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Only the German version is legally binding.*

## **Examination regulations for the master's degree programs Mathematics and Technomathematics at TU Dortmund University**

*(translation of the German version dated of June 9th 2023)*

Based on § 2 paragraph 4 in conjunction with § 64 paragraph 1 of the Act on the Universities of the State of North Rhine-Westphalia (Higher Education Act - HG) of September 16, 2014 (GV. NRW. p. 547), last amended by the Act of 30 June 2022 (GV. NRW. p. 780b), the TU Dortmund University has issued the following regulations:

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## I. General

### § 1

#### Scope of the Master's Examination Regulations

- (1) These Master's Examination Regulations apply to the Master's degree programs Mathematics and Technomathematics at the Faculty of Mathematics of the TU Dortmund University. In accordance with § 64 paragraph 1 of the Higher Education Act of North Rhine-Westphalia (HG – Hochschulgesetz NRW), they regulate the structures of the Master's program.
- (2) The individual study elements, the course contents and the competences to be acquired are presented in the module descriptions. They are not part of these examination regulations. They are decided by the responsible faculty councils and must be reported to the Rectorate.
- (3) Studies and module examinations in the minor subjects must be completed in accordance with the provisions of the applicable minor subject agreement and the examination regulations applicable to the respective minor subject.

### § 2

#### Aim of the study

The master's program Mathematics or Technomathematics is designed to prepare students for a career in business and industry or in the public sector. Due to its research orientation, it also opens up the possibility of a subsequent doctorate in mathematics or an applied subject.

Successful completion of the program demonstrates that graduates have acquired in-depth specialist knowledge for a transition into professional practice: They are able to apply their mathematical knowledge independently in a wide variety of professional fields in science, technology or business. They are also able to recognize and analyze very complex mathematical problems in practice and, if necessary, generate and implement new scientific approaches to solving them. They have the ability to apply mathematical methods appropriately to solve planning, development and research tasks in scientific and public institutions and can work as scientific employees at a university or research institution. By studying a minor subject (application subject), the application proximity of the education is promoted.

Graduates possess a structural and abstract way of thinking and problem-solving skills and are thus able to recognize, abstract, analyze and critically reflect on complex mathematical relationships in different areas in order to select suitable approaches to solve the resulting mathematical problems. They are able to generate and implement their own scientific approaches to solutions.

In doing so, graduates understand how to convey stages of this process appropriately using suitable information and presentation techniques.

Communicative and social skills are important here, as is the ability to critically question problems and set goals. Raising awareness of social commitment is promoted as a cross-cutting theme in numerous courses.

Based on the acquired deep knowledge and ways of thinking and the research-oriented nature of the program, graduates are particularly suited to independently explore new mathematical or even professionally related topics quickly and thoroughly.

Overall, this simultaneously creates a starting point for further doctoral studies in mathematics or technomathematics or in an applied subject.

The study of Technomathematics takes special account of interdisciplinary aspects and current challenges facing graduates in industry: The development of new technical processes requires the

cooperation of interdisciplinary research and development groups. Development work must be successfully completed within a limited period of time in order to achieve both technical and economic success. Technomathematicians have acquired deep interdisciplinary knowledge of a natural or engineering science by choosing an application subject in their studies. They are specialists in applied mathematics (numerics, optimization, scientific computing, etc.) who can develop and implement numerical computer simulations in an interdisciplinary environment.

### § 3

#### Access requirements

- (1) Prerequisite for admission to the master's program in Mathematics or Technomathematics is
  - a. a Bachelor's degree in Mathematics or Technomathematics from the TU Dortmund University or
  - b. another comparable degree in a comparable course of study of at least three years (six semesters) at a state or state-recognized institution of higher education within the scope of the Basic Constitutional Law of the Federal Republic of Germany or at an institution of higher education outside the scope of the Basic Law Constitutional Law, provided that the board of examiners has determined that there are no significant differences from the degree and course of study referred to in paragraph 1 a.
- (2) The comparability of the course of study according to paragraph 1 b is generally given if in the course of study achievements from the field of mathematics amounting to 100 credit points and
  - in case of master's access to Mathematics from one of the minor fields of construction mechanics & statics, chemistry, electrical engineering and information technology, computer science, physics, statistics, engineering mechanics, economics at least 20 credit points,
  - in case of master's access to Technomathematics from one of the minor fields of construction mechanics & statics, chemistry, electrical engineering and information technology, computer science, physics, technical mechanics at least 20 creditshave been acquired. Upon application by the student, corresponding achievements from another minor subject related to Mathematics (20 LP) or Technomathematics (20 LP) can also be recognized.
- (3) The examination board is responsible for checking the admission requirements. The yardstick for determining whether or not there are significant differences is a comparison of the content, scope and requirements of the degree and course of study achieved with the degree and course of study according to paragraph 1 a. Depending on this assessment, the examination board may grant admission without or with conditions for the successful completion of missing examination achievements or refuse admission. Conditions can be imposed with a maximum of 30 credit points and must be successfully demonstrated at the latest by the start of the Master's thesis.
- (4) If the academic degree was acquired abroad, the equivalence agreements approved by the Standing Conference of the Ministers of Education and Cultural Affairs of the federal states of Germany (*Kultusministerkonferenz*) and the German Rectors' Conference, agreements within the framework of university partnerships, and the recommendations of the Central Office for Foreign Education (*Zentralstelle für ausländisches Bildungswesen, ZAB*) must be observed when examining the materiality of differences.
- (5) In addition to the stated requirements in paragraph 1, applicants must meet the following criteria:
  - a. The overall grade achieved in the prerequisite degree in accordance with paragraph 1 was at least 3.0 ("satisfactory") or, in the case of a foreign degree, a grade at least equivalent to 3.0 ("satisfactory") in the respective national grading system.

- b. The applicant must demonstrate very good knowledge of the German language, for example through
- a university entrance qualification from a German-speaking school or
  - a university degree in a German-language course of study or
  - the German Language Test for University Admission of Foreign Study Applicants (DSH-2) or equivalent certified training in the German language.
- c. The study program with the field of study "Industrial Mathematics" in the Master's program Technomathematics is generally completed in English. Therefore, the proof of German language skills according to § 3 paragraph 5 lit. b is waived. Proof of English language skills corresponding to the competence level B2 of the Common European Framework of Reference for Languages (CEFR) is required. The proof is provided by relevant language examinations or relevant equivalent achievements. The choice of this course of study is determined during the application process.
- (6) If an applicant does not yet hold a Bachelor's degree certificate, the Examination Committee may admit this applicant to the chosen Master's degree program if the applicant provides proof that he or she has successfully passed all examinations of a Bachelor's degree program in accordance with Paragraph 2.

#### **§ 4**

##### **Master's degree**

Based on the successful completion of the Master's examination, the TU Dortmund University awards the academic degree "Master of Science" ("M. Sc.") through the Faculty of Mathematics.

