Translation

Examination Regulations
for the Consecutive Master's Degree Program

"Life Science Informatics"

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

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

**Examination Regulations
for the Consecutive Master's Degree Program**

"Life Science Informatics"

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

Version: August 16, 2019

By virtue of § 2, para. 4 and § 64, para. 1 of the NRW Higher Education Act (Gesetz über die Hochschulen des Landes Nordrhein-Westfalen, Hochschulgesetz) of September 16, 2014 (Legal and Regulatory Gazette of North Rhine-Westphalia, p. 547) as last amended by Article 3 of the Act to Secure the Accreditation of Degree Programs in North Rhine-Westphalia (Gesetz zur Sicherung der Akkreditierung von Studiengängen in Nordrhein-Westfalen) of October 17, 2007 (Legal and Regulatory Gazette of North Rhine-Westphalia, p. 806), the Faculty of Mathematics and Natural Sciences of the University of Bonn issued the following Regulations:

Content

Annexes:
1. Module structure for the consecutive master's degree program "Life Science Informatics"
2. Regulations for admission to courses

Part 1
Scope

§ 1
Scope

(1)   Students who commence their studies within the consecutive master's degree program "Life Science Informatics" at the University of Bonn after entry into force of these Examination Regulations are subject to these Examination Regulations.

(2)   The Examination Regulations for the consecutive master's degree program "Life Science Informatics" of the University of Bonn and RWTH Aachen University dated September 29, 2003 (Official Announcement of the University of Bonn, 33rd year, no. 20, dated October 21, 2003) as last amended by the Second Amendment to the Examination Regulations for the Master's Degree Program "Life Science Informatics" dated December 6, 2007 (Official Announcement of the University of Bonn, 38th year, no. 2, dated January 7, 2008), hereinafter referred to as MPO LSI 2003 will be repealed as of September 30, 2022. Examinations in accordance with MPO LSI 2003 will be admissible until September 30, 2021. The examination board may extend this period by six months upon valid request.

(3)   Students who, having commenced their studies prior to the coming into force of these Examination Regulations, are subject to MPO LSI 2003 and have not yet completed all necessary examinations, may
a.   continue their studies under MPO LSI 2003 until the deadline stated in para. 2 or
b.   irrevocably adopt these Examination Regulations by written request.
Students who continue their studies under MPO LSI 2003 and do not graduate by September 30, 2021 shall adopt these Examination Regulations ex officio on October 1, 2021. Credit for prior study achievements shall be granted. This shall not affect para. 2, sentences 2 and 3.

Part 2
Program Objective, Degree and Standard Period of Study

§ 2
Objective of the master's degree program and purpose of the master's examination

(1)   The consecutive master's degree program "Life Science Informatics" offered at the joint institute b-it ("Bonn-Aachen International Center for Information Technology") by the Faculty of Mathematics and Natural Sciences in cooperation with Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS) and Fraunhofer Institute for Algorithms and Scientific Computing (SCAI) as well as RWTH Aachen University is cross-disciplinary and research-oriented.

(2)   Students in this master's degree program 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 giving due regard to changes and requirements in the working world and, if applicable, in cross-disciplinary references. 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. The cross-disciplinary nature of the master's degree program is to enable students to capture cross-disciplinary correlations as well as autonomously apply research methods and findings.

(4)   The master's examination shall lead to conferral of a master's degree in "Life Science Informatics", which qualifies the holder for positions demanding extensive skills in this field.

§ 3
Academic Degree

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

§ 4
Standard period of study, 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 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 credit point is equivalent to a calculated student workload in contact hours and self-learning of 30 hours.

(4)   The degree program includes 75 CP in compulsory modules, 15 CP in subject-specific elective modules and 30 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 structure (Annex 1).

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

(6)   The language of instruction and examinations is English.

(7)   The degree program starts in the winter semester of each year.

Part 3
Admission requirements and recognition of academic achievements

§ 5
Degree program admission requirements

(1)   The consecutive master's degree program "Life Science Informatics" is open to applications

from graduates from a university undergraduate degree program in computer science, biotechnology, pharmacy, medicine, chemistry, mathematics or a related field.

(2) The university undergraduate degree as per para. 1 is to provide proof of the following qualifications:
- Basic organic chemistry, molecular biology and biochemistry as well as theoretical biology with a total of 18 ECTS credit points,
- Knowledge of informatics in the fields of programming, data structures and algorithms, computer architecture as well as basic theoretical computer science with a total of 18 ECTS credit points.

(3) English skills at level B2 or higher according to the Common European Framework of Reference for Languages (CEFR) are a prerequisite for admission to the degree program and to be proved by submitting a recognized language certificate (e.g. TOEFL, IELTS) or equivalent proof.

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

(5) The selection of successful applicants is subject to the "Regulations on Selection Procedures for Degree Programs with Admission Restrictions of the University of Bonn" (Selection Procedure Regulations).

(6) Students who do not meet the enrollment conditions stated in paras. 1–3, but have already taken all examinations necessary for graduating from an undergraduate degree program, may already enroll for a master's degree program if there is sufficient proof of their aptitude for that degree program, which is determined with special regard to the average grade for all examinations taken to that point. This only applies if students themselves are not responsible for the lack of proof that they meet enrollment conditions. Enrollment is revoked if necessary proof of meeting the enrollment conditions is not submitted to the admission office within six months after the date of enrollment.

