



**Subject-specific study and examination regulations for the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management offered by the Faculty of Natural Sciences at Ulm University
of 7 February 2019**

Based on §§ 32 (3) sentence 1 Federal State Higher Education Act (*Landeshochschulgesetz - LHG*) in the version of article 1 of the third law on changes to higher education regulations (*Drittes Hochschulrechtsänderungsgesetz- 3. HRÄG*) of 1 April 2014 (law gazette no. 6, p 99ff) last amended by article 1 of the law of 13 March 2018 (law gazette no. 5, p. 85ff) , the Senate of Ulm University adopted the following statutes for the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management. The President of Ulm University gave his consent on 7 February 2019 in accordance with § 32 (3) sentence 1 *LHG*.

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I. General Provisions

§ 1 Scope of application (§ 1 General Framework)

- (1) These Subject-specific study and examination regulations (*FSPO*) contain specific regulations for the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management.
- (2) The *FSPO* supplements the General provisions on study and examination regulations for bachelor's and master's programmes at Ulm University (General Framework). In cases of doubt, the General Framework has precedence.

§ 2 Study programmes and academic degrees (§ 2 General Framework)

- (1) The Department of Physics at the Faculty of Natural Sciences at Ulm University offers the bachelor's programmes in Physics and Physics and Management leading to the degree of "Bachelor of Science" (in short: "BSc").
- (2) The Department of Physics at the Faculty of Natural Sciences at Ulm University offers the English-taught master's programme in Physics and the master's programme in Physics and Management leading to the degree of "Master of Science" (in short: "MSc").

§ 3 Start of the programme (§ 3 General Framework)

The bachelor's programmes in Physics and Physics and Management start in the winter semester, the English-taught master's programme in Physics and the master's programme in Physics and Management start in the winter and the summer semester.

§ 4 Standard period of study (§ 5 General Framework)

The standard period of study for the bachelor's programmes is three years; for the master's programmes, it is two years.

§ 5 Content, scope and volume of the examination according to § 6 (6) General Framework - basic knowledge examination

- (1) The examination according to § 6 (6) General Framework - basic knowledge examination in the bachelor's programmes in Physics and Physics and Management consists of a

module examination corresponding to 8 CP from the modules “Mechanics” or “Electricity and Magnetism” and a module examination corresponding to 10 CP from the modules “Higher Mathematics I” or “Higher Mathematics II”.

- (2) If students fail to pass the required module examinations defined in para. 1 by the end of the second month following the third semester in the programme, they lose their right to examination unless they are not responsible for exceeding the deadline.

§ 6 Deadlines (§ 6 (7) General Framework)

- (1) In the bachelor’s programmes the following study progress must have been achieved no later than two months after the end of the respective semester:

3. semester in the programme: minimum 60 CP

6. semester in the programme: minimum 120 CP

9. semester in the programme: Completion of the programme according to § 21 General Framework

Students lose their right to examination if they do not meet the deadlines indicated in sentence 1 unless they are not responsible for this.

- (2) Students in the master’s programmes must complete their studies no later than two months after the end of their sixth semester in the programme according to § 21 General Framework. Students lose their right to examination if they do not meet the deadline indicated in sentence 1 unless they are not responsible for this.

§ 7 Courses and examinations in English or any other foreign language (§ 7 General Framework)

§ 1 Courses and examinations can be held in German, English or any other foreign language. As a rule, courses and examinations in the bachelor’s programmes are held in German; in the master’s programme in Physics and Management, they are held in German, and in the Physics master’s programme, they are generally held in English. The Academic Affairs Committee determines the language of the course.

- (2) As a rule, exams are conducted in the course language.

§ 8 Internship (§ 8 General Framework)

(1) It is recommended that students pursue work-related activities (internship) during their studies. This internship can be done at any private and public institution in Germany and abroad suited to provide insight into professional activities. This internship should have a duration of eight or more weeks and, if possible, be done during the lecture-fee period. The application for recognition of this internship according to para. 2-4 must be submitted to the subject examination board before starting it. The internship can be recognised as a study achievement corresponding to 10 CP if students submit a certificate by the employer, draw up an internship report and present it orally.