#### **§ 5**

##### **Credit point system**

- (1) The program is structured on the basis of a credit point system that is compatible with the European Credit Transfer System (ECTS).
- (2) Each module is assigned a number of credit points according to its study effort. One credit point within the meaning of these examination regulations corresponds to one ECTS point and is awarded for a performance that requires a workload of approximately 25 to 30 hours. As a rule, 30 credit points are to be acquired per semester.
- (3) Credit points are awarded on the basis of successfully and fully completed modules only at the end of a module.

#### **§ 6**

##### **Standard period of study and scope of study**

- (1) The standard duration of the master's program is four semesters (two years) and includes the completion of the master's thesis.
- (2) In total, the master's program comprises 120 credit points, which correspond to approximately 3000 to 3600 student work hours and are divided into compulsory and elective courses.
- (3) The course of study is divided into the modules listed in the corresponding overview in the appendix, each of which extends over a maximum of two semesters. These modules are self-contained study units, rounded off in terms of content and time, with a scope of generally at least 5 credit points.

- (4) The program can be started in the winter or summer semester. **The course of studies in the field of study "Industrial Mathematics" can only be taken up for the winter semester.**
- (5) The appendix shows the structure of the study program and the modules, including the credit points to be earned and types of examination (module examination or partial performance).
- (6) Courses and examinations in the elective area can also be offered in English. **In the Master's program in Technomathematics, the courses and examinations in the field of study "Industrial Mathematics" are always offered in English.**

## § 7

### Admission to courses with a limited number of participants

- (1) The courses of the master's degree programs Mathematics and Technomathematics may be limited in the number of participants for the reasons stated in § 59 paragraph 2 sentence 1 HG.
- (2) The determination of the limitation of the number of participants as well as a maximum number of participants for the respective courses is made by the Faculty Council of the Faculty of Mathematics and is announced in an appropriate manner.
- (3) If the number of applicants exceeds the admission capacity, the dean or a lecturer appointed by him or her, with the participation of the Faculty Commission for Teaching and Studies, shall regulate admission upon application by the respective lecturer. Applicants are to be considered in the following order:
  - 1. Students who, as part of their chosen program of study, are required by their course of study to attend the course at that time.  
 On the one hand, students for whom the course is intended according to the module descriptions of the module handbook and the study plan in the semester in which the course is offered, on the other hand, students who are in the last semester of their studies according to the standard period of study or in a later semester and need the course in order to complete their studies in the standard period of study or in a timely manner.
  - 2. Students who, according to their course of study, are not dependent on attending the course at that time in the course of study they have chosen, or students admitted as secondary students according to § 52 paragraph 2 HG who, according to their course of study, are dependent on attending the course at that time in the course of study they have chosen.
  - 3. Students who are admitted to the respective course as secondary students according to § 52 paragraph 2 HG.
  - 4. Other students of the Technical University of Dortmund, provided they meet the requirements for participation in the course.
- (4) If a selection is necessary within a group, the applicants shall be considered in the following order:
  - 1. Students with a long-term or permanent disability, chronic illness or with care requirements (care and upbringing of children within the meaning of the § Section 25 (5) of the Federal Education and Training Assistance Act (Bundesausbildungsförderungsgesetz), care of a spouse, a registered partner or a relative in the direct line or a first-degree relative by marriage, insofar as the latter is in need of care).
  - 2. Students for whom it is mandatory to repeat a course in the module in question.
  - 3. After exhaustion of the remaining criteria, the decision will be made by lot.
- (5) The existence of the conditions related to the criteria according to paragraph 4 number 1 and number 2 must be asserted by the applicants themselves in the course of the application procedure within specified published deadlines to the dean.

- (6) The Faculty of Mathematics shall ensure, within the limits of the resources available, that the students referred to in paragraph 3, point 1, as a rule suffer no loss of time, or at most a loss of time of one semester, as a result of the limitation of the number of participants.

## § 8

### Exams

- (1) Each module is generally completed with at least one examination. As a rule, the module is completed by a graded module examination. Exceptionally, a module can also be successfully completed by cumulative graded partial performances. Partial performances are rendered within the framework of individual courses. The respective types of examination (module examination or partial performances) can be found in the appendix to these examination regulations.
- (2) Module examinations or partial examinations are carried out during the course of study, in particular in the form of written examinations, presentations or seminar papers, homework, oral or electronic examinations or in electronic communication, portfolios, poster or project presentations with or without a disputation and practical examinations. The respective responsible lecturers may determine other suitable forms of examination with the approval of the chairperson of the examination board.
- (3) A module examination shall be conducted in the same semester in which the last course belonging to this module takes place. A repeat date shall be offered in the same or the following semester at the latest.
- (4) For modules whose courses with essentially the same subject content are held at least once a year (e.g. compulsory modules), the respective examinations in accordance with paragraph 3 are at the same time repetition dates for candidates who have failed examinations for this module at the first two dates.
- (5) For modules whose courses are not held regularly with the same subject content (e.g. elective modules), a second repetition date is offered. There is no entitlement to further repetitions.
- (6) The type, form and scope of the module examinations or the partial performances are specified in the module descriptions and are announced - as well as the examination dates - by the respective responsible lecturers or examiners in good time at the beginning of the course. The registration period for examinations organized by the Faculty of Mathematics is at least one week and usually ends one week before the examination. The lecturer responsible for the course will inform the students about the registration process at the beginning of the course. Cancellation without giving reasons is possible for oral examinations up to one week before the beginning of the respective examination, for written examinations up to one day before the beginning of the respective examination. In the case of seminars, the first seminar date is considered the start of the examination.
- (7) The dates for written examinations are set by the instructor in consultation with the examination board and are to be announced as early as possible, but no later than four weeks before the end of the lecture period. Time slots for oral examinations will be announced at least four weeks prior to the earliest examination date. Individual dates will be announced one week before the examination.
- (8) For module examinations, a processing time of one to four hours is to be provided for written examinations and a duration of 20 to 45 minutes for oral examinations. For partial performances, processing times of one to three hours are to be provided for written examinations and a duration of 15 to 30 minutes for oral examinations.
- (9) Admission to the module examinations or partial performances requires that the examinations described as prerequisites in the corresponding overview in the appendix have been successfully passed.

