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**Examination regulations for the Master's programme in Mathematics of the Faculty of Mathematics and Natural Sciences of the University of Kassel, 22.01.2020**

**Content**



**Annex**

## § 1 Scope

The subject examination regulations for the consecutive, English-language Master's programme in Mathematics of the Faculty of Mathematics and Natural Sciences at the University of Kassel supplement the General Regulations for Subject Examination Regulations with the degrees Bachelor and Master (AB Bachelor/Master) of the University of Kassel in the currently valid version.

## § 2 Academic degree, profile type

(1) Upon passing the Master's examination, the Faculty of Mathematics and Natural Sciences awards the academic degree Master of Science (M.Sc.).

(2) The profile of the Master's programme in Mathematics is designed as a more research-oriented programme, taught predominantly in English.

## § 3 Standard Period of Study, Scope of Studies, Focus of Application

(1) The standard period of study for the Master's program, including the Master's degree module, is four semesters.

(2) A total of 120 credits are awarded for the successfully completed Master's course. Of these, 6 credits are allocated to required modules, 60 credits to elective required modules, 30 credits to the Master's degree module, 18 credits to the application minor and 6 credits to additive key competencies.

(3) The Master's program includes the following application minors:

- Computer Science
- Physics
- Nanoscience
- Economics.

Upon request, the examination committee may also approve one of the application minors from the Master's degree program in industrial and applied mathematics.

(4) The course of study, including the examinations, will be conducted in English.

## § 4 Start of studies

The Master's programme in Mathematics can be taken up in the winter and in the summer semester.

## § 5 Examination Committee

(1) Decisions in examination matters in the Master's Program in Mathematics are made by the Mathematics Examination Committee.

(2) The members of the Examination Committee are
(a) three professors of the Institute of Mathematics of the Faculty of Mathematics and Natural Sciences at the University of Kassel

(b) a research assistant at the Institute of Mathematics of the Faculty of Mathematics and Natural Sciences at the University of Kassel
(c) a student of mathematics or industrial and applied mathematics at the University of Kassel.

## § 6 Admission requirements for the Master's programme

(1) Admission to the Master's programme is only open to those who
a) have passed the bachelor's examination in mathematics at the University of Kassel
or
b) hold a degree of at least an equivalent level in the same or a related subject from a German university or university of applied sciences with a standard period of study of at least six semesters and 180 credits
or
c) have completed at least an equivalent foreign degree in the same or a related subject with a standard period of study of at least six semesters and 180 credits

(2) The subject profile of the degree in accordance with paragraph 1(b) or (c) must meet the requirements of the Master's degree in Mathematics. In particular, sufficient basic knowledge in mathematics, which corresponds in content, scope and level to the modules BG1 - BG6 of the Bachelor of Mathematics degree programme, as well as in-depth knowledge in at least one field of mathematics, which corresponds in scope and level to one of the modules listed in § 7 (1b) of the examination regulations for the Bachelor of Mathematics degree programme, must be proven. If the applicant does not meet the requirements for admission to the Master's programme, the Examination Committee can grant admission under the condition that the successful completion of additional modules to the extent of up to 30 credits can be proven before the Master's thesis.

(3) For admission, proof of language skills in English at level B2 of the Common European Framework of Reference for Languages must be provided. The provisions of the Framework of Reference for Language Proficiency according to the regulations of the Common European Framework of Reference for Languages in Bachelor's and Master's Programs at the University of Kassel, as amended, shall apply to the proof.

(4) The Examination Committee decides whether the requirements according to paragraphs 1 and 2 are met. The determination is made on the basis of the written application documents or on the basis of a hearing lasting 30-60 minutes, if the existence of the prerequisites cannot already be determined by the Examination Committee on the basis of the written application documents. The Examination Committee appoints two professors from the Institute of Mathematics of the Faculty of Mathematics and Natural Sciences at the University of Kassel for the selection interview.

## § 7 Module examinations, repetitions

(1) The module examinations are offered in the temporal and factual context of a module.

(2) The following forms of examination are eligible

- written exam (90 to 180 minutes),
- oral examination (20 to 60 minutes),
- term paper (5 to 20 pages),
- Presentations with written essay,
- Project work (related to at least one module),
- internship report
- multiple choice examinations
- and, if applicable, other examination forms described in the study and examination plan.

