Study Regulations for the English-Language Study Program
Foundations in Data Science
leading to the Degree of Bachelor of Science (B.Sc.)
at Technische Universität Chemnitz
Dated 6th March 2025

Based on § 14 para. 4 in conjunction with § 37 para. 1 of the Law on Higher Education Institutions in the Free State of Saxony (Saxon Higher Education Act – SächsHSG) of May 31, 2023 (SächsGVBl. p. 329), which was last amended by Article 2 of the Law of January 31, 2024 (SächsGVBl. p. 83, 87), the Faculty Council of the Faculty of Mathematics at Technische Universität Chemnitz has issued the following study regulations:

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For better readability, the generic masculine is generally used in the following text. All personal designations naturally apply to all genders.

Part 1

General Provisions

§ 1 Scope

These study regulations, based on the applicable examination regulations (§ 9), define the objectives, content, structure, organization, and implementation of the study program

Foundations in Data Science, leading to the Bachelor of Science degree at the Faculty of Mathematics at Technische Universität Chemnitz.

§ 2 Start of Studies and Standard Period of Study
(1) The regular start of the study program is in the winter semester.
(2) The standard period of study is six semesters (three years) for full-time studies and twelve semesters (six years) for part-time studies. The study program comprises modules totaling 180 ECTS credits, which corresponds to an average workload of 5,400 hours.

§ 3 Admission Requirements
Admission to the Bachelor's program Foundations in Data Science requires a general university entrance qualification, a subject-specific university entrance qualification, or another legally recognized equivalent qualification, as well as proficiency in English at level B2 according to the Common European Framework of Reference for Languages (CEFR). Participation in a subject-specific aptitude test offered by the Faculty of Mathematics at Technische Universität Chemnitz is strongly recommended.

§ 4 Teaching and Learning Formats
Teaching and learning formats may include: lectures (V), seminars (S), exercises (Ü), projects (PR), colloquia (K), tutorials (T), internships (P), simulations (PS), or excursions (E). Students are expected to prepare for the courses they attend and deepen their understanding through independent study. The knowledge and skills required for successful completion of the study program are not acquired solely by attending courses; additional self-study is necessary.

For all teaching and learning formats mentioned in paragraph (1), e-learning methods may be employed as long as the character of the respective format is maintained.

Courses are conducted in English, with additional German content provided if necessary. The module descriptions specify which courses may be held in German.

§ 5 Objectives of the Study Program
The objectives of the study program are to impart and develop the following knowledge and competencies, which graduates of the Bachelor's program Foundations in Data Science should possess:

Knowledge and Understanding (Subject Competence)
Graduates will have fundamental knowledge in the fields of Data Science, Artificial Intelligence, Statistics, Optimization, and Numerical Analysis, as well as in various application areas. Furthermore, they will be able to provide an overview of methods from the field of machine learning and relate these methods to one another. They will also be capable of explaining the mathematical and theoretical foundations of these methods and identifying their characteristics. In addition, graduates will be familiar with commonly used software solutions in the field of machine learning.

Application, Utilization, and Generation of Knowledge (Methodological Competence)
Graduates will be able to analyze problems from the field of Data Science and select appropriate methods to solve them. They will be capable of combining various techniques,

understanding novel approaches, and relating these to established methods. Furthermore, they will be able to implement techniques and methods from the field of machine learning efficiently in modern programming languages.

Communication and Cooperation (Social Competence / Personal Competence)
Graduates will be able to engage confidently in professional discussions with other scientists and work in various roles within a team. They will also be capable of independently handling, classifying, and designing methods for complex problems based on known and current research-based procedures. Additionally, they will be able to articulate their own thought processes and solution approaches clearly and make them accessible to non-specialists.

Scientific Self-Understanding / Professionalism (Self-Competence / Personal Competence)
Graduates will be able to conduct independent scientific work even when confronted with novel problems. They will be capable of independently identifying important specialist literature and relevant current research findings.

