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**Faculty of Physics:**

Following the resolution of the Faculty Council of the Faculty of Physics on 02.06.21 and the statement of the Senate on 14.07.2021, the Presidential Board of the University of Göttingen approved the tenth amendment of the examination and study regulations for the consecutive Master's degree programme "Physics" on 22.07.2021, in the version published on 05.10.2016 (Official Announcements I No. 52/2016 p. 1384), last amended by decision of the Presidential Board on 17.02.2021 (Official Announcements I No. 9/2021 p. 133), (§ 44 section 1 sentence 2 NHG in the version published on 26.02.2007 (Nds. GVBl. p. 69), last amended by Article 4 of the Act dated 16.03.2021 (Nds. GVBl. p. 133); § 41 section 2 sentence 2 NHG; §§ 37 section 1 sentence 3 no. 5 b) NHG, 44 section 1 sentence 3 NHG).

**Examination and study regulations  
for the consecutive Master's degree programme "Physics"  
of the University of Göttingen**

**Index**

- § 1 Scope
- § 2 Objectives of the academic programme, purpose of the examination; occupational fields
- § 3 Academic degree
- § 4 Study orientation
- § 5 Start of programme; structure of the academic programme; research focuses
- § 6 Course unit types and means of transmission
- § 7 Examination board
- § 8 Examination organisation
- § 9 Subject-specific examination types
- § 10 Repeatability of examinations
- § 11 Voluntary additional module examination
- § 12 Master's thesis
- § 13 Overall result
- § 14 Study advisory service
- § 15 *Rescinded*
- § 16 Entry into force; interim regulations

Appendix    Sample curricula

## **§ 1 Scope**

(1) The "General examination regulations for Bachelor's and Master's degree programmes as well as other courses and degrees offered at the University of Göttingen" (APO) shall apply as amended to the consecutive Master's degree programme "Physics" at the University of Göttingen.

(2) This regulation specifies the further provisions for the completion of the course of studies in the consecutive Master's degree programme "Physics".

## **§ 2 Objectives of the academic programme, purpose of the examination; occupational fields**

(1) <sup>1</sup>Building on a Bachelor's programme in physics, the academic programme prepares students for independent work in research and application-oriented, physics-related occupational fields. <sup>2</sup>The extensive course of studies provides thorough scientific specialisation as well as the specialised knowledge and methodological skills that can be applied when solving challenging physical problems independently. <sup>3</sup>The methods and contents of physics will be presented in a way that promotes professional application of these proficiencies and skills in very different sectors. <sup>4</sup>The consecutive Master's degree programme is principle-oriented and allows for the rapidly changing requirements of professional practice with its selection academic profiles. <sup>5</sup>The training not only enables familiarization with the various problem presentations and varying areas of responsibility of later professional life, it also promotes effective communication with specialists with different orientations.

(2) <sup>1</sup>The master's examination determines whether the candidate have acquired the comprehensive specialised knowledge and in-depth special knowledge of the field which is required for transitioning into professional practice as a physicist and the capacity for independent academic work. <sup>2</sup>The master's examination provides a professional and research-oriented degree, which, in particular, provides the requirements for independent scientific work as part of doctoral studies.

(3) <sup>1</sup>The objective of master education is the acquisition of scientific competence which facilitates the resolution of problems in the various fields of technology, business, the financial sector and research using the methods of physics. <sup>2</sup>A variety of fields of activity are open to the successful graduate of a master's course of studies, ranging from the application and development of physical methods in the field of high technology and medicine, to complex planning and organisational tasks, to fundamental research at research institutes and universities.

### **§ 3 Academic degree**

Once the master's degree examination is passed, the University of Göttingen awards the university degree "Master of Science" (abbreviated: M.Sc.).

### **§ 4 Study orientation**

<sup>1</sup>Before the termination of each semester, the Faculty of Physics offers an information session about the Master's degree programme which provides information about the application process and the various research focuses. <sup>2</sup>An orientation event for the master programme takes place at the beginning of each semester.