§ 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 or in degree programs at foreign public or officially recognized universities will be recognized if the acquired skills are deemed equivalent to those that would have been acquired at the University of Bonn. The examination board assigns credit points for these achievements to the corresponding modules defined in the curriculum. The same applies to achievements in other degree programs at the University of Bonn. 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 consecutive master's degree program "Life Science Informatics".

(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 is compared to the same aspects of the academic achievement that the former is to replace. This shall not be done by skeletal comparison but rather in the form of an overall review and evaluation. A difference in the amount of awarded credit points alone does not constitute significant difference. The aforementioned regulations respectively apply to academic achievements in postgraduate programs. Academic achievements are recognized to their full extent if significant difference 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 course work and/or examinations are

completed; only then, ECTS credit points shall be awarded to the extent stipulated in these Regulations. Scope and nature of course work 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 when determining equivalence.

(3)   In accordance with § 8, para. 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 master's degree program "Life Science Informatics". 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 may be consulted. Students shall be notified within 8 weeks of whether an academic achievement is recognized, including information on legal remedies available. In case 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 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 course work is recognized, the entry "pass" shall be made in the student's transcript, not assigning a grade. Should the grading systems not be comparable, the entry "pass" shall also be made in the student's transcript. Recognized academic achievements shall be identified as such in the student's certificate. Academic achievements in degree programs not using the ECTS credit point system shall be translated by the examination board into the ECTS credit point system, provided that the respective examination is equivalent to the module examinations defined in these Examination Regulations. Such translation must adhere to the scale approved by the Standing Conference of the Ministers of Education and Cultural Affairs of the Länder of the Federal Republic of Germany for comparisons to the ECTS system.

(5)   If the requirements defined in para. 1 are met, students are legally entitled to having 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.

(6)   Applicants who, due to their performance in a placement test as per § 49, para. 12 of the NRW Higher Education Act, 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)   Other skills and qualifications may be recognized upon request, condition being documented proof. These skills and qualifications shall only be recognized if they are equivalent in content and skill level to the examinations they are to replace.

§ 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 lecturer may file a request with the

examination board of the degree program to which the respective module is assigned to manage admissions to that course, giving due regard to § 59 of the NRW Higher Education Act. Criteria for admissions in these cases are stipulated in Annex 2 of these Examination Regulations.

(2)   The examination board 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 exam office

(1)   The faculty council of the Faculty of Mathematics and Natural Sciences shall appoint an examination board that is to organize examinations and manage the tasks outlined in these Examination Regulations. The dean shall assure that the examination board is able to duly fulfill its tasks and does reliably do so. The dean shall give appropriate instructions and provide necessary administrative support.

(2)   The examination board shall have a chairperson, a deputy chairperson and an additional five regular members. The chairperson, the deputy chairperson and two additional members are appointed by the faculty council from the group of university professors (Hochschullehrerinnen und Hochschullehrer). The faculty council appoints another member from among the faculty's academic staff (akademische Mitarbeiterinnen und Mitarbeiter) and two other members from the group of students in the master's degree program, separated by group. All university professors teaching in the master's degree program "Life Science Informatics" are eligible to become members of the examination board. From among academic staff, those teaching in the master's degree program "Life Science Informatics" or involved in its management are eligible to become members of the examination board. From the group of students, those enrolled in the master's degree program "Life Science Informatics" are eligible to become members. For each member–except the chairperson and deputy chairperson–a deputy shall be appointed. The term of office of members from the group of professors and lecturers as well as of members from among academic staff is three years. The term of office of members from the group of students is one year. Members may be re-elected.

(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 ("LSI Exam Office") for administrative support 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. The examination board shall report to the faculty council on a regular, at least annual basis on the development of examination and study periods, including the time taken to complete master's theses and the distribution of overall grades. 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, para. 6 or do not meet the requirements to be admitted to the master's examination as per § 11, para. 1. The examination board shall provide input for amendments to the Examination Regulations and curriculum. The examination board may delegate clearly defined tasks to the chairperson. It shall not delegate

- decisions on objections as per sentence 2,
- decisions on acceptance of withdrawals from examinations with good cause (e.g. due to illness) as per § 22, para. 3,

- reviews of decisions on deception and disruption of examinations as per § 23, para. 1, sentences 1 and 2,
- assessments of whether a student repeatedly or otherwise seriously attempted to cheat as per § 23, para. 3,
- decisions on the invalidity of the master's examination and revocation of the master's degree as per § 30 and
- reporting duties 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 chairperson 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 chairperson or their deputy, at least four more members or their deputies, including at least two members from the group of professors and lecturers, are present. If, due to unavailability of the chairperson, a meeting is chaired by the deputy chairperson, his/her deputy shall have the right to attend that meeting as a voting member; however, the deputy chairperson's deputy can never chair a meeting in the chairperson's place. The examination board shall pass resolutions by simple majority. In the event of a tie vote, the chairperson's vote or, in case of his/her absence, the deputy chairperson's vote shall be the deciding vote. Members of the examination board have a right to attend examinations upon resolution of the examination board.

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

(8)   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 staff shall have a right to speak but no right to vote.

