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Subject-specific examination and study regulations for the Master's programme in Mathematics Mathematics dated 29 August 2025

Based on § 5 (1) sentence 2, § 10 Paragraph 5, sentences 2 and 3, in conjunction with § 20 (2), sentence 1, § 23 (2) sentence 1, § 70 (2) no. 8 and § 81 (2) sentence 1 no. 1 of the Brandenburg Higher Education Act (BbgHG) of 9 April 2024 (GVBl. I/24, [No. 12]), amended by Article 2 of the Act of 21 June 2024 (GVBl. I/24, [No. 30], p. 32) and § 16 (2) No. 1 and § 29 (4) sentence 1 No. 1 of the Basic Regulations for the Brandenburg University of Technology Cottbus–Senftenberg (GO BTU) of 8 January 2016 (AMbl. 01/2016), last amended by the Fourth Amendment Statute of 23 January 2025 (AMbl. 08/2025) and § 1 of the General Examination and Study Regulations for Master's Degree Programmes at the BTU Cottbus–Senftenberg (RahmenO-MA) of 12 September 2016 (AMbl. 14/2016), last amended by the Fifth Amendment Statute (AMbl. 30/2024 of 29 August 2024), the Brandenburg University of Technology Cottbus–Senftenberg (BTU) adopts the following statutes:

Table of contents

§ 1 Scope

[1]These statutes regulate the subject-specific features of the Master's programme in Mathematics. [2]They supplement the General Examination and Study Regulations for Master's programmes at the BTU (RahmenO-MA) in their current version.

§ 2 Content profile of the programme, objectives of the programme

(1) The English-language international Master's programme in Mathematics prepares students for independent work as mathematicians in industry and business, as well as at universities and research institutions.

(2) Mathematicians work in a wide variety of professional fields in which, in addition to general professional skills, specific knowledge, abilities and skills related to special mathematical theories, models and methods are required.

(3) [1]The research-oriented Master's programme in Mathematics offers a selection of module complexes in accordance with Appendix 2, which are closely linked to the core topics of research at the BTU and the main areas of research represented at the Institute of Mathematics. [2]Here, students acquire detailed and specialised knowledge and skills that enable them to independently apply methods and ways of thinking for the use of mathematical models and procedures in the analysis and processing of mathematical problems. [3]The ideas, procedures and evaluations they develop independently can be used to solve scientific, technical and economic problems.

(4) [1]In the Applications module, students acquire interdisciplinary skills that enable them to collaborate with non-mathematicians, in particular expertise in their chosen field of application. [2]The aim of the complex is to acquire in-depth knowledge and skills in mathematical modelling and problem solving using mathematical methods that go beyond the insights gained in the Bachelor's programme. [3]In addition, students can deepen their foreign language skills.

(5) [1]Students will also be enabled to act independently and to continue to develop their skills independently throughout their lives in line with the current requirements of professional life. [2]Furthermore, they will acquire the ability to critically question the prerequisites, limitations and effects of applying mathematical methods to socially relevant problems. [3]They will have the skills and knowledge required to pursue a doctorate.

§ 3 Graduation, degree title

Upon successful completion of the Master's programme in Mathematics, the academic degree "Master of Science" (M.Sc.) is awarded.

§ 4 Special admission and enrolment requirements

(1) [1]Enrolment in the Master's programme in Mathematics requires proof of a Bachelor's degree with at least 180 credit points in a mathematical or mathematics-related programme, particularly in the fields of mathematics or business mathematics. [2]The degree is generally considered to be sufficiently relevant in terms of content if the mathematics content studied to date does not differ significantly from the content specified in the study and examination regulations for the Bachelor's degree programmes in Mathematics or Business Mathematics at the BTU and is of a comparable scope.

(2) The examination committee shall assess whether the degree is sufficiently similar in terms of content.

(3) [1]Admission to the Master's programme in Mathematics may, as a result of the assessment by the examination board, be subject to the condition that certain modules from the Bachelor's programme in Mathematics or Business Mathematics with the associated examination performances amounting to a maximum of 18 credit points (CP) must be completed if the basic knowledge in the competencies specified in paragraph 1 is lacking. [2]The modules to be made up cannot be credited towards the Master's programme in Mathematics.

(4) In order to be admitted to the programme, all applicants must provide evidence of sufficient language skills in accordance with § 3 (3) of the BTU's current enrolment regulations.

(5) [1]Required modules may be specified as German-language modules. [2]In such cases, prospective students are advised to ensure that they have sufficient German language skills on their own responsibility.

§ 5 Scope of study and standard period of study

(1) [1]The programme comprises 120 credit points with a standard period of study of four semesters. [2]One credit point corresponds to 30 hours of work.

(2) The programme can be started in the winter or summer semester.

(3) Individual part-time study is possible in accordance with § 6 RahmenO-MA.

§ 6 Course structure and organisation

(1) The language of instruction and examination is English.

(2) The programme comprises compulsory and compulsory elective modules in mathematics, compulsory elective modules in an area of application, and a compulsory elective module from the interdisciplinary programme (FÜS).