### **§ 5 Start of programme; structure of the academic programme; research focuses**

- (1) The academic programme starts in the winter or summer semester.
- (2) The standard course length is 4 semesters.
- (3) The consecutive Master's degree programme "Physics" can be attended part-time.
- (4) <sup>1</sup>The academic programme includes a total of at least 120 C which are distributed as follows:

- a) 12 C for practical/lab course work,
- b) 56 C for a research focus (elective compulsory area),
- c) 10 C for the area of professionalisation,
- d) 12 C for the key competencies,
- e) 30 C for the master's thesis.

<sup>2</sup>More specific details are regulated in the module overview.

(5) <sup>1</sup>The study and examination components should be completed in compulsory, compulsory elective and elective modules. <sup>2</sup>The module index, which also contains the module overview within the meaning of § 4 section 1 sentence 1 APO, is published separately; it forms part of this examination and study regulations. <sup>3</sup>For recommendation on the appropriate academic programme structure, please refer to the study schedule enclosed in the appendix.

(6) One study focus must be successfully completed in one of the following research areas in physics (research focus):

- a) Astrophysics and geophysics (AG),
- b) Biophysics and the physics of complex systems (BK),
- c) Solid-state physics and material physics (FM),
- d) Nuclear and particle physics (KT)
- e) Theoretical physics.

(7) <sup>1</sup>Interdisciplinary key competencies will be acquired, especially in the area of methodological competencies. <sup>2</sup>Here, in the preliminary stages of the master's thesis, the

planning, implementation and performance review of scientific projects is learned in a main research practical course. <sup>3</sup>The “Networking” module, in which students take part in a congress or a conference, is intended to give students practice in making independent contact with their professional or scientific milieu. <sup>4</sup>Both modules will be completed before the master’s thesis and guided by their academic advisor. <sup>5</sup>Other key competence modules can be voluntarily selected from the university’s range in addition to these compulsory modules.

## **§ 6 Course unit types and means of transmission**

The modules offered in the Master's degree programme are comprised of course units of the following types:

- a) lectures (V),
- b) tutorials on lectures (Ü),
- c) practical/lab courses (P),
- d) seminars (S).

a) Lectures are used for conveying fundamental and specialist scientific knowledge and methodological understanding by means of coherent presentation of larger sub-sections of subject area. They open the way to broadening and deepening knowledge in private study.

b) Tutorials will be offered in conjunction with the lectures. They give students the opportunity, in working on illustrative problems, to apply and consolidate the material they have worked on and to self-monitor their level of knowledge.

c) Practical/lab courses have the objective of conveying methodological knowledge, promoting understanding of the interrelations between facts by inductive understanding of physical interrelations and building experience by working on practical tasks. The experimental demonstration, consolidation and application of the material that has been worked on and the transmission of fundamental knowledge and skills in the implementation and evaluation of physical experiments and the interpretation of their results take place in a physics practical course.

d) Seminars address the treatment of special technical problems. In them, the students are expected to learn how to work on complex scientific questions independently and to give a talk on this in front of specialists of their own subject and other subjects in an appropriate manner and also to acquire the ability for critical scientific discussion.

## **§ 7 Examination board**

<sup>1</sup>The Faculty of Physics shall form a joint examination board for the Bachelor's degree programme "Physics" and the consecutive Master's degree programme "Physics" to organise the examinations and to perform all the responsibilities assigned by the APO and these examination and study regulations. <sup>2</sup>More specific details shall be regulated by the examination and study regulations for the Bachelor's degree programme "Physics".

## **§ 8 Examination organisation**

(1) <sup>1</sup>The implementation and organisation of the examination procedure is delegated to the Examination Office of the Faculties of Mathematics and the Natural Sciences of the University of Göttingen without prejudice to the competencies of the Dean of Studies. <sup>2</sup>It also maintains the examination records.

