

Statutes of the Doctoral School Mathematics and Scientific Computing

These statutes are a translation of the legally valid German original, see https://www.tugraz.at/fileadmin/public/Studierende_und_Bedienstete/Information/Doctoral_Schools/DrSchool_Mathematik_Statuten_062020.pdf. They apply to Ph.D. students starting from October 2020. The previous English language version of the statutes can be found here: https://www.tugraz.at/fileadmin/public/Studierende_und_Bedienstete/Information/Doctoral_Schools/Statutes_Doctoral_School_08_Mathematics_English.pdf.

Introduction

The doctoral school *Mathematics and Scientific Computing* is a joint effort of the mathematical departments of Graz University of Technology (TU Graz) and Graz University (KFU Graz). It is an international doctoral school, and its language is English. These statutes apply to TU Graz students and are based on the curricula for doctoral studies implemented at both TU Graz and KFU Graz.

The doctoral school aims to intensify scientific cooperation between the universities involved, which includes the joint advising of dissertations. Students are encouraged to take classes offered at both universities in order to broaden their mathematical education.

The doctoral school consists of those employees of TU Graz who are members of participating institutes and hold a *venia docendi*. Doctoral students advised by them are likewise members. Further employees of TU Graz can become members if they hold a *venia docendi* in a mathematical field.

The coordinating team of the doctoral school together with the Dean of Studies are responsible for implementing the curriculum, in particular the details specific to the subject of Mathematics and Scientific Computing according to §3(4) of the curriculum. The curricula that apply are *Doktoratsstudium der Technischen Wissenschaften* and *Doktoratsstudium der Naturwissenschaften*.

1. Subject Area

Doctoral studies in the Doctoral School *Mathematics and Scientific Computing* involve the scientific investigation of topics in Mathematics and closely related subjects. The education of Ph.D. students includes research performed by the student.

2. Academic Degree

Depending on which of the two possible curricula applies, after the successful defense of their thesis, students are awarded either the degree of *Doktor der Technischen Wissenschaften*, female form: *Doktorin der Technischen Wissenschaften*, or the degree *Doktor der Naturwissenschaften*, female form: *Doktorin der Naturwissenschaften*. These degrees are abbreviated as *Dr. techn.* resp. *Dr. rer. nat.* Both are translated to English as *Ph.D.*

3. Aims and Scope

During their doctoral studies, students acquire in-depth knowledge in their field and in Mathematics in general as well as the capability of performing independent research. They also learn how to effectively present their work. Graduates possess expert knowledge in the subject of their thesis as well as other fields of Mathematics and its applications, and they are experienced in using the scientific methodology and appropriate techniques of their field. They are qualified in assessing and using new results in the natural sciences, engineering, and other fields of applications.

4. Scientific Areas present in the Doctoral School

4.a TU Graz institutes associated with the doctoral school. The Doctoral School *Mathematics and Scientific Computing* consists of the following institutes:

- 5010 Institute of Analysis and Number Theory,
- 5040 Institute of Applied Mathematics,
- 5050 Institute of Discrete Mathematics,
- 5060 Institute of Statistics,
- 5070 Institute of Geometry.

The following subject areas are present: algebra and number theory; analysis; discrete mathematics; numerical analysis and applied mathematics; probability theory, statistics, financial mathematics; geometry, topology and applications; optimization and operations research.

4.b Partners. The Institute of Mathematics at KFU Graz is part of the doctoral school. The cooperation within the framework of the doctoral school extends the cooperation existing in bachelor and master studies. Students enrolled in one of the participating universities are encouraged to take classes at the other university. This continues the existing joint curricula at both the bachelor and master level. Classes according to § 6 (3), 1–2 of the curriculum (*scientific methods and communication*) are offered jointly by TU Graz and KFU Graz.

5. The Coordinating Team of the Doctoral School

The coordinating team of the Doctoral School *Mathematics and Scientific Computing* consists of a member and a deputy member nominated by each of *Professorenkurie*, *Mittelbaukurie*, *Studierende* (professors, other teaching staff, students). The duties of the coordinating team are described by the curriculum.

Student members of the coordinating team. The student representative and deputy student representative in the coordinating team are nominated every two years. This student member of the coordinating team takes part in the planning of the scientific communication classes and must be heard in disputes according to § 4 (8) of the curriculum.

6. Guidelines for Advising and Mentoring

The curriculum in § 4 describes the doctoral studies and modalities of advising, which includes the signing of an advisory agreement and progress reports. In addition to that we specify that persons acting as mentors according to § 4 (5) of the curriculum should have a Ph.D. in the field. They do not have to be members of the Doctoral school, not even members of TU Graz.