(3) In the field of mathematics, the following compulsory modules worth 42 CP must be completed:

- Seminar Mathematics Fundamentals (4 CP)
- Seminar Mathematics Specialisation (4 CP)
- Master's Seminar (4 CP)

  The Master's Seminar is intended to serve as preparation for the Master's thesis and deals with a topic from the field of the Master's thesis.
- Master's Thesis (30 CP)

(4) Furthermore, in the field of mathematics, compulsory elective modules from the following complexes are required

- Optimisation
- Stochastics
- Numerics
- Analysis/Algebra/Combinatorics

with a minimum of 44 LP. [1]At least 6 LP must be earned from each of the four complexes. [2]A maximum of 10 LP may be earned from modules that conclude with coursework (ungraded). [3]An overview of the modules that can be selected is provided in Appendix 2. [4]As a specialisation, in particular in preparation for the Master's thesis, additional modules from one of the complexes listed in Appendix 2 must be selected, totalling at least 14 CP. [5]Other modules are also possible with the approval of the mentor and the examination board.

(5) [1]For the Applications complex, compulsory elective modules from one of the application areas

- Computer Science & Artificial Intelligence
- Natural Sciences and Engineering
- Economics and Social Sciences

with a minimum of 18 CP. [2]An overview of the modules that can be selected is provided in Appendix 3. [3]If desired, modules from another area of application may also be selected for the Applications complex. [4]This requires consultation with the mentor and must be approved in advance by the examination board. [5]Students whose native language is not English may take a module within the Applications complex to deepen their

knowledge of English as a scientific language. [6]Alternatively, students without sufficient German language skills may choose a module from the German as a Foreign Language area in order to prepare themselves for future employment in the German labour market. [7]The choice of language module is made in consultation with the mentor, see § 6 (9), and must be approved in advance by the examination board.

(6) The total number of compulsory elective modules chosen in the field of mathematics and in the Applications complex must be at least 72 CP.

(7) [1]The range of compulsory elective modules may be adjusted each semester as necessary. [2]In all cases, it must be ensured that the programme can be completed within the standard period of study. [3]Any adjustments to the range of compulsory elective modules must be notified by the programme director to the administration (Campus Management System) one month before the start of the semester.

(8) Six credit points must be earned in interdisciplinary studies.

(9) [1]Students must choose a mentor by the beginning of the second semester of the Master's programme at the latest. [2]University lecturers or doctoral staff members of the Institute of Mathematics at the Brandenburg University of Technology Cottbus-Senftenberg may act as mentors. [3]The examination board shall decide on exceptions. [4]The tasks of a mentor are to advise students on the structure of their Master's programme, to confirm individual study plans in accordance with paragraph 10 and, as a rule, to supervise the Master's thesis in accordance with § 8.

(10) [1]The selected elective modules must be documented in an individual study plan. [2]The individual study plan must be completed by the beginning of the second semester of the Master's programme at the latest and confirmed by the mentor's signature. [3]If the Master's thesis is not supervised by the mentor, the individual study plan should also specify who will supervise the Master's thesis. [4]The individual study plan can be updated. [5]The mentor must agree to this.

(11) The modules are defined in the study programme-specific module handbook for the Master's programme in Mathematics (study programme website).

§ 7 Special regulations for the organisation of examinations

There are no special regulations for the organisation of examinations.

§ 8 Master's thesis

(1) [1]The Master's thesis is worth 30 CP. [2]The time allowed for the written part of the Master's thesis is 24 weeks from the date of registration.

(2) Those who have earned at least 78 credit points at the time of registration are eligible to write the Master's thesis.

(3) [1]The Master's thesis shall be assigned and supervised by a university lecturer or a member of academic staff with a doctorate from the Institute of Mathematics. [2]The Examination Board shall decide on any exceptions. [3]The Master's thesis shall be written in English. [4]In justified exceptional cases, it may be written in another language upon written request by the student and with the consent of the supervisor. [5]The examination board shall decide on the request.

(4) For Master's theses written in cooperation with external institutions, the second review may be written by another person involved in the supervision and preparation of the Master's thesis, provided that this person has a relevant diploma or Master's degree. The examination board shall decide on exceptions.

(5) Non-public appendices to the Master's thesis are permitted, but are not included in the assessment and are not the subject of the public colloquium.

§ 9 Additional supplementary provisions

There are no further supplementary provisions.

§ 10 Entry into force, transitional provisions, expiry

(1) These regulations shall enter into force in the winter semester 2025/26.

(2) These regulations apply to all students who enrol in the Master's programme in Mathematics from the winter semester 2025/26 onwards.

(3) These examination and study regulations dated 29 August 2025 (AMbl. 30/2025) shall expire after the last enrolment at the end of the standard period of study plus four semesters.

Issued on the basis of the resolutions of the Faculty Council of Faculty 1 – MINT – Mathematics, Computer Science, Physics, Electrical Engineering and Information Technology of 5 June 2024, 6 November 2024 and 9 April 2025, of the statement of the Senate of 17 October 2024 and 22 May 2025, as well as the approval by the President of the Brandenburg University of Technology Cottbus–Senftenberg on 17 June 2025.