(2) In the Physics bachelor’s programme, the internship can be recognised as an ungraded additional examination.

(3) In the Physics master’s programme, the internship can be recognised as a module in examination area D.

(4) In the bachelor’s programme in Physics and Management, the internship can be recognised as a module in the examination area H, and, in the master’s programme in Physics and Management, as a module in the examination area E.

§ 9 Subject examination board (§ 10 General Framework)

- (1) A subject examination board is formed for the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management.
- (2) The subject examination board consists of six members. It is composed of four full-time lecturers and habilitated members working full-time at Ulm University, one scientific staff member and one student member in an advisory capacity. The term of office of the student member is one year; that of the other members is three years.

§ 10 Organisation of module examinations (§ 13 General Framework)

Dates of written examinations are specified in § 13 (1) General Framework. Examiners organise other examinations themselves in terms of registration periods, withdrawal periods, date and place of the examinations.

§ 11 Related study programmes (§ 14 (2c) General Framework)

- (1) All physics programmes at higher education institutions within the scope of the General Framework are deemed to be related to the Physics programmes according to § 14 (2c) General Framework.
- (2) All physics and management programmes at higher education institutions within the scope of the General Framework are deemed to be related to the programmes in Physics and Management.
- (3) The study programmes in Physics/Physics and Management are not related according to § 14 (2) General Framework.

§ 12 Admission and requirements for the bachelor's and master's thesis (§ 16c General Framework)

- (1) The application for admission to a bachelor's and master's thesis must be submitted to the subject examination board before starting the thesis. The subject examination board checks whether the topic meets the scientific requirements of the subject.
- (2) The bachelor's thesis counts 10 CP corresponding to a six-week workload. It can be completed within a period of three months during the course of studies.
- (3) The master's thesis corresponds to 30 CP. The time allowed from admission to submission of the master's thesis is twelve months in the Physics master's programme and six months in the master's programme in Physics and Management.
- (4) The subject examination board may extend the time allowed for the completion of the bachelor's thesis by up to 2 weeks and, for the master's thesis, by up to 4 weeks if the failure to comply with the deadline does not lie within the students' responsibility. The request must be submitted to the subject examination board at least two weeks before the end of the time allowed for the completion of the thesis and requires the thesis supervisor's approval.
- (5) The topics of the bachelor's thesis in the Physics programme and of the master's thesis in the Physics programme are set by an examiner in the Department of Physics. The bachelor's thesis is, as a rule, completed at Ulm University or at the Institut für Lasertechnologien in der Medizin und Messtechnik.

- (6) The topic of the bachelor's and master's thesis in the programme in Physics and Management is set by an examiner in the Department of Physics, Economics or Mathematics at Ulm University. If students' admission to the master's programme in Physics and Management was based on a bachelor's degree in physics, the topic of the master's thesis is limited to Econophysics, Economics, Mathematics and Management or an interdisciplinary area of Physics and Economics.
- (7) With the consent of the first examiner, the bachelor's thesis in the bachelor's programmes in Physics and Physics and Management and the master's thesis in the master's programme in Physics and Management can be written in English. With the consent of the first examiner, the master's thesis in the master's programme in Physics can be written in German.
- (8) The bachelor's thesis must be submitted in one, the master's thesis in two bound copies and one digital copy as a pdf to the *Studiensekretariat* (student administration and examinations office) in due time according to § 16c (9) General Framework.