- (10) The written examinations are conducted under supervision and are not open to the public. Any permitted aids will be announced in good time by the respective lecturer prior to the examination.
- (11) As a rule, written examinations are graded by the respective teachers. Examination performances in written or oral examinations with which a degree program is completed, and in repeat examinations for which no compensation option is provided in the event of a final failure, are to be evaluated by at least two examiners as defined in § 13 (§ 65 paragraph 2 HG). The assessment of written examinations shall be communicated to the students after two months at the latest.
- (12) Examinations that are to be taken in whole or in part using the answer-choice method (so-called "single choice" or "multiple choice") are also part of the written examinations. Particularly when using this method, care must be taken to ensure that the examination tasks are based on the content and knowledge imparted in the modules or the corresponding courses, and that they enable reliable examination results. In the case of examinations which are to be assessed by two examiners, at least two examiners shall jointly determine which solutions are to be recognized as correct when preparing the examination questions. Tasks or sub-tasks that have not been solved correctly may not be assessed with minus points. In the case of an examination which is to be carried out entirely or predominantly in the answer-choice procedure, the examiners must also announce the number of points sufficient for passing the examination (§ 18, Paragraph 3) together with the aids (Paragraph 10, Sentence 2).
- (13) Oral examinations shall be taken as individual examinations in the presence of several examiners or one examiner and an expert assessor. If an oral examination is taken in the presence of one examiner, the examiner must hear the assessor before determining the grade in accordance with Section 18 (1). If an oral examination is taken in the presence of two examiners, each examiner shall determine an individual grade for the oral examination performance in accordance with § 18, paragraph 1. The grades for the oral examination performance shall be determined from the arithmetic mean of the two individual grades in accordance with Section 18 (7).
- (14) The essential items and results of the oral examination are to be recorded in a protocol. The result of the examination shall be announced to the students following the oral examination. Students who wish to take the same examination at a later date shall be admitted as listeners in accordance with the space available, unless the student to be examined objects. Admission does not extend to the deliberations and the announcement of the examination results. In the event of influencing or disrupting the examination, these persons may be excluded as listeners by the examiner.
- (15) In modules that conclude with a module examination, course achievements may be required in the individual courses. These can be in particular: presentations, homework, internships, practical exercises, written or oral performance reviews, lectures, protocols or portfolios. The requirements of a course credit are in form and extent below the requirements of a module examination or partial performance. If the form of the course work is not defined in the module descriptions, it will be announced by the lecturer at the beginning of the course. Course work can be graded or assessed as passed or failed. § 18 paragraph 3 b does not apply. The prerequisite for participation in the module examination is the successful completion of all coursework required in this module. Accordingly, the academic achievements must have been graded with at least "sufficient" (4.0) or assessed as "passed".
- (16) The obligation of regular attendance may be provided for courses whose learning objective cannot be achieved without the active participation of the students. When regulating compulsory attendance, the constitutional requirement of proportionality must be observed. A decision on compulsory attendance is made either on the basis of a vote on the matter by the Student Advisory Board or on the basis of a two-thirds majority of the Faculty Council. The compulsory attendance is to be indicated in the module description in the module handbook. The exact form of compulsory attendance is announced to the students in an appropriate form at the beginning of the course.

## § 9

### Disability compensation

- (1) If students provide a medical certificate showing that they are unable to take an examination in whole or in part in the prescribed form, duration or time limit due to a long-term or permanent disability or chronic illness, the chairperson of the examination committee shall determine the other form, duration or time limit in which the examination is to be taken. This also applies to the acquisition of a participation requirement. Furthermore, deviations may be provided with regard to the use of aids or assistants as well as to the number of and requirements for the repetition of examination performances. In the case of persons with a disability or chronic illness, it should cover all examinations to be taken during the course of study, unless a change in the clinical picture or disability is to be expected. In case of doubt, the responsible person or office for questions concerning the interests of disabled students (e.g. the "Disability and Studies" department within the Center for Higher Education at the Technical University of Dortmund) should be involved.
- (2) Compensation for disadvantages is granted on a case-by-case basis upon application to the Examination Committee; the application must be submitted to the Central Examination Administration. Examination procedures take into account periods of absence due to the care and upbringing of children within the meaning of Section 25 (5) of the Federal Training Assistance Act (Bundesausbildungsförderungsgesetz), the care of the spouse, the registered partner or a relative in the direct line or first-degree relative by marriage, insofar as the latter is in need of care.

## § 10

### Maternity protection

The statutory maternity protection periods and the corresponding provisions of the Maternity Protection Act apply, cf. section 64, paragraph 2, no. 5 and paragraph 2a HG NRW.

## § 11

### Repetition of examinations, passing of the Master's examination, final failure

- (1) Examination performances can be repeated twice if they have not been passed or are deemed to have been failed. If a partial performance is not passed, only this performance is to be repeated. For reasons of comparability and fairness, repeated examinations must be conducted in the same form as the first attempt. Examinations that have been passed cannot be repeated.
- (2) In deviation from paragraph 1, the master's thesis can only be repeated as a whole and then only once with a new topic. Returning the topic of the Master's thesis in accordance with § 19 Paragraph 8 is only permitted if the candidate did not make use of this option when preparing the unsuccessful Master's thesis.
- (3) In the case of elective modules, failure can be compensated for by successfully completing another compulsory elective module in each case.
- (4) The Master's examination is passed if all 120 credit points from the course-related examinations and for the Master's thesis have been acquired.
- (5) The Master's examination as a whole is definitively not passed if
  - a. the Master's thesis is again failed after repetition or is considered as failed or
  - b. the required minimum number of credit points can no longer be acquired or
  - c. a compulsory module has been definitively failed.
- (6) If the Master's examination has been definitively failed or if an examination is deemed to have been definitively failed, the chairperson of the examination board shall notify the candidate of this in writing. The notification shall be accompanied by instructions on how to appeal. Upon application, the candidate will be issued a certificate of the successfully



passed examinations; the addition that this certificate is not valid for presentation at another university will be included.

## § 12

### Audit Committee

- (1) For the organization of the examinations and the tasks assigned by these examination regulations, a joint examination board is formed for the study programs Mathematics and Technomathematics.
- (2) The examination board according to paragraph 1 consists of seven members, namely four members from the group of university professors, one member from the group of academic staff and two members from the group of students. The members are elected by the Faculty Council separately according to groups for two years, the members from the group of students for one year. The examination board elects the chairperson and the deputy chairperson from among its members from the group of university teachers. Representatives are elected by the Faculty Council for the members of the Examination Committee with the exception of the chairperson and the deputy chairperson. Re-election is permitted. The composition of the examination board is announced by the dean. If the election of the examination board or individual members is declared invalid after taking office, this shall not affect the legal validity of the resolutions and official acts previously adopted.
- (3) The examination board ensures that the provisions of the examination regulations are observed and that the examinations are conducted properly. In particular, it is responsible for deciding on appeals against decisions made in the examination procedure and for coordinating inter-faculty questions and problems. In addition, the examination board has to report to the faculty regularly, at least once a year, on the development of examinations and study times. It makes suggestions for the reform of the examination regulations and the curricula. The examination board may delegate the completion of the following tasks to the chairperson: Recognition issues, admission to the Master's program, placement in higher semesters, urgent decisions, complaints, appointment of examiners and assessors, regulations on compensation for disadvantages in accordance with § 9 and determination of other forms for examination performance in accordance with § 8 paragraph 2 in consultation with the respective lecturer as well as for the extension of processing times for the Master's thesis in accordance with § 19 paragraph 7 and for the submission of the Master's thesis in an analogous procedure in accordance with § 20 paragraph 1 sentence 2). Decisions on objections and the duty to report to the Faculty Council cannot be transferred to the chairperson of the examination committee.
- (4) The examination board constitutes a quorum if, in addition to the chairperson or his or her representative and two other members from the group of university professors, at least one other voting member is present. The examination board decides by simple majority. In the event of a tie, the chairperson has the casting vote. The student members do not participate in pedagogical-scientific decisions. Such decisions include in particular the assessment, the recognition of achievements, the determination of examination tasks and the appointment of examiners and assessors.
- (5) The members of the examination board have the right to attend the taking of examinations.
- (6) The meetings of the examination board are not public. The members of the examination board, including their representatives, the examiners and the assessors are subject to official secrecy. If they are not in public service, they must be sworn to secrecy by the chairperson of the examination board.
- (7) In the performance of its duties, the Examination Committee avails itself of the administrative assistance of the Central Examination Administration of the TU Dortmund University.