§ 9
Examiners and assistant examiners

(1)   The university professors and junior professors in Computer Science and at the Bonn-Aachen International Center for Information Technology are examiners without express appointment by the examination board. This also applies to members with postdoctoral qualification ("Habilitation"), contract lecturers and honorary professors, academic staff and lecturers with special responsibilities, provided that the individual person has teaching responsibilities during the respective semester. All those holding a position named in sentences 1 and 2 can also act as assistant examiner. The examination board has the right to appoint additional examiners and assistant examiners. Examinations may only be held by persons 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. Assistant examiners must have at least passed the master's examination or an equivalent examination.

(2)   Module examinations are usually held by the responsible teaching staff on that module. 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.

(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 assures that the candidate is informed of the name of the examiners in due time, as a rule within 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 module structure (Annex 1);
2.   the master's thesis.
All examinations are to be completed within the standard period of study stipulated in § 4, para. 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 the assigned module examination is graded "Sufficient" or higher.

(4)   Examinations are generally held in the language of instruction.

§ 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 and prior to 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 student in this 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 this 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 para. 1; an enrollment certificate of another degree program at the University of Bonn can serve as proof as per para. 1 sentence 3 if that degree program imports the respective module in accordance with its examination regulations; proof of admission as a cross-registered student in accordance with § 52, para. 1 of the NRW Higher Education Act can serve as proof as per para. 1, sentence 3;

2.   meet all requirements that may be stipulated in the module structure (Annex 1) for the respective module and module examination.

(3)   Should the candidate not be able to submit documented proof as per para. 1 sentence 3 in the required form, the examination board may allow the candidate to provide documented 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 para. 1 and/or not submitted as requested by a certain deadline;
b.   the requirements specified in para. 1 are not met;
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; or
d.   the student is registered for an examination procedure at another university in the chosen degree program or a degree program with substantial similarities in content as per § 6, para. 1, if failing the examination procedure would mean failing the final attempt at the master's examination.

(6)   The examination board may only deny admission to a module examination where the criteria defined by para. 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 module structure (Annex 1).

(2)   Candidates in module examinations must be students enrolled in a 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 of the NRW Higher Education Act.

(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 cross-disciplinary correlations. Module examinations can be completed by passing graded partial examinations. Module examinations and partial module examinations can be
   -   written examinations;
   -   oral examinations;
   -   (seminar) talks;
   -   presentations;
   -   lab reports and

- programming tasks.

The type of examination and, if applicable, division into partial module examinations is stipulated in the module structure. Deviating from the specifications stipulated in the module plan is possible in accordance with § 15, para. 4 and § 17, para. 4; the examination board shall, in conjunction with the examiners, determine the type of examination and, in accordance with § 8, para. 7, announce its decision in due time before the beginning of the semester.

(4)   The module structure may stipulate that students must have completed certain assessments (course work) prior to taking a module examination. Where required course work has not been completed, students shall not be admitted to the module examination. Upon request filed by the lecturer, the examination board shall, in accordance with § 8, para. 7, announce the specific requirements regarding such course work before 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 at the end of the lecture period in which the module or assigned course is completed. 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, in accordance with § 8, para. 7, announce all examination dates as well as the duration of individual examinations before the beginning of the semester. 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 qualification target requires active participation by students, the module structure may stipulate mandatory regular participation (compulsory attendance) as prerequisite to being admitted to the examination. Before the beginning of the semester, the examination board shall give reasons for its decision on which courses require compulsory attendance. In such cases, the examination board shall also define when participation can be considered regular. Depending on the qualification target, absences of up to 20% are permissible, including absences excused by means of a medical certificate. In accordance with § 8, para. 7, the examination board shall make the decisions stated in Sentences 2–4 before the beginning of the semester.

(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. In accordance with the applicable data protection regulations, results shall be made available by public display or in electronic form via the examination management system; as a rule, results are to be made available before the standard period of study ends.
2.   Oral examinations shall always be graded by a minimum of two examiners or a single examiner in the presence of a competent assistant examiner. A record shall be kept of the essential topics and results of each examination. If the examination is conducted by a single examiner in the presence of an assistant examiner, the examiner shall hear the assistant examiner in private prior to setting a grade. Candidates shall be informed of their grade immediately following the oral examination.
If the examination is conducted by two examiners, the grade shall be calculated using the average of the two individual grades. Examinations to be completed in the course of studies that cannot be compensated for once the final attempt has been failed shall always be graded by a minimum of two examiners. Rules for grading the master's thesis are set forth in § 21, para. 4.

§ 13
Module examinations – registration and withdrawal

(1)   For each module examination, students shall electronically register with the examination board by the prescribed deadline. Where justified, 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 periods are cutoff periods.

(3)   Candidates may withdraw from a written or oral examination in writing or electronically without indicating reasons until one week before the examination date. This shall not affect para. 6. Candidates may withdraw from term papers until one week before assignment of the topic. The date of receipt by the examination board prevails. In cases of examinations that spread over a whole semester or are assigned to a specific course, candidates may not withdraw without giving reasons once topics or places have been assigned.

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

(5)   Students must register for their first attempt at an examination by the end of the third semester after the semester in which the course assigned to the examination as per the module structure 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. 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)   Students who fail a module examination shall automatically be registered for the next examination date, from which they may not withdraw without giving reasons.

(7)   When registering for module examinations that may be assigned to more than one specialization area, students shall indicate to which specialization area the examination is to be assigned.