(2) <sup>1</sup>The location and time of module examinations shall be determined by the Dean of Studies based on proposals from the responsible examiners, communicated to the Examination Office and announced by the Examination Office in the form determined by the examination board. <sup>2</sup>The examination board shall determine a registration and deregistration period for each examination period.

(3) <sup>1</sup>Registration for module examination shall be made using the examination management system within the registration period. <sup>2</sup>Cancellation without statement of reasons (deregistration) is possible within the deregistration period; deregistration is otherwise ruled out.

## **§ 9 Subject-specific examination types**

Besides the examination components allowed according to the provisions of APO, the following subject-specific examination components can be planned:

a) Written report:

Candidates are required to keep a written report to document the contributions they made to the planning, implementation and evaluation of the projects and to keep records of the results in a technically suitable form. The written report will be assessed by the examiner leading the project.

c. Record:

Candidates are expected to keep a record which documents in writing the contributions they have independently made to the planning, implementation and evaluation of the practical course experiments and to present the results in a technically suitable written form. The record will be assessed by the examiner leading the project.

c) Poster presentation:

In a poster presentation, the contributions independently made to the research project shall be initially presented in the form of a large poster in the usual scientific manner (scientific poster). Subsequently, the results will be orally presented on the basis of the poster. The poster presentation will be assessed by the examiner leading the project.

### **§ 10 Repeatability of examinations**

(1) Notwithstanding § 16 a section 1 APO, module examinations for physics modules (module numbers B.Phy.[numerals], M.Phy.[numerals] and M.Phy-AM.[numerals]) which have been failed or are deemed to have been failed can be repeated three times.

(2) <sup>1</sup>In the consecutive Master's degree programme "Physics", up to 4 module examinations from the area of physics (module numbers B.Phy.[numerals], M.Phy.[numerals] and M.Phy-AM.[numerals]) which were passed at the first attempt can be repeated once for the purpose of grade improvement within the standard course length. <sup>2</sup>Repetition must take place in the next possible examination period for the corresponding module. <sup>3</sup>Repetition cannot lead to any devaluation of the grade.

(3) <sup>1</sup>If the Presidential Board has determined a significant impairment of university operations within the meaning of § 7 section 7 sentence 1 GO for the period of one semester, the following shall apply on application for a module examination, partial module examination or module part examination taken within that semester

a) in the case of a fail, the examination attempt used up shall be deemed not to have been taken,

b) in the case of a pass, that the examination may be repeated once for the purpose of improving the grade.

<sup>2</sup>An application in accordance with sentence 1 may not be made for several module examinations, partial module examinations or module part examinations of the same semester and not more than once for the same examination performance.

### **§ 11 Voluntary additional module examination**

(1) <sup>1</sup>The candidate is entitled to acquire a performance record and take examinations in modules (additional modules) other than those required. <sup>2</sup>They will then be listed in the certificate and in the transcript of records.

(2) Additional modules will not be considered in the calculation of the final grade for the master's examination.

### **§ 12 Master's thesis**

(1) With the written master's thesis, the candidate is expected to prove that he or she is capable of working on a physical question within the selected research focus, using established methods and within the specified time frame, arriving at scientifically substantiated results and presenting the results in a formally as well as linguistically appropriate manner.

(2) Admission to the master's thesis shall only be granted upon acquisition of a total of at least 54 C from the compulsory and elective compulsory modules of the degree programme.

(3) <sup>1</sup>The master's thesis must be produced in the field of the selected research focus; it should be begun subsequent to the corresponding main research practical course work. <sup>2</sup>The provisional topic for the master's thesis is to be coordinated with a person authorised as an examiner by the Faculty Council, who shall also supervise the work. <sup>3</sup>A research assistant can collaborate in the supervision. <sup>4</sup>If the candidate does not find an academic advisor, this and the topic of the master's thesis shall be determined by the examination board upon application from the candidate. <sup>5</sup>The candidate's view should be considered in choosing the topic. <sup>6</sup>The right to make a proposal for the choice of topic does not result in any legal entitlement.

