BMS Study Regulations

(As of 17 October 2025)

1. INTRODUCTION

The Berlin Mathematical School (BMS) is the joint graduate school of the mathematics departments of Freie Universität Berlin, Humboldt-Universität zu Berlin and Technische Universität Berlin and forms the graduate program of the Berlin Mathematics Research Center MATH+. It is the declared goal of each BMS student to obtain a doctoral degree in mathematics at one of these universities, or in exceptional cases at Universität Potsdam.

The BMS study program consists of two phases. Students with a bachelor's degree are admitted to Phase I, which consists primarily of coursework at the graduate level and lasts up to four semesters. Upon successful completion of Phase I, students move into Phase II, which is centered on research leading to a doctoral dissertation, and typically lasts three years. Students who hold a master's degree can be admitted directly into Phase II if they demonstrate the excellence, depth and breadth expected.

The BMS awards certificates for the successful completion of each phase of studies, but does not itself award degrees. Phase I students will be registered as master's students at one of the three Berlin universities and need to complete a master's degree according to the study regulations (*Studienordnung*) of their university. Exceptions can be made for students who have already completed a master's degree in their home country and need only two semesters of courses to be eligible for PhD studies in Germany.

Each Phase II student has a dissertation supervisor from the BMS faculty and will be registered as a doctoral student at the university where the supervisor is based. Again, because the degree will be awarded by that university, the student needs to be aware of and follow its doctoral regulations (*Promotionsordnung*) in addition to these BMS study regulations.

2. BMS COURSES

The BMS groups its mathematical activities into various Research Training Areas (RTA), each covering a broad but coherent part of mathematics, and typically including both pure and applied topics. There are currently eight BMS Areas:

1. Geometry and topology
   Differential geometry, algebraic topology, and mathematical physics

2. Algebraic geometry and number theory
   Algebraic geometry, arithmetic geometry and number theory

3. Stochastics and mathematical finance
   Probability, statistics and stochastic analysis

4. Discrete mathematics and optimization
   Combinatorics, graph theory, discrete optimization and algorithms, complexity

5. Discrete geometry

Discrete geometry, discrete differential geometry and visualization

6. Numerical mathematics
   Numerical analysis, continuous optimization and scientific computing

7. Applied analysis
   Modelling, Analysis and Optimization with Partial Differential Equations

8. Mathematics for AI
   Mathematics of data science and AI

The BMS offers three types of courses: Core Courses, Advanced Courses and Complementary Courses. Each course is also an offering of one of the universities and is open to all interested students in Berlin. All BMS courses are offered in English (assuming at least one student requests this).

The BMS Core Courses are at the foundation of the Phase I study program and are designed to introduce students to research in a given area while illuminating interdisciplinary connections and applications, modern trends, and current problems. They give students the necessary foundation to enable them, after the completion of Phase I, to continue directly into the research-oriented dissertation phase.

In each of the BMS Areas, there are at least two Core Courses; sometimes these form a two-semester sequence, while in other cases they can be taken independently. Each Core Course meets for four hours per week of lectures and carries regular homework assignments, which are usually discussed in a two-hour exercise section each week. (Occasionally, one of the universities may offer a course with two hours of lectures, covering half the material of one of the Core Courses; such a course counts as half of a Core Course for the purposes of the Phase I requirements in part 5.) The BMS makes every effort to ensure that each Core Course is offered at least once during every academic year at one or more of the Berlin universities.

In each area, there are also BMS Advanced Courses, covering topics beyond those of the Core Courses and often varying from semester to semester. These courses typically meet for either two or four hours of lectures per week. Some Advanced Courses take the form of student seminars, where each participant gives a presentation to the class.

The BMS Complementary Courses are courses at an advanced undergraduate level. They are offered by the BMS in English to help those students who need some extra background knowledge. They do not count towards the BMS requirements for Phase I, but can typically be used for credit towards a master's degree.

In advance of each semester, the BMS courses that will be offered are listed on the BMS website. If a course at one of the universities is not listed, even though it is equivalent to one of the BMS Core Courses or is at the level of an Advanced Course, students can apply to have the course count towards the Phase I requirements listed in part 5.

3. BMS GRADES

The grading for a BMS course is typically based on an exam (either oral or written) at the end of the semester, which is held according to the regulations of the respective university. Grades for courses are reported in the standard German numerical system, where 1.0 is a perfect grade and

5.0 is a failing grade. The possible numerical grades are shown in the following table, along with the approximately equivalent US letter grades, the German grades in words, and translations into English:

1.0	1.3	1.7	2.0	2.3	2.7	3.0	3.3	3.7	4.0	5.0
A	A-	B+	B	B-	C+	C	C-	D+	D	F
sehr gut		*gut*			*befriedigend*			*ausreichend*		*ungenügend*
very good		good			satisfactory			sufficient		failing

“Very good” reflects outstanding performance, while “good” reflects performance significantly above average. “Satisfactory” reflects performance meeting average standards, while “sufficient” reflects performance meeting minimum standards despite faults.

4. OTHER ELEMENTS OF THE BMS STUDY PROGRAM

The MATH+ Friday Colloquium brings distinguished mathematicians from around the world to Berlin to give talks designed to be accessible to all BMS students. These colloquium lectures are preceded by the student-organized “What is …?” seminars. The BMS also offers soft-skills seminars each semester, concerning topics such as time management, presentation skills and intercultural training. All BMS students – in both Phase I and Phase II – are expected to participate regularly in these BMS events, including attending soft-skills seminars as appropriate.