Part 2

Structure and Content of the Study Program

§ 6 Structure of the Study Program
In the course of study, a total of 180 ECTS credits are earned, which are composed as follows:

1. **Basic Modules (Σ 100 ECTS)**

- 220000-701 Mathematics for Science and Engineering I, 10 ECTS (Mandatory Module)
- 220000-702 Mathematics for Science and Engineering II, 10 ECTS (Mandatory Module)
- 220000-703 Mathematics for Science and Engineering III, 10 ECTS (Mandatory Module)
- 220000-704 Mathematics for Science and Engineering IV, 10 ECTS (Mandatory Module)
- 220000-140 Mathematical Training I, 5 ECTS (Mandatory Module)
- 220000-141 Mathematical Training II, 5 ECTS (Mandatory Module)
- 220000-142 Computational Machine Learning, 5 ECTS (Mandatory Module)
- 220000-110 Scientific Programming, 5 ECTS (Mandatory Module)
- 220000-120 Mathematical Modeling in Economics, 10 ECTS (Mandatory Module)
- 220000-705 Applied Optimization, 5 ECTS (Mandatory Module)
- 220000-113 Numerical Methods, 10 ECTS (Mandatory Module)
- 220000-143 Statistical Modeling, 5 ECTS (Mandatory Module)
- 243033015 Digital Systems, 5 ECTS (Mandatory Module)

- 243031010 Mikroprozessortechnik / Microprocessor Technology, 5 ECTS (Mandatory Module)

2. **Advanced Modules (Σ 35 ECTS)**

- 220000-151 Proseminar Mathematics, 5 ECTS (Mandatory Module)

From the following advanced modules, modules totaling 30 ECTS must be selected:

- 220000-106 Measure and Integration Theory, 10 ECTS (Elective Module)
- 220000-107 Vector Analysis and Ordinary Differential Equations, 10 ECTS (Elective Module)
- 220000-112 Fundamentals of Optimization, 10 ECTS (Elective Module)
- 220000-114 Probability Theory, 10 ECTS (Elective Module)
- 220000-115 Algebra, 10 ECTS (Elective Module)
- 220000-116 Introduction to Discrete Mathematics, 10 ECTS (Elective Module)
- 220000-117 Function Theory, 10 ECTS (Elective Module)
- 220000-118 Mathematical Statistics, 10 ECTS (Elective Module)
- 220000-160 Research Module Mathematics A (large), 10 ECTS (Elective Module)
- 220000-161 Research Module Mathematics A (small), 5 ECTS (Elective Module)
- 220000-162 Research Module Mathematics B (large), 10 ECTS (Elective Module)
- 220000-163 Research Module Mathematics B (small), 5 ECTS (Elective Module)
- 220000-164 Research Module Mathematics C (large), 10 ECTS (Elective Module)
- 220000-165 Research Module Mathematics C (small), 5 ECTS (Elective Module)

3. **Language and Supplementary Modules (Σ 30 ECTS)**

From the following language and supplementary modules, as well as the advanced modules not chosen in section 2, modules totaling 30 ECTS must be selected depending on the student's mother tongue and their level of German (as defined by the Common European Framework of Reference for Languages, CEFR). Language modules in the student's mother tongue must not be selected.

Students whose mother tongue is not German and who cannot demonstrate CEFR level A1 must compulsorily take the following module:

- 136004-005 German as a Foreign Language I (Level A1), 5 ECTS (Elective Module)

Students whose mother tongue is not German and who cannot demonstrate CEFR level A2 must compulsorily take the following module:

- 136004-006 German as a Foreign Language II (Level A2), 5 ECTS (Elective Module)

Students whose mother tongue is not German and who cannot demonstrate CEFR level B1 must compulsorily take the following two modules:

- 136004-007 German as a Foreign Language III (Level B1), 5 ECTS (Elective Module)

