



# Study and Examination Regulations

Master of Science

Physics

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Please note that this is an **unofficial translation** of the Study and Examination Regulations.  
In case of inconsistency between the German and the English version, the German version of the agreement prevails.

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Study and Examination Regulations	16/2018
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Please note that this is an **unofficial translation** of the Application and Admission Regulations for the Master's Program in Physics from 4 April 2018 (AMBI. TU 16/2018, p. 151ff).

In case of inconsistency between the German and the English version the German version of the agreement prevails.

**Study and Examination Regulations for the Master's Program in Physics at Faculty II – Mathematics and Natural Sciences – of Technische Universität Berlin**

**of 4 April 2018**

On 7 March 2018, the Faculty Board of Faculty II – Mathematics and Natural Sciences – of Technische Universität Berlin adopted the following Study and Examination Regulations for the Master's Program in Physics, in accordance with Section 18 (1) no. 1 of the Constitution of Technische Universität Berlin and Section 71 (1) no. 1 of the Berlin State Higher Education Act (*Berliner Hochschulgesetz – BerlHG*), in the version of 26 July 2011 (Berlin Gazette of Laws and Ordinances [*GVBl.*], page 378), last amended by Section 6 of the *BerlHG* on 2 February 2018 (Berlin Gazette of Laws and Ordinances, page 160).

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#### I. General regulations

##### Section 1 – Scope of application

These Study and Examination Regulations govern both the objectives and organization of studies, and the requirements and conduct of examinations in the Master's Program in Physics. The program-specific provisions included herein supplement the current version of the Regulations Governing General Study and Examination Procedures (*AllgStuPO*) of Technische Universität Berlin with stipulations relating specifically to this study program.

#### Section 2 – Entry into force / expiry

(1) These Regulations shall enter into force on the day after their publication in the Official Gazette of Technische Universität Berlin (Amtliches Mitteilungsblatt).

(2) The Study and Examination Regulations for the Master's Program in Physics of 20 February 2008 (Official Gazette of TU Berlin 1/2009, pages 2–12) shall expire at the end of the sixth semester following the entry into force of these Regulations.

(3) Students who have not completed their studies at the time of expiry in accordance with Subsection 2 shall continue their studies in line with the present Regulations.

(4) Students enrolled in the Master's Program in Physics at Technische Universität Berlin prior to the entry into force of these Study and Examination Regulations shall decide within one year of the entry into force of these Regulations as to which set of regulations they wish to continue their studies under. This decision shall be irrevocable and must be filed with the relevant central office of the university administration. No decision in this regard shall be allowed once the Master's thesis has been registered.

## II. Objectives and organization of studies

### Section 3 – Learning outcomes, program content, and professional fields

(1) The aim of Physics is to attain a fundamental understanding and quantitative description of processes in nature. On the one hand, findings in the field of Physics have shaped our scientific view of the world; on the other hand, they form a significant part of the basis of all those technical developments without which our civilization today would be inconceivable. The further development of this domain of science is indispensable for addressing the technological challenges of the future. The Bachelor's and Master's programs in Physics endeavor to provide the foundations for this purpose.

(2) Building on the foundation of a broad fundamental education in Physics acquired during the Bachelor's studies in Physics, the Master's Program initially provides students with the opportunity to deepen and specialize their knowledge and skills in several of the subject's experimental and theoretical fields, which they shall select themselves. In this regard, students may choose one of three fields of study (Applied, Experimental or Theoretical Physics). This study phase is followed by one year of scientific work. To this end, students shall initially independently explore the current state of research in a topical field of Physics, while learning the current experimental or theoretical methods that are required in order to undertake research tasks in this field. In their subsequent Master's thesis, students shall apply these findings and skills in their independent processing of a question of topical scientific interest. By means of this education in independent scientific work, as well as their extensive knowledge across a wide area of Physics and Physics-related topics, graduates shall be enabled to pursue careers as scientific generalists capable of successfully meeting challenges in various fields of science and technology. Master's graduates will therefore be able to work in a broad professional field that ranges from fundamental and industrial research, application-related development, and technical sales and distribution, to functions that involve planning, review and management in industry and administration. Furthermore, the Master's degree provides graduates with the opportunity to pursue doctoral studies, particularly in the fields of Natural Sciences and Technology.

#### **Section 4 – Program start, standard period of study, and required coursework**

- (1) Students may begin their studies in the winter or summer semester.
- (2) The standard period of study, including completion of the master's thesis, is four semesters.
- (3) The required coursework in the Master's Program in Physics amounts to 120 credits.
- (4) The teaching curriculum and the entire examination procedure are structured and organized in such a way as to enable students to complete the program within the standard period of study.

