subject-Specific Elective Modules	Vertebrate Palaeontology II
MP12	-	Subject-Specific Elective Modules	
MP13	MP13	Subject-Specific Elective Modules	Specialization in Vertebrate Paleontology (Mammals)
MP20	MP20	Subject-Specific Elective Modules	Industrial Micropaleontology
MP21	MP21	Subject-Specific Elective Modules	Micropaleontology in the Field and Lab
MP23	MP23/OEP-A27	Subject-Specific Elective Modules	High-Resolution Biostratigraphy and Structural Analyses of Larger Foraminifera
MP30	MP30	Subject-Specific Elective Modules	Terrestrial Paleoecology and Climatology
MP40	MP40	Subject-Specific Elective Modules	Palaeobiology of Invertebrates
M80	-	Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	
M81	-	Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	
M82	-	Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	
M83	-	Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	
M84	-	Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	
M85	M85	Interdisciplinary Elective Modules for the master's degree programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	Geodynamics
M03	MP16	Subject-Specific Elective Modules	Practical Teaching Experience

Module Code according to Module Structure OLD	Module Code according to Module Structure NEW (if the module is still offered)	Modules according to Module Structure NEW among which a module successfully completed according to Module Structure OLD is counted	If applicable, new module name according to Module Structure NEW
M04	MP03	Subject-Specific Elective Modules	Practical Work Experience
Import modules from related master's degree programs	-	Until 18 ECTS CP have been acquired in these modules: Interdisciplinary Elective Modules for the Master's Degree Programs Geology, Geochemistry/Petrology, Physics of the Earth and Atmosphere, and OEP-Biology	