- 136004-016 German for Engineers (Level B1+), 5 ECTS (Elective Module)
- 220000-180 Study Abroad, 20 ECTS (Elective Module)
- 136004-008 German as a Foreign Language IV (Level B2), 5 ECTS (Elective Module)
- 136004-009 German as a Foreign Language V (Level C1), 5 ECTS (Elective Module)
- 136004-001 German as a Foreign Language – Professional Communication I (Level C1), 5 ECTS (Elective Module)
- 136004-002 German as a Foreign Language – Professional Communication II (Level C1), 5 ECTS (Elective Module)
- 136001-004 English in Academic and Professional Communication III (Level C1), 5 ECTS (Elective Module)
- 136001-005 English in Academic and Professional Communication IV (Level C1), 10 ECTS (Elective Module)
- 136001-006 English in Academic and Professional Communication V (Level C1), 5 ECTS (Elective Module)
- 136001-007 English in Academic and Professional Communication VI (Level C1), 5 ECTS (Elective Module)
- 136000-011 Business English 4 (BE4), 5 ECTS (Elective Module)

4. **Bachelor Thesis Module**

- 220000-190 Bachelor Thesis, 15 ECTS (Mandatory Module)

The recommended progression through the Bachelor's program Foundations in Data Science at Technische Universität Chemnitz within the standard period of study is determined by the schedule set out in the study plan (see Appendix 1) and the modular structure of the study program.

§ 7 Content of the Study Program

(1) In the English-language Bachelor's program Foundations in Data Science, students acquire fundamental knowledge in the areas of Data Science, Artificial Intelligence, and Machine Learning. In particular, the focus is on statistical learning, the development of efficient algorithms for large datasets, the mathematical foundations of learning theory, as well as modern methods of numerical analysis and optimization. An important pillar of the study program is, moreover, the linguistic training and further education of the students.
(2) The content, objectives, teaching methods, ECTS credits, examinations, frequency of offerings, and duration of each module are specified in the module descriptions (see Appendix 2).

Part 3

Implementation of the Study Program

§ 8 Academic Advising

In addition to the central academic advising at Technische Universität Chemnitz, subject-specific advising is provided. The Faculty Council of the Faculty of Mathematics designates a member of the faculty to perform this advising function.

A student is required to participate in academic advising in the third semester if, by the beginning of the third semester, they have not provided at least one proof of achievement.

It is recommended to seek academic advising, in particular, in the following cases:

1. Before the start of studies, especially prior to commencing part-time studies,
2. Before a study abroad period,
3. Before an internship,
4. In the case of changing study programs or institutions,
5. After failing examinations.

At the end of the fourth semester, subject-specific advising regarding further study progression is offered, and its use is strongly recommended.

§ 9 Examinations

The regulations concerning examinations are contained in the examination regulations for the English-language study program Foundations in Data Science leading to the Bachelor of Science (B.Sc.) at Technische Universität Chemnitz.

§ 10 Distance and Part-Time Study

A distance learning program is not provided. The study program may be pursued on a part-time basis in the event of employment, special family obligations, or particular health restrictions. In cases of other compelling reasons, the examination board decides on admission to part-time study. In part-time study, the average workload per semester is 50% of that of full-time study. The subject-specific advisor provides an individually tailored study plan for part-time study.

Part 4

Final Provisions

§ 11 Entry into Force and Publication

These study regulations apply to students enrolling from the winter semester 2025/2026 onward.

These study regulations enter into force on the day following their publication in the Official Announcements of Technische Universität Chemnitz.

Issued on the basis of the resolution of the Faculty Council of the Faculty of Mathematics dated 13th February 2025 and approved by the Rectorate of Technische Universität Chemnitz dated 19th February 2025.

Chemnitz, dated 6th March 2025

The Rector
of Technische Universität Chemnitz

Prof. Dr. Gerd Strohmeier