### § 13

#### **Examiners and assessors**

- (1) The examination board appoints the examiners and the assessors in accordance with the legal requirements. It may delegate the appointment to the chairperson of the examination board. Lecturers at the TU Dortmund University as well as other persons authorized to examine within the meaning of § 65 paragraph 1 HG may be appointed as examiners. An assessor may be appointed who has acquired at least the qualification to be determined by the examination or a comparable qualification.
- (2) The examiners are independent in their examination activities.
- (3) Candidates may propose examiners for the master's thesis. The suggestions should be taken into consideration as far as possible. However, they do not constitute a claim.

### § 14

#### **Recognition of examination results, placement in higher semesters**

For the recognition of examination achievements and the classification into higher semesters, the currently valid regulations on the recognition of examination achievements for all Bachelor's and Master's degree programs at the Technical University of Dortmund apply.

### § 15

#### **Default, withdrawal, deception, breach of order**

- (1) An examination shall be deemed to have been graded "insufficient" (5.0) or "failed" if the candidate fails to appear at an examination date without good reason or if he or she withdraws from the examination after it has begun without good reason. The same applies if a written examination performance is not completed within the specified processing time.
- (2) The reasons asserted for the withdrawal or the failure to attend must be notified to the examination board in writing without delay and must be made credible. In the case of illness of the candidate or of a child predominantly to be cared for by the candidate, the submission of a medical certificate in German is required. In the case of illness of the candidate, the medical certificate must prove the inability to take the examination. In the case of a subsequent withdrawal from an examination taken, the medical certificate must show that the impairment of performance given during the examination was not recognizable to the student for health reasons and that there was no reasonable cause to doubt the ability to perform. If the examination board does not recognize the reasons for the withdrawal or the failure, this will be communicated to the candidate in writing.
- (3) If an examination performance is influenced by deception (e.g. use of unauthorized aids, adoption of text passages without reproduction as a quotation, copying, etc.), this examination is deemed to be graded as "insufficient" (5.0) or "failed". This also applies to attempted cheating. If an attempt at deception or deception as defined in sentence 1 is detected by the invigilator during an examination, the invigilator shall record the attempt at deception or the deception. The decision as to whether there has been an attempt at deception or an act of deception and thus whether the examination has been assessed as "insufficient" (5.0) or "failed" is made by the respective examiner. A candidate who disrupts the orderly conduct of the examination may be excluded from continuing the examination by the examiner or the invigilator, as a rule after a warning. In this case, the examination in question shall be deemed to have been assessed as "insufficient" (5.0) or "failed". The respective reasons for the decision shall be recorded in the records. In serious cases of deception or disruption, the examination board may exclude the candidate from taking further examinations.
- (4) In the case of module examinations or partial performances, the examination board may require a written declaration from the candidate that he or she has written the work - in the case of a group work, an appropriately marked part of the work - independently and has not

used any sources and aids other than those indicated, and has marked verbatim and analogous quotations. § 19 paragraph 10 remains unaffected.

- (5) The candidate can demand within a period of 14 days that decisions according to paragraph 3 be reviewed by the examination board. The candidate must be informed immediately in writing of any incriminating decisions, the reasons for them and instructions on how to appeal. Before the decision is made, the candidate must be given the opportunity to be heard.

## **II. Master's examination**

### **§ 16**

#### **Admission to the Master's examination**

- (1) Upon enrollment in the Master's degree programs in Mathematics or Technomathematics at the TU Dortmund University or upon admission as a secondary student according to § 52 paragraph 2 HG, a student is considered admitted to the examinations of the Master's degree program in Mathematics or Technomathematics, unless the enrollment or admission is to be rejected according to paragraph 2.
- (2) Enrollment or admission shall be denied if.
  - a. the candidate has definitively failed an examination required by these examination regulations in the Master's degree program Mathematics or Technomathematics at the TU Dortmund University or in another degree program that has a significant content-related proximity to this degree program, or
  - b. the candidate, after having passed the examination in one of the above-mentioned degree programs, has not yet received a final and legally binding decision on the final failure due to a subsequent challenge of the examination notice.

### **§ 17**

#### **Scope of the Master's examination**

- (1) The Master's examination consists of examinations during the course of study, including the Master's thesis and an oral presentation, in which a total of 120 credit points are to be acquired. Of these, 90 credit points are in the compulsory and elective areas, a further 26 credit points are to be acquired through the master's thesis and 4 credit points through an oral presentation in which the results of the master's thesis are presented.
- (2) Modules that were used in the Bachelor's examination or recognized as additional work in the Bachelor's program may no longer be studied in the Master's program. The same applies if modules used in the Bachelor are almost identical in content to modules in the Master. At the beginning of the study program, a corresponding check is made by the examination board.
- (3) In the master's program Mathematics or Technomathematics, the respective modules listed in the corresponding overview in the appendix must be studied and successfully completed.

### **§ 18**

#### **Evaluation of the course-related examination performances, Acquisition of credit points, formation of grades**

- (1) The grades for the individual examination performances are determined by the respective examiners. The following grades are to be used for the evaluation:  
1 = *very good (sehr gut)* = an excellent performance

|   |   |   |   |   |
|---|---|---|---|---|
| 2 | = | <i>good (gut)</i>                         | = | a performance that exceeds the average requirements                                 |
| 3 | = | <i>satisfactory (befriedigend)</i>        | = | a performance that meets the average requirements                                   |
| 4 | = | <i>sufficient (ausreichend)</i>           | = | a performance that, despite its shortcomings, still meets the requirements          |
| 5 | = | <i>not sufficient (nicht ausreichend)</i> | = | a performance that, due to significant deficiencies, does not meet the requirements |

For differentiated consideration of the course-related examinations, the grades can be reduced or increased by 0.3; the grades 0.7, 4.3, 4.7 and 5.3 are excluded.

- (2) In consultation with the Examination Committee, examination performances that are not taken into account in the overall grade can be evaluated either according to the grading scale according to Paragraph 1 or according to the following simplified scale:

*passed* = a performance that at least meets the requirements

*failed* = a performance that, due to significant deficiencies, does not meet the requirements.