§ 14
Resitting examinations

(1)   Examinations that have been failed or deemed failed may only be repeated twice. Resits shall be conducted in accordance with § 13, para. 6. Rules for the repetition of the master's thesis are defined in § 21, para. 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 two elective modules are deregistered from the degree program by the Student Registry once the examination board's decision that the final attempt at the master's examination has been failed has come into force.

(4)   Module examinations graded "Sufficient" or higher cannot be repeated.

(5)   Should a student fail to attend a compulsory resit examination 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 course work to be repeated are designated as such in the 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 thematic field and solve 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 are in particular free text or clozes that are completed using a computer.

(3)   Written examinations shall last a minimum of 60 minutes and a maximum of 150 minutes. § 12, para. 7 applies accordingly. In accordance with § 8, para. 7 the examination board shall announce the specific examination date before the beginning of the semester.

(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; in accordance with § 8, para. 7 this shall be announced in due time before the beginning of the semester.

§ 16
Multiple choice model

(1)   Written examinations as per § 15 with a minimum of 50 registered candidates may be conducted entirely or in part using the multiple choice model.

(2)   The examination questions shall be adapted to the specific knowledge covered in the respective module and facilitate reliable results. The examination questions shall be cooperatively developed by two examiners with at least the same or an equivalent qualification as the one to be determined through that examination. When designing the examination questions, the examiners shall define how many and which answers will be considered correct. The number of answers to be ticked shall be indicated on the task sheet. Questions with only one correct answer shall be considered solved correctly if the correct answer is the only one ticked. If the candidate does not tick the correct answer, ticks a wrong answer or ticks more than the one correct answer, the question shall be graded with 0 points. If there is more than one correct answer, the question shall be graded in proportion to the number of correct answers ticked. If the candidate does not tick any answer or ticks too many answers, the question shall be graded with 0 points.

(3)   Before determining the result of an examination, its questions shall be checked for errors with regard to the module's requirements. Erroneous examination questions shall not be considered when determining the result of an examination. The reduced number of examination questions shall be taken into account when grading the examination. A candidate's grade shall not suffer under a reduced number of examination questions. Deducting points in individual examination questions or the examination as a whole shall not be permitted when grading an examination. Offsetting wrong answers with correct answers shall also be prohibited.

(4)   Examinations using the multiple choice model shall be considered passed when the candidate

reaches a minimum of 50 percent of the total score or a score that does not fall below the average score reached by all candidates in this examination by more than 22 percent.

(5)   Results in a multiple choice examination shall be graded as follows: If the candidate reaches the minimum score necessary to pass the examination as per para. 4, the grade shall be

1.0	Very good	if 90 – 100%	
1.3	Very good	if 80 – <90%	
1.7	Good	if 70 – <80%	
2.0	Good	if 60 – <70%	
2.3	Good	if 50 – <60%	of points above the necessary
2.7	Satisfactory	if 40 – <50%	minimum score
3.0	Satisfactory	if 30 – <40%	have been reached.
3.3	Satisfactory	if 20 – <30%	
3.7	Sufficient	if 10 – <20%	
4.0	Sufficient	if 0 – <10%	

Candidates who do not reach the minimum score necessary to pass the examination shall receive the grade "Insufficient".

(6)   Deviating from para. 1, written examinations that are resits may partly or entirely be conducted using the multiple choice model on the second examination date, even when not reaching the minimum number of registered candidates, provided that
-        the written examination is equal in level of expertise, difficulty and maximum score to the written examination on the first examination date, and
-        the written examinations for both dates are developed by the same examiner simultaneously, and
-        the decision on which written examination is assigned to which examination date is made by drawing lots.
The written examination held on the second examination date shall be graded using the same grading scale as the one used for the first written examination; the pass score defined for the first written examination in accordance with para. 4 shall also apply to the written examination held on the second examination date. Examiners shall confirm in the record that the conditions as per sentence 1 are met.

(7)   Should the examination include both multiple choice questions and other questions, the part using the multiple choice model shall be graded in accordance with paras. 2–6. All other questions will be graded following the applicable provisions. The overall grade is calculated from the results of both parts, with results from each part being weighted in relation to the total achievable score. If one part of an examination is failed, this part shall be graded "Insufficient" (5.0) and taken into account as such when calculating the overall grade.

(8)   Otherwise, § 15 shall apply accordingly.

§ 17
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)   Oral examinations shall be conducted by either a panel of several examiners (Kollegialprüfung)

or a single examiner in the presence of a competent assistant examiner, with candidates being examined either individually or in a group. If the examination is conducted by a panel of several examiners, the candidate shall be examined by one examiner per subject of examination. This shall not affect the provisions set forth in § 12, para. 7. Each oral module examination shall last a minimum of 15 minutes and a maximum of 45 minutes per candidate. 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. Admitting students to sit in is at the discretion of the examiner or, in case of a panel of several examiners, the panel chair. 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. In accordance with § 8, para. 7 this shall be announced in due time before the beginning of the semester.

§ 18
(Seminar) Talks, presentations, lab reports and programming tasks

(1)   (Seminar) Talks are oral presentations that last a minimum of 45 minutes and a maximum of 60 minutes, including a discussion. These talks are based on original scientific texts and individual research by the candidates. In (seminar) talks, candidates demonstrate their ability to comprehensibly present research results and explain them in a discussion. (Seminar) Talks shall be held in the semester in which the respective course is offered.