(4) <sup>1</sup>An application must be made in text format to the examination board for admission to the master's thesis. <sup>2</sup>The following material must be enclosed with the application:

- a) evidence of fulfilment of the requirements according to section 2, insofar as the required components are not defined in the examination management system,
- b) topic proposal for the master's thesis,
- d) confirmation from the academic advisor,
- b) a proposal for two evaluators,
- e) a declaration specifying that the master's examination has not been failed definitively or registered as definitively failed in the same or comparable Master's degree programme at a domestic or foreign university.

<sup>3</sup>The proposals under letters b) and d) as well as the proof as specified under letter c) are unnecessary if the student provides assurance that he or she has been unable to find an academic advisor.

(5) <sup>1</sup>The examination board shall decide on admission. <sup>2</sup>This should be rejected if the qualifications for entry are not fulfilled or the master's examination in the same or similar degree programme at a domestic or foreign university has been definitively failed. <sup>3</sup>The examination board shall determine two evaluators for the master's thesis, taking into consideration the proposal provided by the candidate.

(6) <sup>1</sup>Upon admission, the academic advisor will issue the topic for the master's thesis. <sup>2</sup>The time of issue must be recorded.

(7) <sup>1</sup>The time to complete the thesis is 6 months. <sup>2</sup>Upon application by the candidate, the examination board can extend the deadline for submitting the thesis by a maximum of 8 weeks in the event of an important reason that cannot be attributed to the candidate. <sup>3</sup>An important

reason normally exists in the case of an illness that is to be notified immediately and demonstrated by producing a medical certificate.

(8) <sup>1</sup>The topic can be returned only once and only within the first two months of the time allotted for completing the thesis. <sup>2</sup>A new topic must be agreed on without delay. <sup>3</sup>In the event that the master's thesis is repeated, the topic may be returned only in accordance with sentence 1 if the examinee has not resorted to this option in the first submission of the master's thesis.

(9) <sup>1</sup>The master's thesis must be submitted to the Examination Office within the deadline exclusively in digital form (unprotected) via the examination administration system. <sup>2</sup>The time of submission should be recorded. <sup>3</sup>Upon submission, the candidate should declare in writing that he or she has independently compiled the work and has not used any sources and tools other than those specified.

(10) <sup>1</sup>The Examination Office shall forward the master's thesis to the evaluator. <sup>2</sup>Each evaluator will award a grade. <sup>3</sup>The duration of the assessment procedure should not exceed 6 weeks.

(11) The master's thesis must be written in English or German.

### **§ 13 Overall result**

(1) The master's examination is passed, if at least 120 credits were acquired and all of the required module examinations as well as the master's thesis have been passed.

(2) The grade point average "with distinction" will be awarded if the master's thesis is graded at least 1.3 and the grade point average of the master's examination is

- a) among the best 10% of the graduates of the previous graduation years and
- b) at least 1.3.

### **§ 14 Study advisory service**

(1) The Central Office of Student Affairs for the University of Göttingen offers an advisory service for general questions on study aptitude, course admission and subjects. Student Services also offers psychological counselling for study-related personal difficulties.

(2) <sup>1</sup>Course-related, subject-specific advice is provided by the advisor from the Office of the Dean of Studies or by the subject-specific advisors appointed by the Faculty of Physics and by the lecturers. <sup>2</sup>The course-related, subject-specific advice supports students in particular in questions of academic programme design, study techniques and the selection of study focus and in coping with study difficulties.

### **§ 15 - Rescinded -**

## **§ 16 Entry into force; interim regulations**

(1) The present regulations will come into force with retroactive effect to 01.10.2016 after their publication in the Official Announcements I of the Georg-August-Universität Göttingen.