7. Coursework

7.a Extent of coursework. The general information contained in § 6 of the curriculum is made more precise by the requirement that for students in the Doctoral School *Mathematics and Scientific Computing* coursework to the extent of 16h is required.

These comprise 10h of courses specific to the field according to § 6 (2) of the curriculum, 4h of courses on scientific methods and communication according to § 6 (3), and a 2h *privatissimum*. We again emphasize that courses are offered also at KFU Graz.

7.b Coursework specific to the field. The Doctoral School is offering the courses specified in more detail below. They are at a graduate level and assume that students are familiar with the contents of compulsory bachelor and master courses. They are intended for a broad audience and should avoid highly specialized subjects. Each is a 3h lecture. All institutes comprising the Doctoral School are to be involved in teaching these courses, and we plan to offer two to four of them each semester. The courses are:

- Grundthemen: Algebra (*algebra*),
- Grundthemen: Analysis (*analysis*),
- Grundthemen: Diskrete Mathematik (*discrete mathematics*),
- Grundthemen: Geometrie (*geometry*),
- Grundthemen: Numerische Mathematik (*numerical analysis*),
- Grundthemen: Optimierung (*optimization*),
- Grundthemen: Stochastik (*stochastics*),
- Grundthemen: Zahlentheorie (*number theory*).

Every student has to successfully complete two different items from the previous list. Students may also apply to the dean of studies to substitute courses offered by other doctoral schools if they are suitable with regard to extent, level and contents, provided this substitution is justified by the topic of the thesis.

In addition to the *Grundthemen* courses mentioned above, students need to take elective subjects to the extent of 4h. To that purpose each year individual master level courses are designated as suitable for the Doctoral School. Students are free to choose among these courses with the exception that a course does not count as Ph.D. coursework if it has already been used to fulfill the requirements for a different degree, e.g. at the master level.

7.c Scientific methods and communication. These courses are described by § 6 (3), 1–2 of the curriculum. Students are required to choose 2h each of *Wissenschaftliches Arbeiten* and *DissertantInnenseminar* (i.e., doctoral school seminar). This seminar is used by students to present the results of their Ph.D. work, and also to introduce new students to the Doctoral School.

8. Publications

It is assumed that parts of the thesis are published already before submitting the thesis. § 5 (6) of the curriculum is made more precise by the following rules: if at the time of submission of the thesis there are fewer than two accepted publications, the thesis needs three reviews instead of two. Only international peer-reviewed publications in the field count, like journals and competitive conference proceedings. The coordinating committee of the Doctoral School is responsible for checking if these criteria are met.

9. Guidelines regarding the contents of the thesis

Ph.D. theses are to be written in English, and they must conform to the layout guidelines published by the dean's office. According to § 5 (6) of the curriculum it is permitted to use publications in unchanged form as parts of the thesis. In that case the thesis must contain an additional introductory chapter about the topics of these publications and how they are related to each other.

10. Rules regarding reviewing

The reviewing of theses is governed by § 5 (2) of the curriculum. This in particular applies to the pre-assessment phase and the way reviewers are selected. In the Doctoral School *Mathematics and Scientific Computing* for each thesis two independent reviews by external reviewers are required. These reviewers must be well-established researchers in their field.

11. The Ph.D. defense

The curriculum in § 7 gives guidelines for the Ph.D. defense. These are made more precise by the following rules: the date of the defense as well as the names of the examiners must be communicated to all members of the Doctoral School two weeks prior to the defense. The defense is a public event and its date and time must be chosen accordingly. It consists of two parts:

- (1) A 30–45 min presentation by the Ph.D. student about the thesis work. All members of the Doctoral School are invited to take part. After the presentation members of the audience may ask questions.
- (2) An oral exam by a committee consisting of a chair and two examiners. Each examiner is to ask questions for 20–25 min, and also the chair may do so. The nature of this exam is exactly what the term “defense of the thesis” suggests, with questions pertaining to the thesis and the (narrower) field of research the thesis is about.

12. Confidentiality.

All members of the Doctoral School are required to keep confidential all information they obtain via the Doctoral School. This applies to progress reports and comments on progress reports and in particular to the review process. It also applies to the contents of a thesis, if this thesis has been temporarily classified as confidential according to § 5 (7) of the curriculum.

13. Transition to the 2019 curriculum.

Here § 9 of the curriculum applies. These statutes are valid for students subject to the 2019 curriculum (either *Doktoratsstudium der Technischen Wissenschaften*, or *Doktoratstudium der Naturwissenschaften*) which takes effect on October 1, 2020. Regular Ph.D. students subject to the previous version of either curriculum when they started their Ph.D. may voluntarily transition to the new curriculum. Otherwise the latest date to defend their thesis is September 30, 2024.