- (3) A written examination that has been carried out entirely by the answer-choice method is deemed to have been passed if
- 60 % of the total score to be achieved has been reached or
  - the score achieved does not fall below the average performance of the candidates who took part in the examination by more than 22%.

- (4) If the candidate has achieved the minimum number of points for the tasks in accordance with paragraph 3 and has thus passed the examination, the grade shall be as follows:

very good (1.0), if at least 75%,

very good (1.3) if at least 66.6% but less than 75%,

good (1.7) if at least 58.3% but less than 66.6%,

good (2.0) if at least 50% but less than 58.3%,

good (2.3) if at least 41.6% but less than 50%,

satisfactory (2.7) if at least 33.3% but less than 41.6%,

satisfactory (3.0) if at least 25% but less than 33.3%,

satisfactory (3.3) if at least 16.6% but less than 25%,

sufficient (3.7) if at least 8.3% but less than 16.6%,

sufficient (4.0), if none or less than 8.3 %.

of the points to be achieved in excess of the minimum score were obtained.

- (5) If a written examination is only partly carried out in the answer-choice procedure, the tasks in the answer-choice procedure are assessed according to paragraphs 3 and 4. The remaining tasks will be assessed according to the usual procedure for them. The grade of the examination paper is determined from both assessments, taking into account the proportions of the total number of points to be achieved in each case.
- (6) The number of credit points assigned to the respective module is acquired if the module has been evaluated with at least "sufficient" (4.0) or "passed".
- (7) If the module is completed by a module examination, this grade is also the module grade. In the case of partial performances, the module grade is calculated from the weighted arithmetic mean of the non-rounded grades of the partial performances taken within the framework of the respective module. The partial performances are weighted with the respective number of credit points of the associated courses.

When calculating module grades, only the first decimal place after the decimal point is taken into account; all other decimal places are deleted without rounding.

The module grades are in words:

with an average up to 1.5 = *very good*

with an average value of 1.6 to 2.5 = *good*

with an average score of 2.6 to 3.5 = *satisfactory*

with an average score of 3.6 to 4.0 = *sufficient*

with an average value from 4.1 = *not sufficient*.

- (8) In the mathematical part and in the minor subject, a subject grade is determined in each case.
- (9) If more modules are completed in the mathematical part than required according to the corresponding overview in the appendix, the modules with the lowest grades are not to be taken into account for the master's examination, taking into account the minimum requirements specified there. In case of equal grades, the modules completed later shall not be taken into account. The student may request a different consideration before completing the last examination. When calculating the subject grade in the mathematical part, the compulsory elective module with the worst grade to be taken into account is weighted, if necessary, only with the number of credit points that leads to the maximum number of credit points possible in the compulsory mathematical part.
- (10) The subject grade in the mathematical part of the Master's examination is calculated from the weighted arithmetic mean of the module grades of all graded modules of the mathematical part of the Master's examination according to the corresponding overview in the appendix, taking into account paragraph 9, sentence 3. Paragraph 7 applies accordingly.
- (11) If more modules are completed in the minor than required according to the corresponding overview in the appendix, the modules with the worst grades are not to be considered for the master's examination, taking into account the minimum requirements specified in the minor agreements. In the case of equal grades, the modules completed later shall not be taken into account. When calculating the subject grade in the minor subject, the elective module to be taken into account with the worst grade is weighted, if necessary, only with the number of credit points that leads to the required credit point total in the minor subject. The minor agreement may provide for other consideration. The student may request a different consideration prior to completion of the final examination.
- (12) The subject grade in the minor subject of the Master's examination is calculated from the weighted arithmetic mean of the module grades of all graded modules of the minor subject part of the Master's examination according to the corresponding overview in the appendix and the respective minor subject agreement, whereby the individual grades are weighted with the respective number of credit points. Paragraph 7 applies accordingly.
- (13) Subject grades in the mathematics section and the minor are not reported separately.
- (14) The overall grade of the Master's examination in the study program Mathematics is calculated from the weighted arithmetic mean of the quadruple-weighted subject grade in the mathematical part and the single-weighted subject grade in the minor subject. The overall grade of the Master's examination in the study program Technomathematics is calculated from the weighted arithmetic mean of the six-fold weighted subject grade in the mathematical part and the single weighted subject grade in the minor subject. Paragraph 7 applies accordingly.
- (15) The overall grade is simultaneously shown in the form of a degree according to the European Credit Transfer System (ECTS). In addition, ECTS grades can be shown for all graded examination achievements. This requires a corresponding resolution of the examination board.

The degrees according to ECTS are reported as follows:

A = usually the top approximately 10% of successful students;

B = usually the next approximately 25% of successful students;

C = usually the next approximately 30% of successful students;

D = usually the next approximately 25% of successful students;

E = usually the next approximately 10% of successful students.

- (16) The formation of the ECTS grades is basically done by comparing the cohorts of the last six semesters. If this group is smaller than 50 persons, the reference group is to be determined from the last 10 semesters. In principle, the current semester shall not be taken into account in the formation of ECTS grades. As long as no statistical data is available for the calculation of a relative evaluation, no ECTS grades will be shown. For reasons of legally secure awarding, a decision of the examination board may waive the display of ECTS grades. Corresponding notes appear in the final document. The composition of the comparison group shall be differentiated according to the degree and the degree program. In addition, a different composition of the comparison group can be made in objectively justified cases. This requires a corresponding resolution by the examination board.

## § 19

### Master thesis (Thesis)

- (1) The master's thesis should demonstrate that the candidate, with the specialist knowledge acquired in the master's program, is able to work independently on an in-depth problem using scientific methods within a specified period of time. For this purpose, he or she researches relevant specialist literature and evaluates it independently. The work is to be presented and documented independently in an appropriate form. The length of the thesis should not exceed 100 pages.
- (2) The master's thesis can be taken up after the acquisition of 60 credit points.
- (3) The candidate may make suggestions for the topic of the thesis. The topic is issued by the chairperson of the examination board; the time of issue is to be recorded.
- (4) The master's thesis can be issued and supervised by any university lecturer and any post-doctoral lecturer of the Faculty of Mathematics who is working in research and teaching. Other scientists who fulfill the requirements according to § 65 paragraph 1 HG can be appointed as supervisors with the approval of the examination board.
- (5) If a candidate is unable to name a supervisor, the chairperson of the examination committee will ensure that the candidate is given a topic for the master's thesis and a supervisor.
- (6) The master's thesis must always be written independently as an individual work. However, this does not preclude the topic of the master's thesis being worked on within a working group. In this case, it must be ensured that the contribution of the individual to be evaluated as an examination performance is clearly distinguishable and assessable according to objective criteria and fulfills the requirements according to paragraph 1. The number of pages specified in paragraph 1 must reasonably exceed the requirements of an individual thesis.
- (7) The processing time for the master's thesis is six months. The topic and the assignment must be such that the thesis can be completed within this period. Upon justified request of the candidate, the examination board may exceptionally grant an extension of the processing time by up to three months in agreement with the supervisor. An application for an extension must be submitted to the examination board at least 14 days before the end of the processing period. In the case of illness, the deadline for submission can be extended by a maximum of half of the processing time. This requires the submission of a medical certificate. The extension corresponds to the period of illness. If the duration of illness exceeds half of the processing time, the candidate will be given a new topic via the chairperson of the examination committee without recognition of an examination attempt.
- (8) The topic of the master's thesis may be returned only once and only within the first fourteen days from the issue of the topic; the master's thesis is then considered not to have been started.