Cottbus, 29 August 2025

Prof. Dr. Gesine Grande
President

Appendix 1: Overview of modules, status, credit points (LP)

Module no.	Complexes and modules	Status	Assessment	CP
	Mathematical Compulsory Modules			**42**
14259	Seminar Mathematics Fundamentals	P	SL	4
14260	Seminar Mathematics Specialisation	P	SL	4
14261	Master's Seminar	P	SL	4
14262	Master's Thesis	P	Prü	30
	Mathematical Elective Modules (selectable from Appendix 2)			**44 - 54**
	Modules from the Optimization complex	WP	Prü /SL	at least 6
	Modules from the Stochastics complex	WP	Prü SL	at least 6
	modules from the Numerics complex	WP	Prü /SL	at least 6
	modules from the Analysis/Algebra/Combinatorics complex	WP	Prü /SL	at least 6
	Additional modules from a complex in Appendix 2	WP	Prü/SL	at least 14
	Applications (selectable from Appendix 3)			**18**
	Modules for the selected application area	WP	Prü	at least 18
	General Studies			**6**
	Module from interdisciplinary studies according to the BTU module catalogue	WP	Prü	6
Total				**12**

P = compulsory module; WP = compulsory elective module Prü = examination; SL = coursework

Appendix 2: Overview of compulsory elective modules in mathematics

Complex	Module no.	Module title	Assessment	LP
Complex Optimisation	14263	Mixed-Integer Programming	Prü	8
	14264	Special Topics of Infinite-Dimensional Optimisation	Prü	8
	14265	Project Seminar in Mixed-Integer Programming	Prü	8
	14276	Advanced Topics of Linear Programming and Combinatorial Optimisation	Prü	6
	14279	Network Optimisation	Prü	8
	14356	Differentiable Optimisation	Prü	8
	14082	Advanced Topics of Differentiable Optimisation	Prü	6
	14083	Special Topics of Convex Optimisation	Prü	8
Complex Stochastics	13889	Stochastic Processes	Prü	8
	14114	High-Dimensional Statistics	Prü	8
	14266	Stochastic Analysis	Prü	8
	14267	Advanced Topics of Stochastics	Prü	6
	14268	Risk Theory	Prü	8
	14269	Financial Mathematics in Continuous Time	Prü	8
	14277	Measure and Integration Theory	Prü	8
Complex Numerics	13843	Scientific Computing	Prü	8
	13874	Introduction to Numerical Linear Algebra	Prü	6
	14270	Advanced Topics of Numerical Mathematics	Prü	6
	14271	Special Topics of Scientific Computing	Prü	8
Complex Analysis/ Algebra/ Combina-torics	13949	Differential Geometry	Prü	6
	14275	Partial Differential Equations	Prü	8
	11859	Cryptography	Prü	8
	13844	Functional Analysis	Prü	8
	14085	Graph Theory	Prü	8
	14274	Algorithmic Graph Theory	Prü	8
	13912	Coding Theory	Prü	6
	14272	Special Topics of Analysis	Prü	8
	13911	Algebra: Structures and Algorithms	Prü	6
	14273	Special Topics of Discrete Mathematics	Prü	8
	14300	Spectral Theory of Self-adjoint Operators in Hilbert Spaces	Prü	8
	14380	Special Topics of Algebra	Prü	8

Appendix 3: Overview of the elective modules in the Applications complex

Area of application	Module No.	Module title	Assessment	LP
Computer Science & Artificial Intelligence	13841	Speech Processing	Prü	6
	13847	Cognitive Systems: Behaviour Control	Prü	6
	13969	Introduction to Cyber Security	Prü	6
	13335	Brain-Computer Interfaces (BCIs) for Neuroadaptive Technology	Prü	6
Natural Sciences and Engineering	13010	General Theory of Relativity	Prü	6
	13023	Introduction to Semiconductor Physics	Prü	6
	13027	Computational Physics	Prü	6
	13569	Biological Neuronal Networks	Prü	6
	13849	Introduction to Computational Neuroscience	Prü	6
Economics and Social Sciences	13715	Causal Data Science in Business and Economics	Prü	6
	14288	Psychology of Entrepreneurship and Change	Prü	6
	14037	Quantitative Data Analysis and Visualisation for Business Environments	Prü	6
	13477	Digital Marketing	Prü	6

Appendix 4: Standard study plan (example)

Complexes/Modules	CP per semester				Total CP
	1	2	3	4	
Mathematical Compulsory Modules					**42**
Seminar Mathematics Fundamentals	4				
Seminar Mathematics Specialisation		4			
Master's Seminar			4		
Master's Thesis				30	
Mathematical Elective Modules					**44 - 54**
Module from the Optimisation complex	6				
Module from the Stochastics complex	8				
Module from the Numerics complex		6			
Module from the Analysis/Algebra/Combinatorics complex	6				
Additional modules from a complex in Appendix 2		8	14		
Applications					**18 - 28**
Modules for the selected area of application	6	6	12		
General studies					**6**
Interdisciplinary studies		6			
	30	**30**	**30**	**30**	**120**