§ 13 Calculation of the final grade, evaluation of the module examinations, module handbook, attendance requirement (§ 17 General Framework)

- (1) The bachelor's thesis counts towards the overall grade of the bachelor's programme in Physics with 10 CP; the highest-graded modules count towards it with a volume of not less than 125 CP. In the calculation of the overall grade, modules with identical module results are considered according to their allocated CP in ascending order. The first module exceeding the total volume of 135 CP is fully weighted.
- (2) The master's thesis counts with 30 CP, the modules "Methodological knowledge and project planning I and II" with 15 CP respectively, and the highest-graded modules with a total volume of 30 CP towards the overall grade of the Physics master's programme. In the calculation of the overall grade, modules with identical module results are considered according to their allocated CP in ascending order. The first module exceeding the total volume of 90 CP is fully weighted.
- (3) The bachelor's thesis counts towards the overall grade of the bachelor's programme in Physics and Management with 10 CP; the highest-graded modules count towards it with a volume of not less than 136 CP. In the calculation of the overall grade, modules with identical module results are considered according to their allocated CP in ascending order. The first module exceeding the total volume of 146 CP is fully weighted.
- (4) The master's thesis counts towards the overall grade of the master's programme in Physics and Management with 30 CP; the highest-graded modules count towards it with a total volume of 49 CP. In the calculation of the overall grade, modules with identical module results are considered according to their allocated CP in ascending order. The first module exceeding the total volume of 79 CP is fully weighted.
- (5) Written examinations may not have more than 50% multiple choice questions.
- (6) If more elective modules are completed than are prescribed, these count towards the overall grade in the examination area with their actual weight. Where one module already provides the required minimum number of credit points, no further modules may be considered for the calculation of the overall grade.
- (7) The module handbooks specify which modules according to § 16 (1) and (3) and § 19 (1) and (2) may be chosen.

- (8) Admission to the exams may be subject to coursework as defined in § 6 (3) of the General Framework and specified in the module handbooks. Form and scope of the respective coursework are published in good time before the start of the course by the persons responsible for the course.
- (9) Laboratory courses offered in the Department of Physics require attendance to achieve the learning objectives and competences defined in the module handbook. Students failing to attend 100% of such course days are not entitled to taking the corresponding module examinations. This also applies if their absence is due to reasons beyond their control. If they fail to comply with their obligation to attend as defined in sentences 1 and 2 above, they are deemed to have failed their coursework; courses can be repeated without limitations. Already completed parts of previous courses can be recognised if students' absence from the course was due to reasons beyond their control.

§ 14 Repetition of module examinations (§ 20 General Framework)

- (1) In the bachelor's and the master's programme, module (part) examinations can be repeated twice. The basic knowledge examination according to § 5 as well as the bachelor's and master's thesis can be repeated only once.
- (2) A module (part) examination in the bachelor's programme in Physics in the examination areas A, B and D according to § 16 (1), in the master's programme in Physics in the examination areas B and C according to § 16 (3), in the bachelor's programme in Physics and Management in the examination areas A and B according to § 19 (1) and in the master's programme in Physics and Management in the examination areas A and C according to § 19 (2) can be repeated a third time if the first three attempts were in written form. The third repeat is conducted as an oral exam. This exam must be taken within three months of determination of the fail grade. If this exam is not taken within these three months, it is deemed to have been failed unless the student is not responsible for exceeding the deadline. The examiner is one of the examiners of the previous three exam attempts. The duration of the exam is 30 minutes.

II. Bachelor's programme in Physics and master's programme in Physics

§ 15 Objectives of the Physics programme

- (1) The Physics programme prepares students for scientific and/or engineering work in research, industry, business and in the public sector. It conveys experimental and theoretical knowledge and skills in the most important fields in physics. Physicists are capable of applying, designing and implementing -in a many-layered fashion- methods from mathematics and the natural sciences to solve practical and theoretical issues.
- (2) Graduates in the bachelor's programme in Physics have sound skills and a sound and broad knowledge base in the natural sciences and mathematics. They have acquired transferable skills such as communicative and cooperative skills, are able to independently and continuously expand their knowledge and have gained international and possibly intercultural experience. They are capable of acting in a responsible and target-oriented manner using scientific and technical advances and of familiarising themselves with new problems.
- (3) Graduates in the master's programme in Physics have in-depth knowledge and skills in some fields in physics. They have gained in-depth knowledge in special areas of experimental and theoretical physics in line with current international research. They are able to independently do scientific work, screen current technical literature and

apply it in a sub-field, plan research activities and develop solutions. They have excellent interdisciplinary skills enabling them to take on scientific tasks in peripheral areas of physics and in neighbouring disciplines. In particular, completion of the programme qualifies graduates to pursue doctoral studies.