#### **Section 5 – Program structure**

(1) Students have the right to individually determine the order of progression of their own course of study. However, they are obliged to comply with the provisions of these Study and Examination Regulations. Students are recommended to follow the chronology of modules set down in the proposed course schedules in Annex 2 to these Regulations. This shall not apply to obligations arising from the definition of subject-specific admission requirements for modules.

(2) Students must achieve a total of 120 credits, 90 of which are awarded for modules and 30 for the master's thesis.

(3) The compulsory part of the program is worth 34 credits and is structured as follows:

- a) Seminar (4 credits)
- b) Research phases I, II (30 credits)

The modules assigned to the different fields can be found in the module list (Annex 1).

(4) The compulsory elective part of the program has a scope of at least 36 credits (compulsory elective and elective modules must amount to a total of 56 credits) and comprises the following modules:

- (a) one compulsory elective module in Experimental Physics (at least 9 credits)
- b) two compulsory elective modules in Theoretical Physics (at least 9 credits each)
- c) a further compulsory elective module in Physics (at least 9 credits)

Students choosing "Applied Physics" or "Experimental Physics" as their field of study are only required to take one compulsory elective module in Theoretical Physics.

Students choosing "Applied Physics I" together with "Applied Physics II" in the compulsory elective part of the program are required to take the module "Applied Physics I/II" – with the latter counting as two compulsory elective modules in Experimental Physics.

The modules assigned to the different fields can be found in the module list (Annex 1).

(5) A total of up to 20 credits must be earned in elective modules. The exact number of credits is determined by the number of credits earned in the compulsory elective modules. Elective modules shall enable students to acquire additional specialized and interdisciplinary skills, as well as skills qualifying them for entry to a profession, and may be selected from the entire range of subjects offered at Technische Universität Berlin, other universities and equivalent institutions of higher education within the scope of application of the Framework Act for Higher Education (*HRG*), and

foreign universities and institutions of higher education that have been accredited as equivalent. Students are recommended to choose interdisciplinary modules. The range of selectable modules also includes modules for learning foreign languages.

(6) Students have the opportunity to choose one of three fields of study, which will be noted in the certificate:

- a) In the field of study "Applied Physics", the module "Applied Physics I/II" in the amount of 24 credits must be completed.
- b) In the field of study "Experimental Physics", compulsory elective modules from the same field in the amount of at least 24 credits must be completed.
- c) In the field of study "Theoretical Physics", compulsory elective modules from the same field in the amount of at least 24 credits must be completed, including the compulsory elective module "Quantum Mechanics II".

The compulsory elective modules required in this regard may also be taken as elective modules.

Students are required to state their chosen field of study when registering for the Master's thesis at the responsible department of the Central University Administration.

(7) In accordance with Section 33 (6) of the Regulations Governing General Study and Examination Procedures (*AllgStuPO*), the skills and knowledge to be taught in specific modules, the requirements for module examinations, and the relevant admission requirements, if any, are updated annually in the form of course-specific module catalogs and are published in the Official Gazette of TU Berlin at the beginning of the winter semester in October and the beginning of the summer semester in April.

### **III. Requirements and conduct of examinations**

#### **Section 6 – Purpose of the Master's examination**

The Master's examination determines whether a candidate has achieved the learning outcomes according to Section 3 of these Regulations.

#### **Section 7 – Master's degree**

On behalf of Faculty II – Mathematics and Natural Sciences, Technische Universität Berlin awards the academic degree "Master of Science" (M.Sc.) to students who have passed the Master's examination.

#### **Section 8 – Scope of the Master's examination, calculation of the overall grade**

(1) The Master's examination comprises the module examinations listed in the module list (Annex 1) and the Master's thesis according to Section 9.

(2) According to the principles stipulated in Section 47 of the Regulations Governing General Study and Examination Procedures (*AllgStuPO*), the overall grade is to be determined by combining the grades achieved for those examinations arising from modules taken from the module list that are marked both as graded and for inclusion in the overall grade together with the grade achieved for the Master's thesis.

#### **Section 9 – Master's thesis**

(1) As a rule, students shall complete their Master's theses during the third and fourth semesters in close connection with the Research Phase I and II modules. The Master's thesis amounts to 30 credits and is to be produced within 12 months.

In the event that important grounds exist that prevent the completion of the thesis within this time frame, and these grounds lie outside of the student's control, the examination board shall grant an extension of the deadline for so long as the grounds in question continue to exist. The total possible extension must not exceed six months. In the event that the combined extensions exceed the stipulated maximum period of extension, the student may withdraw from the examination.

(2) To apply for admission to the research phase / Master's thesis, students must present proof of successfully completed module examinations in all compulsory elective subjects and in the seminar – with no more than one missing proof of examination being admissible – to the responsible department of the Central University Administration.

(3) The topic of the Master's thesis may be rejected once, however only within the first month of being issued by the responsible department of the Central University Administration.