- (9) The Master's thesis can also be completed in English by agreement between the examiner and the respective student. **If the field of study "Industrial Mathematics" is studied, the master thesis in the master program Technomathematics has to be written in English.**
- (10) When handing in the Master's thesis, the candidate must declare in lieu of an oath that he or she has written the thesis independently and that he or she has not used any sources or aids other than those indicated, and that he or she has indicated verbatim and analogous quotations. Unpublished contributions must also be included in the list of sources. For the affidavit, a standardized form from the Central Examination Administration is to be used and included, signed, as an integral part of the master's thesis when it is handed in.

## § 20

### Submission and evaluation of the master thesis

- (1) For the submission of the Master's thesis, the provisions of the Regulations for the Submission of Final Theses (Bachelor's/Master's) of the TU Dortmund University apply in the currently valid version. If the uploading of individual theses or parts of theses is not suitable for technical reasons and/or if there is a contractual agreement with third parties that excludes the publication of theses or parts of theses, the previous analogous procedure for the submission of theses according to paragraph 2 shall apply by decision of the chairperson of the examination board. If the master's thesis is not handed in on time, it shall be deemed to have been assessed as "insufficient" (5.0).
- (2) In the analog procedure, the Master's thesis must be submitted in writing to the Central Examination Office of the Technical University of Dortmund in due time in triplicate bound copies and additionally in an electronic version (PDF version) that can be used for a software product for plagiarism detection; the time of submission must be recorded in the files. In the case of postal delivery, the date of the postmark shall apply. If the master's thesis is not handed in on time, it is considered to have been graded as "insufficient" (5.0).
- (3) The Master's thesis is to be assessed and evaluated by two examiners. One of the examiners shall be the supervisor of the thesis. The second examiner shall be appointed by the chairperson of the examination board. The individual evaluation is to be carried out in accordance with § 18 and justified in writing.
- (4) The results of the Master's thesis shall be presented in an oral presentation to the supervisor of the thesis and an examiner according to § 13. The presentation remains ungraded.
- (5) The grade of the written thesis is formed from the arithmetic mean of the individual evaluations, provided that the difference is not more than 2.0. If the difference is more than 2.0 or if only one examiner evaluates the master's thesis with at least "sufficient" (4.0), a third examiner is appointed by the examination board to evaluate the master's thesis. In this case, the grade of the thesis is formed from the arithmetic mean of the two better grades. However, the Master's thesis can only be evaluated as "sufficient" (4.0) or better if at least two grades are "sufficient" (4.0) or better. § 18 paragraph 7 applies accordingly.
- (6) The candidate shall be informed of the evaluation of the Master's thesis as a rule three months after submission.

## § 21

### Additional qualifications

- (1) Students may take examinations in modules other than those prescribed before finally passing or failing the Master's examination. No credit points can be acquired with these examination performances.
- (2) The assessment of the examination results in these additional subjects will be included in the Transcript of Records upon application by the candidate, but will not be taken into account when determining the overall grade. The application must be made before the last Master's examination.

## § 22

### **Certificate, attestations for a change of university**

- (1) The candidate receives a certificate for the passed Master's examination, which should be issued as a rule within six weeks after the assessment of the last examination performance. The certificate shall bear the date on which the last examination performance was completed. The overall grade of the Master's examination, including the ECTS grade according to § 18 paragraph 16, the topic and grade of the Master's thesis, the modules and module grades as well as the number of credit points acquired in the individual modules shall be included in the certificate.
- (2) A Diploma Supplement is attached to the certificate. It describes in particular the essential course contents on which the degree is based, the course of study, the competences acquired with the degree and the awarding university. The Diploma Supplement is issued in German and English. Furthermore, an overview of the achievements (Transcript of Records) is attached to the certificate.
- (3) At the request of the candidate, additional achievements that have not been included in the module and overall grade due to exceeding the maximum limits of credit points within a module will be shown on the transcript of records. In addition, voluntary internships completed during the course of study, which have been approved upon application via the examination board and which have a content-related and subject-related connection to the chosen course of study, can also be included.
- (4) At the candidate's request, a certificate of the examination achievements already made (grade certificate) will also be issued before completion of the Master's examination, which contains a list of the successfully completed modules with the acquired credit points and examination achievements and the grades according to § 18 paragraph 1 as well as the corresponding grades according to ECTS according to § 18 paragraph 16.
- (5) The certificate is signed by the chairperson of the examination board and bears the seal of the Faculty of Mathematics.
- (6) The certificate and other certificates will also be issued in English at the candidate's request in consultation with the examination board.

## § 23

### **The Master's diploma**

- (1) The candidate is issued a Master's diploma with the date of the certificate in German and English. The Master's diploma shall certify the award of the Master's degree in accordance with § 4. The degree program and, in the case of the Technomathematics degree program, the selected field of study "Industrial Mathematics" of the graduate must be indicated in the Master's certificate.
- (2) The Master's diploma is signed by the Dean of the Faculty of Mathematics and the Chairperson of the Examination Committee and bears the seal of the Faculty of Mathematics.

## **III. Final provisions**

## § 24

### **Invalidation of examination results and revocation of the master's degree**

- (1) If the candidate has cheated in an examination and this fact only becomes known after the certificate has been issued, the Examination Committee may subsequently correct the



grades for those examination performances in the performance of which the candidate cheated and declare the examination failed in whole or in part.

- (2) If the requirements for admission to an examination were not fulfilled without the candidate intending to deceive, and if this fact only becomes known after the certificate has been issued, this defect is cured by passing the examination. If the candidate has intentionally obtained admission unlawfully, the examination board shall decide on the legal consequences in compliance with the Administrative Procedure Act for the State of North Rhine-Westphalia (*Verwaltungsverfahrensgesetz für das Land Nordrhein-Westfalen*).
- (3) Prior to a decision pursuant to paragraph 1 and paragraph 2, the person concerned shall be given the opportunity to make oral or written comments.
- (4) In the event of a decision in accordance with paragraph 1 or paragraph 2 sentence 2, the incorrect certificate shall be withdrawn and, if necessary, a new one issued. A decision in accordance with paragraph 1 and paragraph 2 sentence 2 is excluded after a period of five years after the certificate has been issued.
- (5) The Master's degree shall be revoked and the certificate shall be withdrawn if it is subsequently found that it has been obtained by deception or if essential requirements for the award have been erroneously considered to have been met. The Faculty Council of the Faculty of Mathematics decides on the revocation.

