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

Based on Section 5 (1) sentence 2, Section 10 (5) sentences 2 and 3 in conjunction with § 20 (2) sentence 1, Section 23(2) sentence 1, Section 70(2) no. 8 and Section 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 Section 16 (2) No. 1 and Section 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:

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§ 1 Scope

[1]These statutes regulate the subject-specific features of the Master's programme in Mathematical Data Science (MDS). [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) [1]The Master's programme in Mathematical Data Science is an English-speaking international programme. [2]Students are prepared for a wide range of fields of activity in the area of data science.

(2) [1]Through comprehensive training in relevant theories, models and methods of mathematics, computer science and specific application modules, students acquire the thinking skills, knowledge and abilities required in this field. [2]They learn techniques for data analysis and for the prediction and simulation of complex systems, for the representation of knowledge and information, and for the optimisation of corresponding models. [3]The focus here is on the necessary algorithms, methods and models, which are linked to knowledge of mathematical theories and procedures, as well as on additional fundamentals of mathematics and computer science.

(3) [1]Through a wide range of application-oriented electives, students acquire further application-specific expertise in which mathematical concepts of data science occur in practice-relevant contexts. [2]This enables them to master the constantly changing tasks they encounter in their professional practice.

(4) [1]Students of the Mathematical Data Science programme will be equipped to develop, test, theoretically and experimentally validate, and specifically implement complex mathematical methods of data science. [2]Furthermore, they acquire the ability to select and apply algorithms and mathematical methods of data science appropriately in an application-specific context. [3]In addition, they will be able to critically question the prerequisites, limitations and effects of applying mathematical methods to socially relevant problems.

(5) Graduates will have the skills and knowledge required to pursue a doctorate.

§ 3 Graduation, degree title

Upon successful completion of the Master's programme in Mathematical Data Science, the academic degree "Master of Science" (M.Sc.) will be awarded.

§ 4 Special admission and enrolment requirements

(1) [1]Enrolment in the Master's programme in Mathematical Data Science requires proof of a Bachelor's degree comprising at least 180 credit points (CP) 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 similar in 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 board shall assess whether the degree is sufficiently similar in terms of content.

(3) [1]Admission to the Master's program in Mathematical Data Science may, as a result of the examination by the examination board, be subject to the condition that certain modules from the Bachelor's program in Mathematics or Business Mathematics with the corresponding credit points (CP) be completed if the basic knowledge in the competencies mentioned in paragraph 1 is not fulfilled. [2]The modules to be completed cannot be credited towards the Master's programme in Mathematical Data Science.

(4) For admission to the programme, all applicants must provide proof 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 (CP) and has a standard duration 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 Programme structure and organisation

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

(2) The programme comprises compulsory modules in mathematics, compulsory elective modules from three compulsory elective complexes and a compulsory elective module from the interdisciplinary programme (FÜS).

(3) In the field of mathematics, the following compulsory modules worth 46 CP must be completed:

- Mathematical Foundations of Data Science (8 CP)
- Seminar Mathematical Data Science (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 with Colloquium (30 CP)

(4) The elective component of the programme is divided into three elective complexes:

1. Advanced Mathematical Methods in Data Science

This complex consists mainly of mathematics modules that deepen understanding of key algorithms, methods and models in data science. This applies in particular to modules from core areas of data science such as data analysis, techniques for predicting and simulating complex systems, and modelling and optimisation.

2. Fundamentals of Data Science

[1]This complex consists mainly of modules in mathematics and computer science. The modules deal with the mathematical foundations of data science and methods of information processing, which complement the modules in the "Advanced Mathematical Methods in Data Science" complex. [2]The content covers complementary theories,

methods and procedures, particularly in the areas of mathematical foundations, knowledge representation, planning and reasoning, and information processing.

3. Data Science Applications

[1]This module complex comprises modules from computer science and applied sciences that are clearly related to algorithms, methods, fundamentals and applications of data science. [2]Here students should deepen their knowledge from the other two module complexes in practical and application-oriented contexts.

[3]Students whose native language is not English can deepen their knowledge of scientific English within the framework of the "Data Science Applications" complex. [4]Alternatively, students without sufficient German language skills can choose a module from the field of German as a foreign language in order to prepare themselves for future employment on the German labour market. [5]The choice of language module is made in consultation with the mentor, see § 6 (8), and must be approved in advance by the examination board.

(5) [1]In the compulsory elective complexes "Advanced Mathematical Methods in Data Science" and “Fundamentals of Data Science” at least 20 CP must be earned. [2]At least 12 CP must be earned in the elective complex “Data Science Applications.” [3]A maximum of 10 CP may be earned from modules that conclude with coursework (ungraded) in the three compulsory elective complexes. [4]An overview of the modules that may be selected from the three compulsory elective complexes is provided in Appendix 2. [5]The elective courses offered in accordance with Appendix 2 may be adjusted each semester as necessary. [6]In all cases, it must be ensured that the programme can be completed within the standard period of study. [7]The programme director must notify the administration (Campus Management System) of any changes to the elective courses one month before the start of the semester.