(4) The procedures for applying for admission to and assessment of a final thesis are regulated in the current version of the Regulations Governing General Study and Examination Procedures (*AllgStuPO*).

(5) The Master's thesis shall be evaluated by two authorized evaluators, including the supervisor. The first evaluator shall be a member of the institutes of Physics or the Center for Astronomy and Astrophysics at Technische Universität Berlin. The first evaluator shall be responsible for determining the topic of the Master's thesis, ensuring the equivalence of the topics, and making certain that the topics can be completed within the scheduled processing period. Second evaluators may also belong to other departments of Technische Universität Berlin or to cooperating research institutions. In exceptional cases that require special justification, other persons with experience in professional practice and training may also be appointed as second evaluators.

(6) Supervisors shall regularly advise students and keep themselves informed of the progress of the Master's thesis. As a rule, supervisors and students shall meet once a week to discuss the thesis. In the event that a Master's thesis is supervised by the second evaluator, the student must submit interim reports of one to two pages to the first evaluator once or twice a month.

(7) The written part of the Master's thesis shall be approximately 40 pages in length. In the context of preparing the Master's thesis, students should present the findings of their papers, for instance, at a colloquium of the supervising research group.

#### **Section 10 – Types of examination and examination registration**

(1) The types of examination and the registration procedure for module examinations are regulated by the current version of the Regulations Governing General Study and Examination Procedures (*AllgStuPO*).

(2) For elective modules studied at other faculties or institutions of higher education, the types of examination specified in the module descriptions shall apply.

#### **IV. Annexes**

Annex 1: Module list

Annex 2: Proposed course schedules

**Annex 1: Module list**<sup>1</sup>

Modules	Credits	Type of examination	Graded	Weighting in overall grade <sup>2</sup>
Compulsory modules				
Seminar	4	Without examination	No	–
Research Phase I	15	Without examination	No	–
Research Phase II	15	Without examination	No	–
Compulsory elective modules in Experimental Physics <sup>3</sup>				
Applied Physics I <sup>4</sup>	12	Oral	Yes	1
Applied Physics II <sup>4</sup>	12	Oral	Yes	1
Applied Physics I/II <sup>4</sup>	24	Oral	Yes	1
Atoms, Molecules, Cluster I/II	12	Oral	Yes	1
Electron Microscopy (9 credits)	9	Oral	Yes	1
Electron Microscopy (12 credits)	12	Oral	Yes	1
Experimental Astro Physics (9 credits)	9	Oral	Yes	1
Experimental Astro Physics (12 credits)	12	Oral	Yes	1
Solid State Physics I/II	16	Oral	Yes	1
Advanced Optics I/II	12	Oral	Yes	1
Neutron Scattering	12	Oral	Yes	1
Photovoltaic	12	Oral	Yes	1
X-Ray Physics I/II	12	Oral	Yes	1
Compulsory elective modules in Applied Physics <sup>3</sup>				
Applied Physics I/II <sup>4</sup>	24	Oral	Yes	1
Compulsory elective modules in Theoretical Physics <sup>3</sup>				
General Relativity Theory I/II	12	Oral	Yes	1
Biological Physics	10	Oral	Yes	1
Colloid Systems: Theory and Simulation	10	Oral	Yes	1
Non Linear Dynamic and Control	10	Oral	Yes	1
Non Linear Dynamic and Structure Formation	10	Oral	Yes	1
Non Linear Plasma Physics	12	Oral	Yes	1
Quantum Mechanics II	10	Oral	Yes	1
Statistical Physics in Equilibrium	10	Oral	Yes	1
Statistical Physics in Non-Equilibrium	10	Oral	Yes	1
Theoretical Astro Physics (9 credits)	9	Oral	Yes	1
Theoretical Astro Physics (12 credits)	12	Oral	Yes	1
Theoretical Festkörperphysik Physics	10	Oral	Yes	1
Theoretical Quantum Optics	10	Oral	Yes	1
Theory of Quantum Transport	10	Oral	Yes	1
Elective modules		See selected module		1 or –
Master's thesis	30	Assessment	Yes	1
Total	120			

<sup>1</sup> The module descriptions are published annually in the Official Gazette of TU Berlin at the beginning of the winter semester in October and at the beginning of the summer semester in April. The version published in the Official Gazette shall apply (see Section 33 (6) of the Regulations Governing General Study and Examination Procedures – *AllgStuPO*).

<sup>2</sup> Specification “1” means that the grade will be weighted according to the number of credits (Section 47 (6) of the *AllgStuPO*); “–” means the grade is not weighted; every further figure is a multiplication factor of the

number of credits.

3. The list of compulsory elective modules may change over time – the current list can be found online on the Physics Course Guidance webpage.
4. Students choosing Applied Physics I and II must take the module Applied Physics I/II with a total of one oral examination – and this will then be counted as two compulsory elective modules in Experimental or Applied Physics.