§ 16 Study contents, admission to module examinations

- (1) The bachelor's programme in Physics consists of the following examination areas; in each, the number of credit points earned must not be less than that indicated in the last column:

	Examination area	CP
A	Experimental physics	46
B	Theoretical physics	32
C	Laboratory courses	34
D	Advanced seminar and elective area Physics	10
E	Mathematics	30
F	Minor subject	12
G	Transferable skills	6
H	Bachelor's thesis	10

- (2) To be admitted to the modules "Project laboratory course" and "Advanced laboratory course Physics I", students must have completed the "Introductory laboratory course Physics II".
- (3) The master's programme in Physics consists of the following examination areas; in each, the number of credit points earned must not be less than that indicated in the last column:

	Examination area	CP
A	Compulsory courses	12
B	Speciality Physics	18
C	Electives Physics	9
D	Master's offer in all subjects	12
E	General studies	9
F	Research phase	30
G	Master's thesis	30

- (4) For students whose admission was not based on a bachelor's degree in Physics the following applies:
- a) If the admission was based on a bachelor's degree in Physics and Management at Ulm University, in the examination area D the module "Solid-state physics" from the Physics bachelor's programme must be completed.

- b) If the admission was based on a Teacher Education bachelor's degree in Mathematics/Physics at Ulm University, the module "Solid-state physics" must be completed in examination area D and the module "Project laboratory course" must be completed in examination area E.
 - c) If admission was based on an undergraduate degree other than the ones indicated in para. 4 a) and 4 b), the admissions committee determines which modules from the bachelor's programme in Physics must be taken in examination areas D and E.
- (5) Students must register for the exams in the module "Methodological knowledge and Project planning I and II" at the same time as for the master's thesis and the exams must be assessed by one of the two examiners of the master's thesis.
 - (6) Students in the master's programme in Physics whose command of German is below qualification level DSH-1 should take at least one German language course in examination area E.

§ 17 Academic admission requirements for the bachelor's thesis in Physics and the master's thesis in Physics

- (1) A minimum of 135 CP is required to be admitted to the bachelor's thesis in Physics.
- (2) A minimum of 45 CP is required to be admitted to the master's thesis in Physics.

II. Bachelor's and Master's programme in Physics and Management

§ 18 Objectives of the programme in Physics and Management

- (1) The programme in Physics and Management prepares students for scientific and/or engineering work in research, industry, business and in the public sector. It conveys experimental and theoretical knowledge and skills in the most important fields in physics and combines these with basic and expanded expertise in selected fields of economics, also with a view to applying and transferring such theoretical-physical and mathematical concepts to economic problems.
- (2) The graduates of the bachelor's programme in Physics and Management with their acquired knowledge and skills have an interdisciplinary qualification based on a sound foundation in both the natural sciences and mathematics and economics. They have acquired transferable skills such as communicative and cooperative skills, are able to independently and continuously expand their knowledge and have gained international and possibly intercultural experience. Their interdisciplinary skills and their flexibility constitute an excellent basis for further qualification and specialisation. The study programme thus enables graduates to learn to deal with new problems and to act in a responsible and target-oriented manner in a scientific and business environment especially at the interface of technological development and its implementation in businesses.
- (3) The graduates of the master's programme in Physics and Management have expanded and deepened knowledge and skills of physics. Moreover, they have broadened their knowledge of economics and have attained the international state-of-the-art in some areas of research. They possess comprehensive skills in modelling, simulation and transferring physical-theoretical concepts to economic processes. They are able to independently do scientific work, screen current technical literature and actively apply it in sub-fields of economics, plan research activities and develop solutions. They have

highly developed interdisciplinary and generic competences. In particular, completion of the programme qualifies graduates to pursue doctoral studies.