(6) [1]In addition to compulsory elective modules that can only be credited to the Master's programme, but which could already be chosen as options in the specialisation of the Bachelor's programme. [2]Of the modules referred to in sentence 1, modules worth a maximum of 18 CP can be credited to the Master's programme. [3]Modules that have already been credited to the underlying Bachelor's programme cannot be credited again to the Master's programme.

(7) 6 CP must be earned in interdisciplinary studies.

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

(9) [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 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 may be updated. [5]The mentor must give their consent.

(10) The modules are defined in the semester- and study-year-specific module handbook for the Master's programme in Mathematical Data Science (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 completing the written part of the Master's thesis is 24 weeks from the date of registration.

(2) Students who have earned at least 78 CP at the time of registration are eligible to enrol in the Master's thesis.

(3) [1]The Master's thesis is assigned and supervised by a university lecturer or a doctoral academic staff member of the Institute of Mathematics. [2]The examination board decides on 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) [1]For master's thesis written in cooperation with external institutions, the second review may be written by another person involved in supervising and writing the master's thesis, provided that this person has a relevant diploma or master's degree. [2]The examination board shall decide on any 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 Further supplementary regulations

There are no further supplementary regulations.

§ 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 Mathematical Data Science from the winter semester 2025/26 onwards.

(3) These examination and study regulations dated 29 August 2025 (AMbl. 29/2025) 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 on 5 June 2024, 6 November 2024 and 9 April 2025, of the statement of the Senate dated 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 and credit points (CP)

Module No.	Complexes and modules	Status	Assessment	CP
	Mathematical Compulsory Modules			**46**
13639	Mathematical Foundations of Data Science	P	Prü	8
13798	Seminar Mathematical Data Science	P	SL	4
14261	Master's Seminar	P	SL	4
14262	Master's Thesis	P	Prü	30
	Elective Modules (Selectable from Appendix 2)			**68**
	Modules from the complex Advanced Mathematical Methods in Data Science	WP	Prü / SL	at least 20
	Modules from the Fundamentals of Data Science complex	WP	Prü / SL	At least 20
	modules from the Data Science Applications complex	WP	Prü / SL	At least 12
	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

Complex	Module No.	Module title	Assessment	LP
Advanced Mathematical Methods in Data Science	14085	Graph Theory	Prü	8
	11847	Neural Networks and Learning Theory	Prü	8
	14263	Mixed-Integer Programming	Prü	8
	13843	Scientific Computing	Prü	8
	13863	Mathematical Statistics	Prü	8
	13889	Stochastic Processes	Prü	8
	13911	Algebra: Structures and Algorithms	Prü	6
	13912	Coding Theory	Prü	6
	14114	High-Dimensional Statistics	Prü	8
Fundamentals of Data Science	11881	Foundations of Data Mining	Prü	6
	11859	Cryptography	Prü	8
	13500	Introduction to Neural Signal Analysis	Prü	6
	13813	Logic in Databases	Prü	8
	13838	Information Retrieval	Prü	6
	13842	Virtual Reality and Agents	Prü	6
	13844	Functional Analysis	Prü	8
	14186	Image Processing and Computer Vision	Prü	6
	13874	Introduction to Numerical Linear Algebra	Prü	6
	13949	Differential Geometry	Prü	6
	13715	Causal Data Science in Business and Economics	Prü	6
Data Science Applications	11494	Control Engineering 1	Prü	6
	11747	Control Engineering 2	Prü	6
	12790	Seminar Advanced Topics in Network and System Security	SL	6
	12973	Network and System Security	Prü	6
	13294	Control Technology for Processes and Networks	Prü	6
	13335	Brain-Computer Interfaces (BCIs) for Neuroadaptive Technology	Prü	6
	13569	Biological Neuronal Networks	Prü	6
	13839	Advanced Database Models	Prü	6
	13840	Data Warehouses	Prü	6
	13849	Introduction to Computational Neuroscience	Prü	6
	13942	Foundations of Psychophysiology	Prü	6
	13847	Cognitive Systems: Behaviour Control	Prü	6
	13951	Project Laboratory Control and Network Control Technology	Prü	6
	13952	Lab Control Engineering	Prü	6
	13969	Introduction to Cyber Security	Prü	6
	13978	Bioinformatics: Artificial Intelligence and Algorithmic Approaches	Prü	6
	13979	Artificial Intelligence for Drug Design	SL	4
	14038	Computing at Scale in Machine Learning: Distributed Computing and Algorithmic Approaches	Prü	6

Appendix 3: Standard study plan (example)

Complexes/ Modules	LP per semester				Total CP
	1	2	3	4	
Mathematical Compulsory Modules					**46**
Mathematical Foundations of Data Science	8				
Seminar Mathematical Data Science		4			
Master's Seminar			4		
Master's Thesis				30	
Elective Modules					**68**
Module from the complex Advanced Mathematical Methods in Data Science	8	8	8		
Module from the complex Fundamentals of Data Science	8	6	6		
Module from the complex Data Science Applications		6	6		
Further modules from Appendix 2		6	6		
General Studies					**6**
Interdisciplinary studies	6				
	30	**30**	**30**	**30**	**120**