(2) <sup>1</sup>Students who commenced their academic programme before an amendment to these examination and study regulations came into force and who have remained enrolled within this course of studies without interruption, shall be examined, upon application, on the basis of the examination and study regulations in place before the amendments came into force. The application must be made within 6 months of the amendment coming into force. <sup>2</sup>In the event that, upon application according to sentence 1, the examination and study regulations are to be applied in the version in place before an amendment to these regulations came into force, this shall not apply to module overviews and the module handbook for examinations that remain to be taken, unless preventing a breach of trust with a student would necessitate a different decision by the examination board. <sup>3</sup>A different decision can be reached especially in cases where an examination component can be repeated, or a compulsory or elective compulsory module has changed significantly or been cancelled. <sup>4</sup>The examination board can draw up general rules for this purpose. <sup>5</sup>Examinations based on a version valid prior to the coming into force of an amendment to the existing examination and study regulations will be conducted for the last time in the fourth semester after the amendment has come into force.

## Appendix Sample curricula

### 1. Research focus “Astrophysics and geophysics”

Sem. Σ C	Lab courses (12 C)	Research focus “Astrophysics and geophysics” (56 C)			Area of professionalisation (10 C)	Key competencies (12 C)
	Module	Module	Module	Module	Module	Module
1. Σ 30 C	M.Phy.1401 Advanced Lab Course I (Elective compulsory) 6 C	B.Phy.1551 Introduction to Astrophysics (Elective compulsory) 8 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 6 C		M.Phy.413 General Seminar (Compulsory) 4 C	Key competencies (Elective compulsory) 6 C
2. Σ 30 C	M.Phy.1402 Advanced Lab Course II (Elective compulsory) 6 C	M.Phy.409 Research Seminar Astro-/Geophysics (Compulsory) 4 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		Mathematics/ natural sciences (Elective compulsory) 6 C	Key competencies (Elective compulsory) 6 C
3. Σ 30 C		M.Phy.405 Research Lab Course in Astro- und Geophysics (Compulsory) 18 C	M.Phy.1601 Development and Realization of Scientific Projects in Astro- /Geophysics (Compulsory) 9 C	M.Phy.1605 Networking in Astro-/Geophysics (Compulsory) 3 C		
4. Σ 30 C		Master's thesis 30 C				
Σ 120 C	12 C	56 C (+ 30 C)			10 C	12

2. Research focus “Biophysics and physics of complex systems”

Sem. Σ C	Lab courses (12 C)	Research focus “Biophysics and physics of complex systems” (56 C)			Area of professionalisation (10 C)	Key competencies (12 C)
	Module	Module	Module	Module	Module	Module
1. Σ 30 C	M.Phy.1401 Advanced Lab Course I (Elective compulsory) 6 C	B.Phy.1571 Introduction to Biophysics (Elective compulsory) 6 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		M.Phy.413 General Seminar (Compulsory) 4 C	Key competencies (Elective compulsory) 6 C
2. Σ 30 C	M.Phy.1402 Advanced Lab Course II (Elective compulsory) 6 C	M.Phy.410 Research Seminar Biophysics/ Physics of Complex Systems (Compulsory) 4 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		Mathematics/natural sciences (Elective compulsory) 6 C	Key competencies (Elective compulsory) 6 C
3. Σ 30 C		M.Phy.406 Research Lab Course in Biophysics and Physics of Complex Systems (Compulsory) 18 C	M.Phy.1602 Development and Realization of Scientific Projects in Biophysics/ Physics of Complex Systems (Compulsory) 9 C	M.Phy.1606 Networking in Biophysics/ Physics of Complex Systems (Compulsory) 3 C		
4. Σ 30 C		Master's thesis 30 C				
Σ 120 C	12 C	56 C (+ 30 C)			10 C	12 C