§ 19 Study contents, admission to module examinations

- (1) The bachelor's programme in Physics and Management consists of the following examination areas; in each, the number of credit points earned must not be less than that indicated in the last column:

	Examination area	CP
A	Experimental physics	32
B	Theoretical physics	24
C	Laboratory courses and advanced seminar	15
D	Mathematics	33
E	Fundamentals of economics	24
F	Speciality Economics	12
G	Elective area Economics	12
H	Minor subject	12
I	Transferable skills	6
J	Bachelor's thesis	10

- (2) The master's programme in Physics and Management consists of the following examination areas; in each, the number of credit points earned must not be less than that indicated in the last column:

	Examination area	CP
A	Physics	16
B	Advanced seminar	4
C	Econophysics	12
D	Speciality Economics	25
E	Elective area Economics	12
F	Master's offer in all subjects	12
G	General studies	9
H	Master's thesis	30

- (3) For students whose admission was not based on a bachelor's degree in Physics and Management the following applies:

- a) If admission was based on a bachelor's degree in Physics, modules from the examination areas B and C of the master's programme in Physics must be completed in the examination area A; in examination area F, bachelor's and master's programme modules from Economics must be completed.
- b) If admission was based on a Teacher Education bachelor's degree in Mathematics/Physics at Ulm University, bachelor's and master's modules from Economics must be completed in examination area F; in examination area G, the module "Project laboratory course (master's)" must be completed.
- c) If admission was based on an undergraduate degree other than the ones indicated in para. 3 a) and 3 b), the admissions committee determines which modules must be taken in examination areas A, F and G.

§ 20 Subject-specific admission requirements for the bachelor's and master's thesis in Physics and management

- (1) A minimum of 135 CP is required to be admitted to the bachelor's thesis in Physics and Management.
- (2) A minimum of 75 CP is required to be admitted to the master's thesis in Physics and Management.

IV. Final provisions

§ 21 Effective date, transitional provisions

- (1) These study and examination regulations take effect on the day of their publication. They are published in the Official Bulletin of Ulm University. The Subject-specific study and examination regulations for the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management offered by the Faculty of Natural Sciences at Ulm University of 8 March 2017, published in the Official Bulletin no. 9 of 16 March 2017, p. 182 – 194, cease to have effect subject to para. 2.
- (2) Subject to the provision in para. 4, para. 1 sentence 3 does not apply to students who, at the effective date of this document, were enrolled in the first or a higher semester in the bachelor's programmes in Physics or Physics and Management, the English-taught master's programme in Physics or the master's programme in Physics and Management and who, in the winter semester 2018/19, fell under the Subject-specific study and examination regulations of the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management offered by the Faculty of Natural Sciences at Ulm University of 8 March 2017. Such students finish their studies in accordance with the previous Study and examination regulations subject to para. 3 and 4.
- (3) Students enrolled in the first semester in the bachelor's programme in Physics or Physics and Management, in the English-taught master's programme in Physics or in the master's programme in Physics and Management in the winter semester 2018/19 can, upon irrevocable written request by 30 April 2019 and with previous approval by the examination board, request to complete their studies under these Study and examination regulations.
- (4) § 5 (2), § 6, § 17 and § 20 of these regulations also apply to students who, in the winter semester 2018/19, were enrolled in the first or a higher semester in the bachelor's pro-

programmes in Physics or Physics and Management, the English-taught master's programme in Physics or the master's programme in Physics and Management and who complete their studies under the Subject-specific study and examination regulations of the bachelor's programmes in Physics and Physics and Management, the English-taught master's programme in Physics and the master's programme in Physics and Management offered by the Faculty of Natural Sciences at Ulm University of 8 March 2017.

Ulm, 7 February 2019

signed

Prof. Dr.-Ing. Michael Weber

-President-

Courtesy translation