## **§ 25**

### **Inspection of the examination documents**

- (1) After the announcement of an exam result, an inspection of the exam will be granted. Within the scope of the inspection, copies or other reproductions true to the original may be made. The time and place of inspection shall be determined by the examiners and announced in a suitable form at the latest when the examination results are announced. The inspection of the results of further written examination performances is granted to the students upon request. The application must be submitted to the chairperson of the examination board within one month of the announcement of the examination results.
- (2) Students shall be granted access to the examiners' reports relating to the respective examinations and to the examination records of the oral examinations upon request. The request must be submitted to the chairperson of the examination board within three months of the announcement of the examination result. The chairperson of the examination board shall determine the place and time of inspection.

## **§ 26**

### **Scope, entry into force and publication**

- (1) These Examination Regulations shall come into force with effect from October 1, 2023. They will be published in the Official Notices of the TU Dortmund University.
- (2) These examination regulations apply to all students who have been enrolled in the Master's degree program in Mathematics or Technomathematics.

Issued on the basis of the resolution of the Faculty Council of the Faculty of Mathematics dated xx.xx.2023 and the resolution of the Rectorate of the Technical University of Dortmund dated xx.xx.2023.

#### **Note**

Attention is drawn to the fact that, pursuant to Section 12 (5) of the Higher Education Act of the State of North Rhine-Westphalia (Hochschulgesetz - HG NRW), a breach of procedural or formal requirements of the university's regulatory or other autonomous law can no longer be asserted after the expiry of one year from the date of this announcement, unless

1. the order has not been duly published,

2. the rectorate has previously objected to the decision of the body adopting the regulations,
3. the formal or procedural defect has been previously notified to the university, indicating the violated legal provision and the fact giving rise to the defect,  
or
4. the legal consequence of the exclusion of objection was not pointed out in the public announcement of the order.

Dortmund, the

The Rector of the Technical University of Dortmund

Professor Dr. Manfred Bayer

## Appendix:

### I. Course of studies

#### Overview I. A: Example of a possible course of study in the master's program Mathematics

The selected semester assignment is a recommendation. The minor subject modules can have a different layout depending on the subject. Details can be found in the module handbook and the minor subject agreements. The numbers in the plan indicate the credit points of the modules / module parts.

|                     |                                  |                                  |                                  |                       |            |
|---------------------|----------------------------------|----------------------------------|----------------------------------|-----------------------|------------|
| 1st sem.<br>(30 LP) | Elective (9)                     | Elective (9)                     | Elective (9)                     | Minor (3)             |            |
| 2nd sem.<br>(30 LP) | Elective specialization<br>(9)   | Elective (5)                     | Master seminar (5)               | Minor (11)            |            |
| 3rd sem.<br>(30 LP) | Elective speciali-<br>zation (5) | Elective speciali-<br>zation (5) | Elective speciali-<br>zation (5) | Master seminar<br>(5) | Minor (10) |
| 4th sem.<br>(30 LP) | Master thesis (26+4)             |                                  |                                  |                       |            |

#### Overview I. B: Example of a possible course of study in the Master's program Technomathematics

The selected semester assignment is a recommendation. The minor subject modules can have a different layout depending on the subject. Details can be found in the module handbook and the minor subject agreements. The numbers in the plan indicate the credit points of the modules / module parts.

|                     |                                |                                   |   |           |
|---------------------|--------------------------------|-----------------------------------|---|-----------|
| 1st sem.<br>(30 LP) | Elective (9)                   | Elective (5)                      | Simulation techniques<br>(10)           | Minor (6) |
| 2nd sem.<br>(30 LP) | Elective (5)                   | Elective<br>Technomathematics (5) | Technomathematics<br>study project (15) | Minor (5) |
| 3rd sem.<br>(30 LP) | Elective specialization<br>(9) | Elective<br>Technomathematics (9) | Master seminar (5)                      | Minor (7) |
| 4th sem.<br>(30 LP) | Master thesis (26+4)           |                                   |   |           |

**See more examples at the end of the document.**

## II. study structure

### Overview II. A: Study Structure - Master's program Mathematics

| Module  | Com-pulsory / Elective | FS As-sign-ment | LP                 | graded / ungraded | Exam type                | Access re-quirement for the exam-ination <sup>1</sup> |
|---|------------------------|-----------------|--------------------|-------------------|--------------------------|---|
| <b>Mathematical part</b>  |                        |                 |                    |                   |                          |   |
| <u>Mandatory Elective Modules<sup>2</sup></u> :<br>Modules of at least <sup>2</sup> 64 LP and at most <sup>2</sup> 68 LP from the following areas:  | Manda-tory Elective    | -               | 64-68 <sup>2</sup> | graded            | Module Exam <sup>3</sup> | -   |
| <p><u>Lecture Modules:</u> MAT-301 through MAT-499, MAT-601 through MAT-799, or MAT-877 (Simulation Techniques),</p> <p><u>Master's Seminars:</u> MAT-8xy (5 credits),</p> <p><u>Business Mathematics Study Project:</u> MAT-889 (7 credit hours),</p> <p><u>Independent Scientific Work:</u> MAT-871 (5 credit hours, usually to be taken with the first supervisor of the master's thesis).</p> <p>Here must</p> <ul style="list-style-type: none"> <li>a. at least 18 LP in MAT-301 through MAT-399, MAT-601 through MAT-699 (Pure Mathematics), and of these, at least 9 LP in MAT-601 through MAT-699 (Master's in Pure Mathematics),</li> <li>b. at least 9 LP in MAT-701 through MAT-799 (Master's in Applied Mathematics),</li> <li>c. at least 5 LP by a master seminar MAT-8xy</li> </ul> <p>acquired and</p> <ul style="list-style-type: none"> <li>d. at most one study project</li> </ul> <p>can be counted.</p> |                        |                 |                    |                   |                          |   |
| Master thesis with presentation   | Duty                   |                 | 26+4               | graded            |                          | 60 LP   |
| <b>Minor</b>  |                        |                 |                    |                   |                          |   |
| <p>Minor subject modules of 22 to 26 credit points<sup>2</sup> according to separate minor subject agreements for the minor subjects<sup>4</sup> :</p> <p>Construction Mechanics &amp; Structural Engineering, Chemistry, Electrical Engineering, and Information Technology,<br/>           Computer science, physics, statistics, engineering mechanics, economics</p> <p>More detailed information on the individual minor modules can be found in the module handbooks assigned to the respective minor module.</p>   |                        |                 |                    |                   |                          |   |

**Explanatory notes to overview II. A:**

1. Admission requirements can still be study achievements according to § 8 paragraph 15. Further details are regulated in the module handbook.
2. Between 64 and 68 credit points may be earned in the mathematical mandatory elective. Depending on the number of credit points actually taken, exactly as many credit points must be taken in the minor subject section so that the credit point total is at least 90.
3. In seminars and projects, the module examination consists of an oral presentation and, if applicable, the associated paper on an agreed topic.
4. The Examination Committee may, at the request of the student, admit another minor subject related to mathematics, provided that there is a study plan approved by the organizing faculty, according to which modules amounting to at least 22 to 26 credit points must be completed.