(2)   Presentations are oral presentations that last a minimum of 20 minutes and a maximum of 30 minutes. Candidates demonstrate their ability to comprehensibly present and discuss their own documented research results raised using scientific methods. Candidates shall have 2–3 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).

(3)   Lab reports are written summaries of individual scientific research conducted within a lab course. Candidates comprehensibly present and analyze the sequence and results of their work. Lab reports are based on notes taken during the course, code drafts and tests, original scientific texts and individual research. The layout, structure and scope (10–15 DIN-A4 pages) of lab reports shall reflect that of scientific publications. Topics for lab reports shall be assigned at the beginning of the course. Lab reports shall be handed in by the end of the course (end of lecture period).

(4)   In programming tasks, candidates are to demonstrate that they can solve a scientific question with a computer program written by them. The results of programming tasks shall be documented in accordance with certain provisions made by the examiner at the beginning of the semester. The examination shall be completed in the course of the semester. As a rule, candidates shall work on programming tasks within a lab course. Programming tasks shall generally be completed and submitted within one week after receiving the task.

(5)   The examiners shall determine how much time candidates shall have to complete a task or, respectively, how long an examination shall last as well as other specifics in connection with the individual types of examination in each module. Otherwise, the provisions for grading oral and written assessments stipulated in § 12, para. 7 apply accordingly.

§ 19
Compensation for disadvantages and deadline extension

(1)   Should a student provide appropriate proof to the examination board that, due to permanent disability, disability that lasts more than one semester or chronic disease, they are not able to make proper use of their intellectual skills in an assessment and can therefore, entirely or in part, not complete an examination in its designated form and duration, the examination board shall approve an equivalent assessment to be conducted in a form suitable to that student's needs. This may include an extension of the period in which the student may complete the assessment. This applies to examinations as well as course work. When determining an equivalent assessment, due regard shall be given to the workload in the respective module. Students who, due to impairment and regardless of support offered by the University, cannot participate in compulsory lab courses or study periods abroad shall be allowed to participate in alternative forms of assessment.

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

a.   Caring for and raising underage children as per § 25, para. 5 of the Federal Training Assistance Act (BaföG) – for a maximum of three semesters per child;
b.   Acting as elected representative in a university body, the student body, the student body's student councils or the Studierendenwerke – 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 the master's degree program "Life Science Informatics" 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 shall announce the deadline by which a master's thesis must be registered for the candidate to complete the master's degree program within the standard period of study.

(3)   When registering their master's thesis, students must indicate the focus area to which the thesis shall be assigned as well as their choice of examiners for the master's thesis.

(4)   Any examiner may assign the topic for the master's thesis in accordance with § 9, para. 1. As a rule, the examiner who assigned the topic also acts as supervisor of the master's thesis. Permission from the examination board shall be required when an external university professor who is active in research and teaching is to assign the topic for and supervise the master's thesis or when the candidate is to complete their thesis at a facility outside the University, which shall only be granted if

appropriate supervision by an examiner can be assured.

(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 (Annex 1). The examination board shall issue 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; the examination board is not bound to such proposals. Upon request by the student, the examination board shall assure that the student receives a topic for his/her master's thesis in due time as per para. 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 shall contain a minimum of 40 and a maximum of 90 DIN-A4 pages in text.

(8)   Passing the master's thesis awards 30 CP, corresponding to 900 hours in student workload. The master's thesis shall be completed within a maximum period of 6 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 beginning of the fourth semester.

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

(1)   Candidates shall submit their master's thesis in triplicate 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 particular thesis is their own work, that they used only those sources and resources cited in the thesis and that they have marked citations as such.

(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, para. 1. Among these two examiners, at least one examiner must be a member of the group of university professors (Hochschullehrerinnen und Hochschullehrer) at the University of Bonn. The candidate shall be entitled to propose examiners but shall not have a right to being 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, para. 1. When the difference between the two grades is less than 2.0, they shall be averaged together for the final grade for the master's thesis. When the difference is 2.0 or more or one of the grades is "Insufficient", the examination board shall appoint a third examiner for review of the master's thesis. In this case, the two better grades shall be averaged together for the final grade. Grades shall be averaged in accordance with § 25, para. 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. Reviews of master's theses shall be written in English.

(5)   Examiners shall submit their reviews of the master's thesis within eight weeks after the submission deadline.

(6)   Candidates who receive the grade "Sufficient" or higher for their master's thesis are awarded 30 CP.

(7)   Master's theses graded "Insufficient" or deemed failed 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, para. 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, default, withdrawal and reprimand

(1)   Candidates may electronically cancel their registration for module examinations with the examination board until one week before the examination date at the latest; registrations of term papers must be canceled before issue of the topic. The date of receipt by the examination board prevails.

(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 to an examination or to submit a graded assessment within the specified period of time (default).

(3)   Candidates who have registered for an examination but have good cause to withdraw from that examination, especially due to illness, 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 default. In cases of illness, candidates shall present a medical certificate proving their inability to participate in the examination or, respectively, submit their assignment on time. Candidates who withdraw from an 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 medical examiner 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. 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 shall receive the grade "Insufficient"; the respective examiner or proctor shall identify deception or use of inadmissible auxiliary means, include it in the record and notify the examination board. 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 deemed failed and graded "Insufficient". A record shall be made of the reasons for barring the candidate from the examination.