In particular, Phase I students are required to attend at least 75% of all MATH+ Friday Colloquia during their studies to complete Phase I. If a Phase I student cannot attend a MATH+ Friday colloquium due to illness or other academic obligations, they may be excused by the BMS office.

In addition to the standard course program, the BMS also regularly offers summer schools and intensive courses and supports various workshops held in Berlin. These research activities (as well as the Advanced Courses) are often organized in conjunction with one of the Certified Units of the BMS (such as the DFG-funded Research Training Groups and Collaborative Research Centers). All BMS students are encouraged to take advantage of these opportunities.

5. PHASE I COURSE REQUIREMENTS

The BMS course requirements for Phase I are designed to encourage both depth and breadth of knowledge in mathematics, giving students an optimal preparation for their dissertation research in Phase II. Each Phase I student has an advisor from the BMS faculty, who helps choose appropriate courses each semester.

During Phase I, students must successfully complete five Core Courses; no more than two Core Courses from any single BMS Area will be counted. Students must also successfully complete Advanced Courses as follows: one lecture course of four hours per week (or two of two hours per week) and one seminar. The average grade in these BMS courses must be at least “good” (that is, numerically, better than 2.5); in computing the average, of course a pair of two-hour courses has the same weight as one four-hour course. This coursework is typically completed within the first three semesters, leaving time in the fourth semester for the master's thesis.

Students who enter the BMS having already completed courses equivalent to one or more of the BMS Core Courses can apply to have up to three of these count towards the course requirements above. Grades from other universities will not be considered when computing the average grade for BMS purposes. Please note, however, that courses that have been used for credit for a previous degree cannot typically be applied for credit towards a master's degree in Berlin.

6. SUMMARY OF PHASE I REQUIREMENTS

The requirements for BMS Phase I are those outlined in the previous two sections:

- students must complete the required Core and Advanced Courses (with an average grade better than 2.5),
- they must submit a report on their academic activities to the BMS at the end of each semester,
- they must actively participate in the Friday Colloquia (at least 75%),
- and they must complete their master's degree in Mathematics at FU, HU or TU Berlin.

7. PHASE II REQUIREMENTS

During Phase II, students work on independent research for their dissertation, supervised by a member of the BMS faculty. If this supervisor is a member of the postdoctoral faculty or otherwise not a permanent faculty member, a secondary supervisor with permanent status should be named. The student and supervisor(s) sign a supervision agreement, outlining the research plan and their various duties and responsibilities. Should the supervising relationship end, for instance because the supervisor takes up employment at another institution, the BMS will help the student find a replacement.

In addition to their dissertation research, Phase II students should continue to deepen and broaden their mathematical knowledge, in a study program arranged with their supervisor. Typically, this includes one or two Advanced Courses per semester, especially in the first two years of Phase II. Students who are members of one of the BMS Certified Units (such as Research Training Groups and Collaborative Research Centers) should participate in its (structured) program, typically including regular seminar lectures. Phase II students are expected to regularly attend the MATH+ Friday Colloquia and should take advantage of the additional offers of the BMS (such as summer schools and soft-skills training).

Phase II students – especially those intending to apply for postdoctoral positions – should gain teaching experience, for instance by serving as an assistant for one of the BMS Core Courses.

Phase II of the BMS should usually be completed within three years; in particular, the BMS is not able to provide funding beyond that point. The regulations of the individual university govern the submission and defense of the dissertation. With the award of the doctoral degree, the BMS student is welcomed into the ranks of the BMS Alumni, while student membership in the BMS ends.

In addition, Phase II students must submit a report on their activities to the BMS once a year.

8. BMS FUNDING

The BMS has a limited number of Phase I scholarships to offer to certain incoming students as part of the BMS admissions process. Phase I scholarships are initially granted for three semesters and can be extended to a fourth semester. Students in Phase I with sufficient German language skills are normally expected to support themselves by other means, either with BAföG, withstudent jobs like tutoring for undergraduate classes, or by applying for outside scholarships, for instance from the *Studienstiftung des deutschen Volkes*.

Most BMS Phase II students are supported by the various large-scale research projects in Berlin – typically holding positions in MATH+ projects or in the BMS Certified Units – and others are supported by individual research grants of their supervisors. The BMS will help all students find appropriate funding for Phase II, although funding from the BMS itself is available only for a very small fraction of Phase II students, typically three per year.

In keeping with its goal of supporting excellence, the BMS reserves its own Phase II funding for the very best students. To apply for BMS Phase II funding, Phase I students:
- must be on track to complete Phase I (as outlined above),
- must be on track to complete Phase I courses with an average grade better than 1.5
- and agree on a doctoral project with their potential supervisor.

The supervisor must submit a project proposal together with the student's application for Phase II funding within the MATH+ Call for Proposals in March. BMS Phase II funding starts in October of each year as a 75% TVL E13 position for three years. Phase I must be completed before the position starts.

Since external funding is often available, but only after a delay of several months, the BMS provides "gap funding". Any student who has transitioned into Phase II after completing the Phase I coursework (with an average grade of at least "good" as outlined above) can apply for up to six months of gap funding. Gap funding can also be provided later in Phase II, for instance when the source of external funding changes. The BMS, however, cannot provide any funding to students who have already received three years of funding for Phase II.