## Overview II. B: Study structure - Master's program Technomathematics

| Module   | Com-pulsory / Elective | FS As-sign-ment | LP                 | graded / ungraded | Exam type                | Access prerequisite <sup>1</sup> to the test |
|--|------------------------|-----------------|--------------------|-------------------|--------------------------|--|
| <b>Mathematical part</b>   |                        |                 |                    |                   |                          |  |
| <u>Simulation Techniques (MAT-877)</u>   | Manda-tory             | -               | 10                 | graded            | Module Exam              | -  |
| <u>Study project Technomathematics (MAT-878)</u>   | Manda-tory             | -               | 15                 | graded            | Module Exam <sup>3</sup> | -  |
| <u>Elective Modules<sup>2</sup></u> :<br>Modules of at least <sup>2</sup> 45 LP and at most <sup>2</sup> 49 LP from the following areas:   | Manda-tory Elective    | -               | 45-49 <sup>2</sup> | graded            | Module Exam <sup>3</sup> | -  |
| <p><u>Lecture Modules:</u> MAT-301 through MAT-499, MAT-601 through MAT-799,<br/> <u>Master's Seminars:</u> MAT-8xy (5 credits),<br/> <u>Mathematics-related modules from other departments:</u> Upon application, up to 15 LP may be earned in mathematics-related lecture modules in the minor or in computer science.</p> <p>Here must</p> <ol style="list-style-type: none"> <li>At least 23 LP in MAT-301 through MAT-499, MAT-601 through MAT-799, and of these, at least 9 LP in MAT-601 through MAT-699 or MAT-701 through MAT-799 (master's specializa-tion),</li> <li>at least 5 LP by a master seminar MAT-8xy or on request by an industrial internship MAT-879</li> </ol> <p>be acquired.</p> |                        |                 |                    |                   |                          |  |
| Master thesis with presen-tation   | Manda-tory             |                 | 26+4               | graded            |                          | 60 LP  |
| <b>Minor</b>   |                        |                 |                    |                   |                          |  |
| <p>Minor subject modules of 16 to 20 credit points<sup>2</sup> according to separate minor subject agreements for the minor subjects<sup>4</sup> :</p> <p>Construction Mechanics &amp; Statics, Chemistry, Electrical and Information Engineering, Physics, Engineering Mechanics.</p> <p>More detailed information on the individual minor modules can be found in the module handbooks assigned to the respective minor module.</p>  |                        |                 |                    |                   |                          |  |

### Explanatory notes to overview II. B:

1. Admission requirements can still be study achievements according to § 8 paragraph 15. Further details are regulated in the module handbook.
2. Between 45 and 49 credit points may be earned in the mathematical mandatory elective. Depending on the number of credit points actually taken, exactly as many credit points must be taken in the minor subject section so that the credit point total is at least 65.
3. In seminars and projects, the module examination consists of an oral presentation and, if applicable, the associated paper on an agreed topic.
4. The examination board may, at the request of the student, allow another minor subject with a technomathematical connection, provided that there is a study plan approved by the organizing faculty, according to which modules amounting to at least 16 to 20 credit points must be completed.
5. The branch of study "Industrial Mathematics" in the master's program Technomathematics is offered in English.

### Overview I. B\*:

More examples of a possible course of study in the Master's program Technomathematics & "Industrial Mathematics"

### General Schedule

|                     |  |   |   |   |           |
|---------------------|--|---|---|---|-----------|
| 1st sem.<br>(30 CP) | Simulation techniques (10)                     | Elective (9):<br>Basic module<br>Num. I SciC I Opt. I   | Elective (5):<br>Specialization<br>Num. SciC Opt. | Minor (6)   |           |
| 2nd sem.<br>(30 CP) | Technomathematics study project (15)           | Elective (9):<br>Specialization (continuation to the basic module)<br>Num. II SciC II Opt. II |   | Minor (6)   |           |
| 3rd sem.<br>(30 CP) | Master seminar (5) or<br>Industrial internship | Elective (9):<br>Num. I-III SciC I-III Opt. I-III   | Elective (5):<br>Specialization<br>Num. SciC Opt. | Elective (5):<br>Specialization<br>Num. SciC Opt. | Minor (6) |
| 4th sem.<br>(30 CP) | Master thesis (26+4)                           |   |   |   |           |

|                                   |                             |                     |
|-----------------------------------|-----------------------------|---------------------|
| Numerical Methods for PDEs (Num.) | Scientific Computing (SciC) | Optimization (Opt.) |
|-----------------------------------|-----------------------------|---------------------|

### Example A: Numerical Analysis

|                     |   |              |                         |            |
|---------------------|---|--------------|-------------------------|------------|
| 1st sem.<br>(30 CP) | Simulation techniques (10)                  | Num. I (9)   | Specialization SciC (5) | Minor (6)  |
| 2nd sem.<br>(30 CP) | Technomathematics study project (15)        | Num. II (9)  | Specialization Opt. (5) |            |
| 3rd sem.<br>(30 CP) | Master seminar (5) or Industrial internship | Num. III (9) | Specialization Num. (5) | Minor (12) |
| 4th sem.<br>(30 CP) | Master thesis (26+4)                        |              |                         |            |

### Example B: Scientific Computing

|                     |   |              |                         |                         |           |
|---------------------|---|--------------|-------------------------|-------------------------|-----------|
| 1st sem.<br>(30 CP) | Simulation techniques (10)                  | SciC I (9)   | Specialization Opt. (5) | Minor (6)               |           |
| 2nd sem.<br>(30 CP) | Technomathematics study project (15)        | SciC II (9)  |                         | Minor (6)               |           |
| 3rd sem.<br>(30 CP) | Master seminar (5) or Industrial internship | SciC III (9) | Specialization SciC (5) | Specialization Num. (5) | Minor (6) |
| 4th sem.<br>(30 CP) | Master thesis (26+4)                        |              |                         |                         |           |

### Example C: Optimization

|                     |   |              |                         |                         |           |
|---------------------|---|--------------|-------------------------|-------------------------|-----------|
| 1st sem.<br>(30 CP) | Simulation techniques (10)                  | Opt. I (9)   | Num I (9)               | Minor (4)               |           |
| 2nd sem.<br>(30 CP) | Technomathematics study project (15)        | Opt. II (9)  |                         | Minor (6)               |           |
| 3rd sem.<br>(30 CP) | Master seminar (5) or Industrial internship | Opt. III (9) | Specialization Num. (5) | Specialization SciC (5) | Minor (6) |
| 4th sem.<br>(30 CP) | Master thesis (26+4)                        |              |                         |                         |           |

|                                   |                             |                     |
|-----------------------------------|-----------------------------|---------------------|
| Numerical Methods for PDEs (Num.) | Scientific Computing (SciC) | Optimization (Opt.) |
|-----------------------------------|-----------------------------|---------------------|