### 3. Research focus “Solid-state and material physics”

Sem. Σ C	Lab courses (12 C)	Research focus “Solid-state and material physics” (56 C)			Area of professionalisation (10 C)	Key competencies (12 C)
	Module	Module	Module	Module	Module	Module
1. Σ 30 C	M.Phy.1401 Advanced Lab Course I (Elective compulsory) 6 C	B.Phy.1522 Solid State Physics II (Elective compulsory) 6 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		M.Phy.413 General Seminar (Compulsory) 4 C	Key competencies (Elective compulsory) 6 C
2. Σ 30 C	M.Phy.1402 Advanced Lab Course II (Elective compulsory) 6 C	M.Phy.411 Research Seminar Solid State/ Materials Physics (Compulsory) 4 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		Mathematics/ natural sciences (Elective compulsory) 6 C	Key competencies (Elective compulsory) 6 C
3. Σ 30 C		M.Phy.407 Research Lab Course in Solid State/Materials Physics (Compulsory) 18 C	M.Phy.1603 Development and Realization of Scientific Projects in Solid State/Materials Physics (Compulsory) 9 C	M.Phy.1607 Networking in Solid State/Materials Physics (Compulsory) 3 C		
4. Σ 30 C		Master's thesis 30 C				
Σ 120 C	12 C	56 C (+ 30 C)			10 C	12 C

#### 4. Research focus “Nuclear and particle physics”

Sem. Σ C	Lab courses (12 C)	Research focus “Nuclear and particle physics” (56 C)			Area of professionalisation (10 C)	Key competencies (12 C)
	Module	Module	Module	Module	Module	Module
1. Σ 30 C	M.Phy.1401 Advanced Lab Course I (Elective compulsory) 6 C	M.Phy.5807 Particle Physics III (Elective compulsory) 6 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		M.Phy.413 General Seminar (Compulsory) 4 C	Key competencies (Elective compulsory) 6 C
2. Σ 30 C	M.Phy.1402 Advanced Lab Course II (Elective compulsory) 6 C	M.Phy.412 Research Seminar Particle Physics (Compulsory) 4 C	B.Phy.XXXX bzw. M.Phy.XXXX (Elective) 8 C		Mathematics/ natural sciences (Elective compulsory) 6 C	Key competencies (Elective compulsory) 6 C
3. Σ 30 C		M.Phy.408 Research Lab Course in Particle Physics (Compulsory) 18 C	M.Phy.1604 Development and Realization of Scientific Projects in Particle Physics (Compulsory) 9 C	M.Phy.1608 Networking in Particle Physics (Compulsory) 3 C		
4. Σ 30 C		Master's thesis 30 C				
Σ 120 C	12 C	56 C (+ 30 C)			10 C	12 C

## 5. Research focus “Theoretical physics”

Sem. Σ C	Lab courses (12 C)	Research focus “Theoretical physics” (56 C)			Area of professionalisation (10 C)	Key competences (12 C)
	Module	Module	Module	Module	Module	Module
1. Σ 30 C	M.Phy.1404 Methods of Computational Physics (Elective compulsory) 6 C	M.Phy.5401 Advanced Statistical Physics (Compulsory) 6 C	B.Phy.5402 Advanced Quantum Mechanics (Compulsory) 6 C		M.Phy.413 General Seminar (Compulsory) 4 C	Key competencies (Elective compulsory) 6 C
2. Σ 30 C	M.Phy.1405 Advanced Computational Physics (Elective compulsory) 6 C	M.Phy.415 Research Seminar Theoretical Physics (Compulsory) 4 C	M.Phy.5403 Seminar Classical-Quantum Connections in Theoretical Physics (Elective compulsory) 4 C	M.Phy.5406 Current Topics in Theoretical Physics (Elective compulsory) 4 C	Mathematics/ natural sciences (Elective compulsory) 6 C	Key competencies (Elective compulsory) 6 C
3. Σ 30 C		M.Phy.414 Research Lab Course in Theoretical Physics (Compulsory) 18 C	M.Phy.1610 Development and Realization of Scientific Projects in Theoretical Physics (Compulsory) 9 C	M.Phy.1609 Networking in Theoretical Physics (Compulsory) 3 C		
4. Σ 30 C		Master's thesis 30 C				
Σ 120 C	12 C	56 C (+ 30 C)			10 C	12 C