

The English version of the curriculum for the „Doctor of Philosophy programme Mathematics“ is not legally binding and is for informational purposes only. The legal basis is regulated in the curriculum published in the University of Innsbruck Bulletin on 20 March 2009, issue 47, No. 205.

Decision of the Curriculum Committee of the Faculty of Mathematics, Computer Science and Physics on 22 January 2009, approved by Senate Decree on 5 March 2009:

On the basis of § 25 para. 1 no. 10 University Organisation Act 2002, BGBl. I (Federal Law Gazette) No. 120, most recently amended by Federal Law BGBl. I (Federal Law Gazette) No. 134/2008 and § 32 Section "Regulations of Study Law", republished in the University of Innsbruck Bulletin of 3 February 2006, Issue 16, No. 90, most recently amended by the University of Innsbruck Bulletin of 7 May 2008, Issue 42, No. 272, the following is decreed:

**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**

- (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) **Lecture (VO):** In a didactically well-designed manner, lectures provide an introduction to central concepts, results, and methods of the special area in question.
- (2) **Seminar (SE):** Seminars are courses with continuous performance assessment that focus on scientific work on the subject matter and pertinent methods by means of student presentations and discussions. Maximum number of students: 30
- (3) **Special courses (KU)** are courses with continuous performance assessment especially offered for the doctoral programme. They are adapted to the content and learning objective in question, always include intensive scientific discussions, and require active student participation. Maximum number of students: 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

- (1) The following mandatory modules – equal to 60 ECTS credits – have to be completed:

| 1 | <b>Mandatory Module: Doctoral Thesis Defense</b>   | <b>Sem. hours</b> | <b>ECTS credits</b> |
|---|--|-------------------|---------------------|
|   | Final oral dissertation defense before an examination board  | -                 | 5                   |
|   | <b>Total</b>   | -                 | 5                   |
|   | <b>Learning objectives of the module:</b><br>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 the results. |                   |                     |
|   | <b>Admission requirements:</b> positive completion of all other modules and positive evaluation of the dissertation  |                   |                     |

| 2  | <b>Mandatory Module: Analysis of Own and External Research Results</b>  | <b>Sem. hours</b> | <b>ECTS credits</b> |
|----|---|-------------------|---------------------|
| a. | <b>SE Seminar 1</b>   | 2                 | 5                   |
| b. | <b>SE Seminar 2</b>   | 2                 | 5                   |
|    | <b>Total</b>  | 4                 | 10                  |
|    | <b>Learning objectives of the module:</b><br>After completion of this module, students are familiar with the relevant literature of their special field. They are able to present topics from their dissertation area both visually and orally. |                   |                     |
|    | <b>Admission requirements:</b> none   |                   |                     |

| 3 | <b>Mandatory Module: Core Subject</b>   | <b>Sem. hours</b> | <b>ECTS credits</b> |
|---|---|-------------------|---------------------|
|   | <b>SE Seminar 3</b>   | 2                 | 5                   |
|   | <b>KU Course 1</b>  | 1                 | 2.5                 |
|   | <b>KU Course 2</b>  | 1                 | 2.5                 |
|   | <b>Total</b>  | 4                 | 10                  |
|   | <b>Learning objectives of the module:</b><br>Having successfully completed this module, students are able to actively participate in the discussion of the current state of knowledge in the area of the dissertation topic and can critically reflect on and discuss issues with experts of the chosen partial discipline. On this basis, they are able to make their own contributions to research. |                   |                     |
|   | <b>Admission requirements:</b> none   |                   |                     |

| 4 | <b>Mandatory module: Participation in Scientific Discourse</b>   | <b>Sem. hours</b> | <b>ECTS credits</b> |
|---|--|-------------------|---------------------|
|   | Active participation in national and international scientific discourse in the form of conferences and projects; participation in summer/winter schools.   | -                 | 10                  |
|   | <b>Total</b>   | -                 | 10                  |
|   | <b>Learning objectives of the module:</b><br>Students become familiar with results of current research, present research results in national and international forums, acquire basic skills in research management and in applying for research funds; they analyze and critically assess their own research results and those of others; creation of a culture that is committed to research ethics and rejects plagiarism. |                   |                     |

|  |                                     |
|--|-------------------------------------|
|  | <b>Admission requirements:</b> none |
|--|-------------------------------------|

| 5 | <b>Mandatory Module: Interdisciplinary Seminar in the PhD Program</b>   | <b>Sem. hours</b> | <b>ECTS credits</b> |
|---|---|-------------------|---------------------|
|   | <b>SE Seminar MIP</b>   | 2                 | 2.5                 |
|   | <b>Total</b>  | 2                 | 2.5                 |
|   | <b>Learning objectives of the module:</b><br>Students are able to actively reflect on the current state of knowledge in the area of the dissertation topic and related science disciplines. They possess didactic skills which put them in a position to clearly present their research results to laypersons and experts alike and to explain complicated correlations in a clearly understandable manner. |                   |                     |
|   | <b>Admission requirements:</b> none   |                   |                     |

| 6 | <b>Mandatory Module: Scientific Basics/Core Skills of the Thesis Topic</b>   | <b>Sem. hours</b> | <b>ECTS credits</b> |
|---|--|-------------------|---------------------|
|   | Courses, as defined in the dissertation agreement, equal to 15 ECTS credits have to be completed to develop the scientific basis/core competences for the dissertation topic.                      | -                 | 15                  |
|   | <b>Total</b>   | -                 | 15                  |
|   | <b>Learning objectives of the module:</b><br>After the successful completion of this module, students have the high level of subject-specific knowledge necessary for working on the dissertation. |                   |                     |
|   | <b>Admission requirements:</b> none  |                   |                     |

| 7 | <b>Mandatory Module: Generic Skills</b>   | <b>Sem. hours</b> | <b>ECTS credits</b> |
|---|---|-------------------|---------------------|
|   | Courses, as defined in the dissertation agreement, equal to 7.5 ECTS credits have to be completed. One course has to be chosen from the field of "Equality and Gender". Additionally, courses are offered which develop didactic skills and competences for subsequent subject-related knowledge transfer. Suitable options are marked in the course catalog. | -                 | 7.5                 |
|   | <b>Total</b>  | -                 | 7.5                 |
|   | <b>Learning objectives of the module:</b><br>After the successful completion of this module, students possess advanced theoretical and practical knowledge and skills in selected disciplines which exceed their subject-specific competencies and enable them to pursue independent scientific work and help them succeed in their future careers.           |                   |                     |
|   | <b>Admission requirements:</b> none   |                   |                     |

## **§ 7 Dissertation**

- (1) In the course of the Doctor of Philosophy programme Mathematics a dissertation has to be written, which equals 120 ECTS credits. The dissertation is a piece of scientific work which – in contrast to a diploma or master thesis – 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. 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, 3, 5, 6, and 7 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) Mandatory Module 4 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 Mandatory 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**

This curriculum comes into force on 1 October 2009.

For the Curriculum Committee:  
Univ.-Prof. Mag. Dr. Alexander Ostermann

For the Senate:  
Univ.-Prof. Dr. Ivo Hajnal