## Complete Version from 1 October 2014

Curriculum for the
### Doctor of Philosophy Programme Mathematics
at the Faculty of Mathematics, Computer Science and Physics
of the University of Innsbruck

### § 1  Qualification profile and programme objectives

(1)  The Doctor of Philosophy Programme Mathematics belongs to the group of studies in the engineering sciences.

(2)  Graduates of the Doctor of Philosophy Programme Mathematics have a systematic understanding of their research discipline and are able to use the methods employed by the research in this field.

(3)  Graduates of the Doctor of Philosophy Programme Mathematics are able to pursue independent research in a special field of mathematics or the didactics of mathematics. They are prepared for careers in mathematical research in the industry, in business and public service and for teaching as well as research assignments at universities or other post-secondary education and research institutions.

(4)  Through their submission of an original piece of scientific work, graduates of this programme have made their own contribution to research which widens boundaries of knowledge and is conform to the evaluation standards of international experts. They identify scientific questions and independently subject them to critical analysis.

(5)  Graduates are capable of independently designing and carrying out significant research projects with scientific integrity and are also qualified to reflect on these processes in terms of the philosophy of science.

(6)  Graduates are particularly able to reflect on questions critically, to participate in objective discourse, and to work creatively.

(7)  Graduates of the Doctor of Philosophy Programme Mathematics are able to look beyond the boundaries of their own discipline and to constructively integrate in inter-disciplinary scientific discourse

### § 2  Length and scope

The Doctor of Philosophy Programme Mathematics takes three years (six semesters), which equals 180 ECTS-Credits.

**§ 3    Admission**

(1)    Valid proof of the necessary academic level for admission to the Doctor of Philosophy Programme Mathematics must be provided. This includes proof of completion of relevant diploma or master programmes, of completion of relevant diploma or master programmes at a university of applied science or completion of other equivalent studies at an accredited Austrian or non-Austrian post- secondary educational institution. If equivalency is given in principle, and only a few elements are missing for full equivalency, the rector's office is entitled to combine the determination of equivalency with the obligation to pass certain examinations in the course of the Doctor of Philosophy programme Mathematics.

(2)    Relevant studies are in any case

    1.  the Diploma Programme Technical Mathematics at the University of Innsbruck,

    2.  the Master Programme Technical Mathematics at the University of Innsbruck,

    3.  the Academic Teacher Training Programme with Diploma Thesis for the School Subject of Mathematics at the University of Innsbruck


**§ 4    Types of courses and maximum number of students per course**

(1)    Courses without continuous assessment:

Lectures (VO) are courses held in lecture format. They introduce the research areas, methods and schools of thought for a given subject.

(2)    Courses with continuous assessment:

Seminars (SE) provide in-depth treatment of scientific topics through students' presentations and discussion thereof. Maximum number of participants: 30


**§ 5    Procedure for the allotment of places in courses with a limited number of participants**

Students whose study time will be prolonged if they are not admitted are to be given priority.


**§ 6    Modules**

The following compulsory modules with a total of 30 ECTS-Credits are to be taken:

| 1. | **Compulsory Module: Doctoral Thesis Defense** | h | ECTS-Credits |
|---|---|---|---|
| | Final oral dissertation defense before an examination Board. | - | 5 |
| | **Total** | **-** | **5** |
| | **Learning objectives of the module:** Presentation, reflection on, and analysis of the dissertation results in the overall context of the doctoral programme; the focus is on summarizing and explaining results of the research project, on presenting the increase in knowledge for the discipline, on demonstrating evaluation and method competences, as well as on presenting results. | | |
| | **Prerequisite(s):** successful completion of all other modules and positive evaluation of the dissertation. | | |

| 2. | Compulsory Module:Scientific Basics/Core Skills of the Thesis Topic | h | ECTS-Credits |
|---|---|---|---|
| a. | **SE Field of Dissertation** | 2 | 5 |
| b. | Further courses amounting to 5 ECTS-Credits are to be completed according to the determination of the dissertation agreement. | - | 5 |
| | **Total** | **2** | **10** |
| | **Learning objectives of the module:** Having successfully completed this module, students are able to discuss the current state of knowledge in the area of the dissertation and can critically reflect on and discuss issues with experts of the chosen sub discipline. On this basis, they are able to make their own contributions to research. Likewise the students have interface knowledge at a high professional level which is needed for the implementation of the dissertation. | | |
| | **Prerequisite(s):** none | | |

| 3. | Compulsory Module: Participation in the Academic Discussion | h | ECTS-Credits |
|---|---|---|---|
| | Active participation in national and international scientific discourse at conferences and in the form of projects; participation in summer/winter schools. | - | 5 |
| | **Total** | **-** | **5** |
| | **Learning objectives of the module:** Becoming familiar with current research findings, presenting research results in national and international forums, acquiring basic skills in international networking and in research management and in applying for research funds; students analyse and critically assess their own research results and those of others; creation of a culture that is committed to research ethics and rejects plagiarism. | | |
| | **Prerequisite(s):** none | | |