(2)   Candidates may, within a period of two weeks, request that decisions taken pursuant to para. 1, sentences 1 and 2 be reviewed by the examination board.

(3)   In cases of repeated or otherwise grave attempts at deception, the candidate may be deregistered from the degree program. The examination board shall determine whether the candidate's attempt at deception was repeated or otherwise grave. Deregistration of students due to deception is at the rector's discretion. Deregistration is carried out by the Student Registry.

(4)   Violation of 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 competent administrative authority, the chancellor 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 (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 (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 assessments may not be interrupted by a period of parental leave. The assessment 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, para. 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 assessments may not be extended based on such leave taken. The assessment topics shall be deemed not issued. The candidate shall receive a new topic at the end of their leave. This does not affect § 22, para. 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 does not affect § 12, para. 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 graduate 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.

(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". The grading scale for modules is:

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, para. 4 as well as the master's thesis and have thus been awarded a total of 120 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 individually weighted grades is then divided by the total number of ECTS credit points (weighted average). Para. 3, sentence 2 applies accordingly. Deviating from this, the overall grade shall be "Excellent" if the overall grade is no lower than 1.0 and the master's thesis has been graded "Very good" (1.0). Modules marked "pass" due to lack of comparability between grading systems shall not be included when calculating the overall grade.

(6)   The final attempt at the master's examination shall be deemed failed when
-       the candidate has three times failed to pass a module examination in a compulsory module as defined by § 10, para. 3, sentence 4, letter a or, respectively, § 14, para. 2;
-       the candidate has, pursuant to § 14, para. 3, lost their right to examination in two elective modules; or
-       the master's thesis has been graded "Insufficient" in the second attempt.

§ 26
Certificate

(1)   The candidate shall 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. Candidates may also receive an English translation of their certificate on application. 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 and
-       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 examination board and signed by the chairperson of the examination board.

(3)   Candidates who have or are deemed to 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)   Candidates who leave the University without a degree shall, after deregistration and on application, be issued a transcript including a list of all completed course work and examinations. This transcript shall be limited to those parts of the student's course of study which were successfully completed. In addition, a notification may be issued on application 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 of the master's examination, candidates shall receive a Master's Diploma issued the same day in English and German 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 of the University of Bonn and by the chairperson 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 degree program and
- 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).

(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 of the Administrative Procedure Act (Verwaltungsverfahrensgesetz).

(3)   The examination board shall determine when and where the examination records may be accessed and notify the candidate hereof in due time.

§ 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 or their master's thesis, the examination board may correspondingly correct the grades for those examinations or the thesis in which the candidate used deception as well as the overall grade and declare the entire master's examination or parts thereof failed.

(2)   Should it become known after the certificate has been issued that the candidate had not met the requirements for admission to the master's 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 Administrative Procedure Act.

(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 pursuant to para. 1 and para. 2, sentence 2 may be taken only for a period of five years after the issue of the certificate.

(5)   Should the master's examination be deemed altogether failed, the master's degree shall be suspended 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 examinations as per § 10, para. 2 have not yet been fully completed, extend their standard scope of studies on application by up to 15 CP in additional modules. These may be modules from this 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 this degree program. Credit can only be granted for modules that are completed within the standard period of study times one and a half. The results of additional examinations shall be included in the certificate 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 Examination Regulations shall enter into force on the day after their publication among the Official Announcements of the University of Bonn.

J. Beck

The Dean
of the Faculty of Mathematics and Natural Sciences
of the University of Bonn
University Professor Dr. Johannes Beck

Executed pursuant to the resolution adopted by the faculty council of the Faculty of Mathematics and Natural Sciences on June 26, 2019 and the resolution passed by the rectorate on July 16, 2019.

Bonn, August 16, 2019

K. Sandmann

For the
Rector
of the University of Bonn
Vice Rector
University Professor Dr. Klaus Sandmann

Annex 1:   Module structure for the consecutive master program "Life Science Informatics"

Module structure key:
- Abbreviations of course types: F = field trip, LC = lab course, prE = practical exercise, S = seminar, T = tutorial, E = scientific exercise, L = lecture.
- Marked with asterisk (*): Courses for which the examination board may, pursuant to § 12, para. 6, require compulsory attendance as prerequisite for participation in the module examination (field trips, language courses, lab courses and practical exercises as well as comparable courses). In these cases, compulsory attendance is an additional requirement to other listed assessments.
- The column "Course Type" shows the type of a course within the module.
- The column "Duration/Study Semester" shows the duration (D) of the module (in semesters) and assigns it to a specific study semester (StS).
- The column "Assessments" shows requirements that must be met for admission to certain examinations pursuant to § 12, para. 4 or, respectively, to acquire ECTS credit points in modules without an examination. Assessments that form requirements for admission to certain examinations and must be repeated in case that examination is failed are marked with the letter "r" ($_r$).
- In the column "Type of Examination", examinations as defined by § 14, para. 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" ($_r$).

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, para. 7.