The form of examination of a module or submodule is determined by the lecturer at the beginning of the course to which the module examination refers, within the framework of the specifications of the study and examination plan.

(3) A module examination may also consist of several partial examinations. The module examination has been passed if all partial examinations have been graded at least "sufficient" (4,0).

(4) Failed module examinations can be repeated twice. A repetition of passed module examinations is not permitted. If a module examination consists of several partial examinations, a partial examination graded as "failed" (5.0) may be repeated twice. A repetition of passed partial examination is not permitted.

(5) Group work by a maximum of three candidates may be admitted. It must be possible to individually delimit and individually evaluate the share of each candidate.

## § 8 Examination parts of the Master's degree

(1) The Master's examination consists of the following module examinations with the corresponding credits and percentages for the weighted calculation of the overall grade according to § 10 (4).

(a) Required modules

| | | |
|---|---|---|
| MS1 Seminar | 6 Credits | 6 % |
| MK1 Additive Key Competencies | 6 Credits | 0 % |

In the case of module MS1, two of the indicated credits are awarded for integrated key competencies.

(b) Elective required modules

A total of six modules must be selected from the following lists. At least three of the five areas of analysis, algebra, discrete mathematics, numerics and stochastics must be covered by modules, whereby between 10 and 30 credits can be earned per area. Modules that have already been completed as part of the Bachelor's programme cannot be selected.

| Analysis: | | |
|---|---|---|
| MV01 Applied Functional Analysis | 10 Credits | 8 % |
| MV08 Dynamical Systems | 10 Credits | 8 % |
| MV09 Introduction to Mathematical Physics | 10 Credits | 8 % |
| MV10 Introduction to Partial Differential Equations | 10 Credits | 8 % |
| MV11 Evolution equations | 10 Credits | 8 % |
| MV13 Complex Analysis | 10 Credits | 8 % |

| | | |
|---|---|---|
| MV14 Geometry and Topology | 10 Credits | 8 % |
| MV15 Advanced Functional Analysis I | 10 Credits | 8 % |
| MV16 Advanced Functional Analysis II | 10 Credits | 8 % |
| MV31 Partial Differential Equations | 10 Credits | 8 % |
| MV36 Calculus of Variations and Applications I | 10 Credits | 8 % |
| MV37 Calculus of Variations and Applications II | 10 Credits | 8 % |
| | | |
| Algebra: | | |
| MV03 Computer Algebra I | 10 Credits | 8 % |
| MV04 Computer Algebra II | 10 Credits | 8 % |
| MV05 Differential algebra I | 10 Credits | 8 % |
| MV06 Differential algebra II | 10 Credits | 8 % |
| MV17 Commutative Algebra I | 10 Credits | 8 % |
| MV18 Commutative Algebra II | 10 Credits | 8 % |
| MV19 Cryptography and Coding Theory | 10 Credits | 8 % |
| | | |
| Discrete mathematics: | | |
| MV27 Optimisation I | 10 Credits | 8 % |
| MV28 Optimisation II | 10 Credits | 8 % |
| MV29 Optimisation III | 10 Credits | 8 % |
| | | |
| Numerics: | | |
| MV12 Finite Element Methods | 10 Credits | 8 % |
| MV24 Numerical Methods for Ordinary Differential Equations | 10 Credits | 8 % |
| MV25 Numerical Methods for Systems of Linear Equations | 10 Credits | 8 % |
| MV26 Numerical Methods for Partial Differential Equations | 10 Credits | 8 % |
| MV30 Parallel Computing | 10 Credits | 8 % |
| | | |
| Stochastics: | | |
| MV02 Applied Statistics | 10 Credits | 8 % |
| MV20 Measure and Probability Theory | 10 Credits | 8 % |
| MV32 Specialised Topics in Stochastics | 10 Credits | 8 % |
| MV33 Stochastic Modelling and Simulation | 10 Credits | 8 % |
| MV34 Stochastic Processes I | 10 Credits | 8 % |
| MV35 Stochastic Processes II | 10 Credits | 8 % |

(c) Application minor
Am application minor according to §3 paragraph 3 must be chosen. Within this specialisation, required or elective required modules according to Annexes 1 to 4 of these examination regulations must be completed.

| | | |
|---|---|---|
| ASP 1 Computer science | 18 Credits | 16 % |
| ASP 2 Physics | 18 Credits | 16 % |
| ASP 3 Economic Sciences | 18 Credits | 16 % |
| ASP 4 Nanoscience | 18 Credits | 16 % |

d) Master's degree module (30 credits, weighting 30 %) according to § 9.