| 4. | Compulsory Module: Interdisciplinary Seminar in the PhD Programme | h | ECTS-Credits |
|---|---|---|---|
| | **SE MIP-Seminar** | 2 | 5 |
| | **Total** | **2** | **5** |
| | **Learning objectives of the module:** Students are able to actively reflect on the current state of knowledge in the area of the dissertation and related science disciplines. They possess didactic skills which enable them to clearly present their research results in an interdisciplinary context and explain complicated correlations in a clearly understandable manner. | | |
| | **Prerequisite(s):** none | | |

| 5. | **Compulsory Module: Generic Skills** | h | ECTS-Credits |
|---|---|---|---|
| | Courses (e.g. gender and science; didactics; skills for future knowledge transfer of the subject; time management; ethics) amounting to 5 ECTS-Credits are to be completed according to the determination of the dissertation agreement. | - | 5 |
| | **Total** | **-** | **5** |
| | **Learning objectives of the module:**<br>After the successful completion of this module, students have advanced theoretical and practical knowledge and skills in selected disciplines which transcend their subject-specific competencies put them in a position to pursue independent scientific work, and help them succeed in their future careers. | | |
| | **Prerequisite(s):** none | | |

## § 7 Dissertation

(1) In the course of the Doctor of Philosophy Programme Mathematics a dissertation has to be written, which equals 150 ECTS-Credits. The dissertation is a piece of scientific work which serves to prove the student's ability to cope with scientific questions in an independent way. The dissertation topic has to be chosen from the field of mathematics or didactics of mathematics.

(2) The dissertation may also consist of articles that are related in terms of subject matter or methods. In this case, a minimum of three articles must have been accepted for publication by an acknowledged scientific journal or must have been accepted for presentation by acknowledged scientific conferences. Additionally, the student has to write an extensive summary of the subject area, the methods employed, and the results he/she has obtained; in doing so, the student must refer to the articles included in the dissertation. Moreover, a preview has to be given of the future scientific and methodical development of the topic elaborated. If the articles were written by several authors, the student's own contribution must be clearly shown and a corresponding list has to be added to the dissertation in the form of an appendix.

(3) The student has to propose a team of supervisors consisting of at least two people (dissertation committee) and to nominate one of them as the supervisor mainly responsible (with a venia docendi).It is permissible to propose supervisors (with the exception of the main supervisor) from related fields. If the dissertation belongs to didactics of mathematics, the dissertation committee must include representatives of both the didactics of mathematics and mathematics. In justifiable exceptional cases it is possible for students to propose only one supervisor.

(4) Prior to beginning the work, the student has to communicate the dissertation topic and the names of the supervisors in writing to the Director of Studies. If work on the dissertation requires monetary or non-monetary resources from university institutions, the allocation of these resources is possible only if the head of the institution has been informed of the planned allocation and has not vetoed it within one month for reasons of significant negative influences on teaching and research. Topic and supervisors are considered as accepted, if the Director of Studies does not veto them by means of a decree within one month after the receipt of the proposal.

## § 8 Examination regulations

(1) The evaluation of Modules 2, 4 and 5 is based on course examinations.

  1. Lectures are evaluated by means of a single exam at the end of the course. The lecturer is required to communicate evaluation methods and criteria (oral and/or written) before the course starts.

2. The evaluation of courses with continuous performance assessment is based on the student's regular, written and/or verbal contributions. The lecturer is required to communicate evaluation methods and criteria before the course starts.

(2)   Module 3 is evaluated by the main supervisor on the basis of a performance report written by the student. A positive grade has to read "participated with success"; a negative grade has to read "participated without success".

(3)   The evaluation of module 1 (Doctoral Thesis Defense) is based on an oral exam taken before an examination board consisting of three examiners.

## § 9   Academic degree

Graduates of the Doctor of Philosophy programme Mathematics are awarded the academic degree of "Doctor of Philosophy" or "PhD", in brief.

## § 10   Implementation

(1)   This curriculum comes into force on 1 October 2009.

(2)   The modification of the curriculum published in the University of Innsbruck Bulletin of 2 June 2014, Issue 24, No 400 comes into force on 1 October 2014 and applies to all students.

**Equivalence list – Doctor of Philosophy Programme Mathematics**

Positively assessed exams, taken as part of the Doctor of Philosophy Programme Mathematics at the University of Innsbruck (curriculum published in the version of the University of Innsbruck Bulletin from 20 March 2009, Issue 47, No 205) will be recognised as equal towards the exams of the curriculum published in the version of the University of Innsbruck Bulletin from 2 June 2014, Issue 24, No 400 as follows:

(1)    The following equivalence list applies for the compulsory modules:

| Curriculum published in the version of the University of Innsbruck Bulletin from 20 March 2009, Issue 47, No 205 | | Curriculum published in the version of the University of Innsbruck Bulletin from 2 June 2014, Issue 24, No 400 | |
|---|---|---|---|
| §6, 5. | SE MIP-Seminar (h 2; 2.5 ECTS-Credits) | §6, 4 | SE MIP-Seminar (h 2; 2.5 ECTS-Credits) |
| §6, 2./3. | SE Seminar 1, 2 or 3 (h 2, 5 ECTS-Credits) | §6, 2.a. | SE Field of Dissertation (h 2; 5 ECTS-Credits) |

(2)    Individual cases, where this regulation does not apply, will be decided in order that no disadvantage shall arise for the student due to the modification.