Compulsory Modules

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-P-001	Introduction to Computer Science	L, E	none	D: 1 sem. StS: 1st sem.	Content: Overview of applied computer science: concepts of imperative and object-oriented programming, algorithm design and analysis techniques, examples of classic algorithms and data structures, introduction to numeric algorithms Objectives: Developing a good understanding of these topics	Exercises	Written examination	11

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-P-002	Introduction to Mathematics	L, E	none	D: 1 sem. StS: 1st sem.	Content: Overview of linear algebra, analysis, probability theory and statistics. Objectives: Competence in understanding mathematical concepts from computer science and life sciences	Exercises	Written examination	3
M-LSI-P-003	Introduction to Chemistry and Biology	L, E	none	D: 1 sem. StS: 1st sem.	Content: Overview of topics from chemistry and biology relevant for Life Science Informatics Objectives: Understanding cells as smallest units of life and their functionality	Exercises	Written examination	7

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-P-004	Biological Databases	L, E	none	D: 1 sem. StS: 1st sem.	Content: - Information systems and technical databases in biomedicine - objects and object orientation in molecular biology - overview of classifications of biological, chemical and medical databases - ontologies, controlled vocabularies and annotations / metainformation - (semantic) data integration - data multimodality and scales - erroneous data, good and bad data Objectives: - Overview of the diversity of biomedical databases - introduction to using health databases - critical distance to databases; to data in databases; quality of annotations - semantics, metadata, annotations - data integration	Exercises	Written examination	6
M-LSI-P-005	Bioinformatics I	L	none	D: 1 sem. StS: 1st sem.	Content: Introduction to methods of computer science used in life sciences, especially molecular biology (genomics, proteomics, expression profiling, network analysis) Computer-assisted description of natural phenomena, especially using probability theory Objectives: Cross-disciplinary thinking Understanding trade-offs of algorithmic approaches	Exercises	Written examination	3

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-P-006	Molecular Modeling and Drug Design	L, E	Introduction to Computer Science, Introduction to Mathematics, Introduction to Chemistry and Biology	D: 1 sem. StS: 2nd sem.	Content: Force fields, molecular mechanics, conformational analysis, search for bioactive conformations, database research, pharmacophores, 2D and 3D QSAR, structure-based drug design, molecular docking and scoring functions Objectives: Understanding the scientific and computer-scientific basis of modeling and computer-assisted drug design	Exercises	Written examination	6
M-LSI-P-007	Bioinformatics II – Visual Computing in the Life Sciences	L, E	none	D: 1 sem. StS: 2nd semester	Content: Overview of concrete methods of data visualization and image processing Objectives: Applying these methods in biology and life sciences.	Exercises	Written examination	6
M-LSI-P-008	Programing Lab I	LC	Introduction to Computer Science	D: 1 sem. StS: 2nd sem.	Contents: Acquisition of practical skills in Python Objectives: Applying these skills to implement bioinformatic and cheminformatic applications		Programming tasks	8

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-P-009	Knowledge Discovery	L, E	none	D: 1 sem. StS: 2nd sem.	Content: - Definition of knowledge discovery and distinction from data mining - knowledge discovery workflows; knowledge vs. data; - introduction to knowledge discovery - introduction to statistics and "data science" - introduction to machine learning - introduction to the analysis of longitudinal data - introduction to information extraction Objectives: - Overview of methods and workflows (or phases) of knowledge discovery - sound understanding of terminology - raising fascination for advanced methods of data- and knowledge-	Exercises	Written examination	6
M-LSI-P-010	Scientific Presentation I	S	none	D: 1 sem. StS: 2nd sem.	Content: Overview of types of scientific presentations: Slide design, structure of scientific talks based on selected examples from scientific literature, presentation training, video training Objectives: Improving presentation skills as an important basis of exchanging scientific ideas and concepts.		Seminar talk	4

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-P-011	Cheminformatics	L, E	Molecular Modeling and Drug Design	D: 1 sem. StS: 3rd sem.	Content: Molecular representation, chemical space design, analysis of molecular similarities, search for molecular similarities, classification of substances, machine learning Objectives: Learning standard methods of cheminformatics as well as their algorithmic foundations	Exercises	Written examination	7
M-LSI-P-012	Programming Lab II	LC	Programming Lab 1	D: 1 sem. StS: 3rd sem.	Content: - Introduction to Java - Advanced Python Objectives: - Methodology of good software development - implementing problem solving approaches using software - principles of good software development		minutes	8
M-LSI-P-013	Master's thesis		Minimum of 60 CP from the degree program, successful completion of modules 1–9	D: 1 semester StS: 4th sem.	Content: The student solves a precisely defined scientific problem from Life Science Informatics using state-of-the-art methods Objectives: Sound and correct use of state-of-the-art methods to solve a scientific question from Life Science Informatics		Master's thesis	30

Elective Modules

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-W-001	LSI Tutorial I	LC	none	D: 1 sem. StS: 1st sem.	Content: Introduction to programming in Python in the context of life sciences. Objectives: Sound use of Python for questions and contents from life sciences (scaled down for learning purposes).		Programming tasks	6
M-LSI-W-002	Introduction to Machine Learning Tutorial	LC	none	D: 1 sem. StS: 2nd sem.	Content: Introduction to machine learning and data mining. Objectives: Application of machine learning methods on problems from life sciences. Handling heterogeneous data in a machine learning context.		Programming tasks	6
M-LSI-W-003	Selected Chapters of Molecular Cell Biology	S	Introduction to Chemistry and Biology	D: 1 sem. StS: 2nd semester	Content: Working on questions from life sciences using relevant research papers from molecular cell biology. Objectives: In-depth knowledge in life sciences.		Seminar talk	3