(2) The list of required elective modules in the specialisation area and the lists of required elective modules in the application minor may be supplemented by additional modules within the framework of the provisions of these examination regulations. These additions are to be decided by the Faculty Council and published in a suitable form (e.g. in the module handbook).

(3) Modules taken during a study period abroad at another university may also be credited by the Examination Committee within the international module. A prerequisite for this is usually a Learning Agreement signed by the host institution, the student, the Chairperson of the Examination Committee and, if applicable, the programme coordinator.

## § 9 Master’s degree module

(1) Master's thesis and Master's colloquium form the Master's degree module. For this module 30 credits are awarded.

(2) The topic of the Master's thesis can be handed out at the earliest after the first Master's semester. The topic is handed out by the supervising reviewer. The supervising reviewer must be a member of the Institute of Mathematics and must also inform the chairperson of the examination board in writing of the provisional topic and the date of issue.

(3) The Master's thesis is to be completed within six months and begins on the day the topic is announced by the supervising reviewer. The topic of the Master's thesis may only be returned once and only within eight weeks of issue. The student shall return the topic by means of a written notification to the Chairperson of the Examination Committee. The topic must be of such a nature that the thesis can be completed within the time limit provided.

(4) If the first deadline cannot be met for reasons for which the candidate is not responsible, the Examination Committee will, upon request, extend the deadline by the period of time during which the candidate is prevented from working on the thesis, but by no more than eight weeks.

(5) The Master's thesis is to be submitted in due time in three bound written copies and one copy in electronic form to the Registrar’s Office of the Faculty of Mathematics and Natural Sciences.

(6) The contents of the Master's thesis are to be presented in a Master's colloquium which represents the course work of the Master's degree module. Students of the programmes in mathematics and industrial and applied mathematics are entitled to participate in the colloquium as listeners. The Master colloquium should take place no later than eight weeks after the Master thesis has been assessed. The duration of the entire colloquium is 60 minutes at the most. The colloquium is usually chaired by the supervisor of the Master's thesis. The chairperson of the colloquium decides whether the colloquium is to be graded as "passed" or "failed" as course work of the Master's degree module. A failed Master's colloquium can be repeated twice.

(7) In order to pass the Master's degree module, the Master's thesis must be graded at least "sufficient" (4,0) and the Master's colloquium must have been passed. The grade for the Master's degree module corresponds to the grade of the Master's thesis.

## § 10 Structure and weighting of the grade

(1) A module has been passed and can be evaluated as part of the Master's degree if the module has been graded at least "sufficient" (4,0).

(2) If a module grade consists of several partial module examinations according to § 6, section 4 General Regulations for Subject Examination Regulations with the degrees Bachelor and Master at the University of Kassel, the module grade is calculated as a weighted arithmetic average of the partial examinations, whereby the weighting is based on the number of credits of the submodules.

(3) For the modules completed within the scope of the application minor, an overall grade is calculated as a weighted arithmetic mean of the grades of the individual modules, whereby the weighting is based on the number of credits of the modules and modules without examinations are not taken into account.

(4) The overall grade of the Master's examination is calculated from the weighted average of the module grades according to § 8.

## § 11 Coming into effect, transitional provisions

(1) These examination regulations shall come into effect in the winter semester 2020/2021. They apply to all students who begin studying in the Master programme Mathematics from this semester onwards.

(2) Students who began their studies in the Master's programme in Mathematics before the winter semester 2020/21 and who have not yet completed their studies, will be examined during a transitional period until September 30, 2025, according to the examination regulations that have been valid for them until now. Upon application by 30 September 2025 at the latest, they will be examined according to these examination regulations.

Kassel, 22 January 2020

The Dean of the Faculty of Mathematics and Natural Sciences
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