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-W-004	Scientific Presentation II	S	none	D: 1 sem. StS: 3rd sem.	Content: Advanced writing techniques: academic writing style, design of scientific publications, strong focus on the master's thesis. Writing techniques (brainstorming, mind mapping, clustering, free writing, quoting scientific texts), avoiding writer's block Objectives: Preparation for writing the master's thesis and scientific publications		Seminar talk	6
M-LSI-W-005	Computational Systems Biology	S	none	D: 1 sem. StS: 3rd sem.	Content: Introduction to Computational Systems Biology, computer-assisted modeling of diseases, modeling methods and approaches Objectives: Thinking and working in the complex context of systems biology		Seminar talk	4
M-LSI-W-006	Cheminformatics	LC	none	D: 1 sem. StS: 3rd sem.	Content: Practical application of lecture contents on specific and clearly defined research questions Objectives: Scientific work based on practical examples from ongoing research		minutes	8

M-LSI-W-007	Molecular Modeling and Drug Design	LC	none	D: 1 sem. StS: 3rd sem.	Content: Relevant questions from molecular modeling and drug design, selected for students Objectives: Acquiring practical skills in molecular modeling and drug design		minutes	8

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-W-008	Data Mining and Machine Learning in the Life Sciences	L, E	none	D: 1 sem. StS: 3rd sem.	Content: Introduction to statistics, data mining and algorithms of machine learning Objectives: Understanding the contents named above and applying them in exercises	Exercises	Written examination	6
M-LSI-W-009	Biological Databases- Design Implementation and Organization	LC	none	D: 1 sem. StS: 4th sem.	Content: - Autonomous design, implementation and testing of biological databases in the broad sense - Introduction to biological database technologies Objectives: - Acquisition of basic knowledge in database design and implementation; - confident and courageous use of modern database technologies		Seminar talk	6
M-LSI-W-010	Visualistics	S	Bioinformatics I	D: 1 sem. StS: 3rd sem.	Content: Overview of different visualization methods and their biomedical applications Objectives: Abstracting methods and scientific illustration		Seminar talk	4

| M-LSI-W-011 | High Content Screening | LC | Bioinformatics I | D: 1 sem.
StS: 3rd sem. | Content:
Overview of methods of high content screening,
simple and trainable image analysis,
statistical analysis of experimental data
handling standard software,
data management
Objectives:
Gaining experience in working with high content screening | | Seminar talk | 4 |

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	C P
M-LSI-W-012	Modeling and Simulation	LC	none	D: 1 sem. StS: 3rd sem.	Content: Computer experiments are conducted in one or more basic modeling and simulation paradigms: Boolean networks, stochastic processes, deterministic dynamic systems Examples include modeling and simulation of logistic growth, cyclic processes (circadian clocks), bistable signaling networks Understanding of the numerical solution of Cauchy problems, bifurcation analyses and stability analyses Objectives: Learning work methods in modeling and simulation		Seminar talk	8
M-LSI-W-013	Mechanism Enrichment using NeuroMMSig	LC	Programming Lab 1	D: 1 sem. StS: 3rd sem.	Content: - Information extraction technologies - knowledge-based models - algorithms for the functional interpretation of data from given knowledge models Objectives: - Modern methods of interpreting signals in data through computable knowledge models - analytics of complex clinical data (mechanism-based stratification)		minutes	4

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-W-014	Medicinal Chemistry	L, E	none	D: 1 sem. StS: 3rd sem.	Content: Introduction to general concepts and modern methods of medical chemistry and drug development, focusing on computer-assisted strategies. Objectives: Understanding the contents named above.		Written examination	3
M-LSI-W-015	Knowledge Assembly, Data Integration and Modeling in Systems and Network Biology	S		D: 1 sem. StS: 3 sem.	Content: - Autonomous development of complex scientific questions - understanding diverse strategies and workflows leading from data through knowledge representations to mining approaches and new insights Objectives: - Systematic development of complex contents - summarizing and preparing - autonomous presentation and practicing presentation techniques		Seminar talk	4
M-LSI-W-016	Current Trends in Applied Life Science Informatics	S		D: 1 sem. StS: 4th sem.	Content: - Presenting plans for the master's thesis (idea, design, implementation plan, performance criteria) - final presentation towards the end of the master's thesis - reports on participation in conferences and workshops Objectives: Discussion of the students' own research, placing it in the research context of the respective specialist area		Seminar talk	3

Module Code	Module Name	Course Type	Admission requirements	Duration/Study Semester	Subject (content) of Examination and Qualification Objective	Assessments	Type of Examination	CP
M-LSI-W-017	Longitudinal modeling of disease progression	LC		D: 1 sem. StS: 3rd semester	Content: - Introduction to longitudinal modeling of complex biomedical data Objectives: - Understanding the basics of longitudinal, systems biological modeling approaches - practical application of learned modeling strategies in specific examples		Presentation	3

The examination board may approve further elective modules and shall make these public before the beginning of the semester, pursuant to § 8, para. 7.

Annex 2:   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 study 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 study 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 this degree program or for another degree program at the University of Bonn that imports modules from this degree program shall have priority. Remaining places are allocated by drawing lots.